

**UNIVERSITY OF CYPRUS**



**Department of English Studies**

**The development of a CLIL teaching model.  
Focusing on its effects on L2 vocabulary  
development and content knowledge**

**DOCTORAL THESIS**

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**Department of English Studies**

**The development of a CLIL teaching model.  
Focusing on its effects on L2 vocabulary  
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## **Abstract**

The current study aimed to develop a CLIL lesson delivery model for elementary school classes (CLELD). The overall aim of the study was to enable teachers to promote students' subject matter knowledge and L2 proficiency, particularly in the area of vocabulary acquisition.

Research findings in the area of CLIL implementation, effective subject-matter learning, L2 language learning, and L2 vocabulary development have been synthesized to develop a CLIL lesson delivery model for effective teaching of a non-language subject through the medium of a foreign language. Regarding language development, CLELD principles include focusing on both acquisition and learning, providing comprehensible input, promoting output production, stimulating teacher-student linguistic interaction, and keeping the affective filter down. Concerning content learning, attention needs to be drawn to lesson clarity, instructional variety, task orientation, engagement in the learning process, and moderate-to-high success rate.

The study investigates the effectiveness of the CLELD model in content and L2 vocabulary learning in elementary school classes. Further, it examines whether CLIL with CLELD involving language enhancement activities (LEA) can lead to better language proficiency in the area of L2 vocabulary knowledge and better subject matter learning, as compared to CLIL without language enhancement activities included in the CLELD, and traditional learning through L1. It is also explored whether students receiving CLIL instruction with the CLELD principles have positive attitudes towards this approach, and whether the educators who apply the guidelines of this model for lesson planning consider their teaching more effective than when not using CLELD. Finally, whether CLIL can contribute to linguistic theory is examined.

Both quantitative and qualitative data were gathered. A pre- post-test experimental research design was used to examine the academic effects of the CLELD model with LEA as compared to CLELD without LEA, and traditional learning through L1. The CLELD with LEA lessons involved language enhancement through a multiple treatment approach that which focused on new vocabulary through analytic teaching (matching target words with pictures/definitions, reading a list of new words), language games involving the new vocabulary, such as bingo, and PowerPoint presentations. Likert-type questionnaires

provided information about the students' views on the effectiveness of CLIL+CLELD delivery. Classroom interaction data shed more light on the processes leading to students' success. Interviews from the teachers who taught the CLIL lessons using both approaches gave further valuable information.

The data showed that the CLELD model promotes both subject matter learning and L2 vocabulary learning. Development in these areas appears to be significantly better in the CLELD with LEA case than CLELD without LEA or traditional learning through L1 Greek. Students and teachers confirmed this outcome. Students exhibited more positive attitudes towards CLELD with LEA than CLELD without LEA. Teachers consider their teaching more effective when following CLELD with LEA. In general, findings suggest that when CLIL is implemented considering the principles of CLELD, it can develop both language and content learning. These results may contribute to linguistic theory by suggesting that language learning grows along knowledge construction and cognitive development in the appropriate learning environment. Language learning also seems to be influenced by prior learning and the level of student motivation, which appears to be affected by effort reinforcement and active involvement in the learning process.

The study provides recommendations for promoting content and L2 vocabulary learning in CLIL environments. Directions for further research are also discussed.

## Περίληψη

Η παρούσα μελέτη είχε ως στόχο την ανάπτυξη ενός μοντέλου CLIL για διδασκαλία σε τάξεις του Δημοτικού (CLELD), το οποίο θα συμβάλλει στην προαγωγή της κατάρκτησης της γνώσης σε μη γλωσσικό μάθημα και στη βελτίωση του επιπέδου γνώσης της ξένης γλώσσας, ειδικά όσον αφορά την κατάρκτηση λεξιλογίου.

Η σύνθεση των ερευνητικών ευρημάτων στους τομείς της εφαρμογής του CLIL, της αποτελεσματικής εκμάθησης μαθήματος περιεχομένου, εκμάθησης ξένης γλώσσας, και ανάπτυξης ξένου λεξιλογίου οδήγησε στην ανάπτυξη ενός μοντέλου αποτελεσματικής διδασκαλίας μαθήματος μέσω ξένης γλώσσας. Αναφορικά με τη γλωσσική ανάπτυξη, οι αρχές που εμπεριέχονται στο CLELD περιλαμβάνουν την εστίαση στην κατάρκτηση αλλά και εκμάθηση της γλώσσας, την προσφορά κατανοητού υλικού, την προαγωγή παραγωγής λόγου, την ενίσχυση της γλωσσικής αλληλεπίδρασης δασκάλου – μαθητή και τη μείωση του συναισθηματικού φίλτρου των μαθητών. Σχετικά με την εκμάθηση μαθήματος περιεχομένου, το μοντέλο εισηγείται καθαρότητα-σαφήνεια, ποικιλία στη μεθοδολογία, προσήλωση στο στόχο, εμπλοκή στη διαδικασία μάθησης και μέτριο μέχρι υψηλό βαθμό επιτυχίας.

Η εργασία διερευνά την αποτελεσματικότητα του CLELD στην εκμάθηση μαθήματος περιεχομένου και στη βελτίωση του ξένου λεξιλογίου σε τάξεις του Δημοτικού Σχολείου. Επιπλέον, εξετάζεται εάν η διδασκαλία CLIL με CLELD, το οποίο περιλαμβάνει δραστηριότητες γλωσσικής ενίσχυσης (LEA), οδηγεί σε καλύτερο επίπεδο γλωσσικής επάρκειας στον τομέα του ξένου λεξιλογίου και σε καλύτερη εκμάθηση μαθήματος περιεχομένου σε σύγκριση με τη διδασκαλία CLIL με CLELD χωρίς δραστηριότητες γλωσσικής ενίσχυσης και με την παραδοσιακή μάθηση μέσω της μητρικής γλώσσας. Επίσης, διερευνάται κατά πόσον οι μαθητές οι οποίοι λαμβάνουν διδασκαλία CLIL με τις αρχές του CLELD έχουν θετικές στάσεις απέναντι στην προσέγγιση αυτή και εάν οι εκπαιδευτικοί οι οποίοι εφαρμόζουν τις αρχές που περιλαμβάνονται στο μοντέλο για σχεδιασμό μαθήματος, θεωρούν τη διδασκαλία τους πιο αποτελεσματική από το να μην χρησιμοποιούν το CLELD. Τέλος, εξετάζεται εάν το CLIL μπορεί να συμβάλει στη διαμόρφωση γλωσσικής θεωρίας.

Συγκεντρώθηκαν τόσο ποιοτικά όσο και ποσοτικά δεδομένα. Χρησιμοποιήθηκε πειραματική έρευνα με χορήγηση προ και μετα-διαγνωστικών δοκιμίων για εξέταση των

ακαδημαϊκών αποτελεσμάτων με τη χρήση του CLELD με LEA σε σύγκριση με τη διδασκαλία CLIL με CLELD χωρίς LEA και την παραδοσιακή μάθηση μέσω μητρικής γλώσσας. Τα μαθήματα CLELD με LEA περιλάμβαναν γλωσσική ενίσχυση με πολλαπλή παρέμβαση, η οποία γινόταν με εστίαση στο νέο λεξιλόγιο μέσω αναλυτικής διδασκαλίας (ταίριασμα λέξεων με εικόνες/ορισμούς, ανάγνωση λίστας με τις νέες λέξεις), παιχνιδιών με το νέο λεξιλόγιο όπως bingo και παρουσιάσεων PowerPoint.

Ερωτηματολόγια τύπου Likert έδωσαν πληροφορίες για τις απόψεις των μαθητών σχετικά με την αποτελεσματικότητα της διδασκαλίας CLIL. Ανάλυση λόγου έδειξε τις διαδικασίες οι οποίες οδήγησαν στην επιτυχία των μαθητών. Συνεντεύξεις από τους δασκάλους που δίδαξαν τα μαθήματα CLIL και με τις δύο προσεγγίσεις έδωσαν περαιτέρω πληροφορίες.

Τα δεδομένα έδειξαν ότι το μοντέλο CLELD προάγει τη μάθηση μαθήματος περιεχομένου και την εκμάθηση ξένου λεξιλογίου. Η ανάπτυξη στους δύο αυτούς τομείς φαίνεται να είναι σημαντικά καλύτερη στην περίπτωση του CLELD με γλωσσική ενίσχυση (LEA) από την περίπτωση της μάθησης με CLELD χωρίς LEA καθώς επίσης και από την παραδοσιακή μάθηση μέσω της μητρικής ελληνικής γλώσσας. Οι μαθητές και οι δάσκαλοι επιβεβαίωσαν αυτό το αποτέλεσμα. Οι μαθητές είχαν πιο θετικές στάσεις απέναντι στο CLELD με LEA παρά στο CLELD χωρίς LEA. Οι δάσκαλοι θεωρούν τη διδασκαλία πιο αποτελεσματική όταν ακολουθούν το CLELD με LEA. Γενικά, τα αποτελέσματα δεικνύουν ότι όταν το CLIL εφαρμόζεται λαμβάνοντας υπόψη τις αρχές του CLELD, μπορεί να αναπτυχθεί και το ξένο λεξιλόγιο και η μάθηση μαθήματος περιεχομένου. Αυτά τα αποτελέσματα θα μπορούσαν να συμβάλουν στη διαμόρφωση γλωσσικής θεωρίας, εφόσον εισηγούνται ότι η εκμάθηση γλώσσας συμβαίνει ταυτόχρονα με την οικοδόμηση γνώσης και τη γνωστική ανάπτυξη μέσα σε κατάλληλο μαθησιακό περιβάλλον. Επίσης, η εκμάθηση γλώσσας φαίνεται να δέχεται επιδράσεις από προϋπάρχουσα μάθηση και το επίπεδο κινήτρων του μαθητή, το οποίο επηρεάζεται από την ενδυνάμωση της προσπάθειας και την ενεργητική συμμετοχή στη μαθησιακή διαδικασία.

Η μελέτη παρέχει εισηγήσεις για βελτίωση της μάθησης μαθήματος περιεχομένου καθώς και του ξένου λεξιλογίου σε περιβάλλον CLIL. Επίσης, προτείνει κατευθύνσεις για περαιτέρω έρευνα.

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# **The development of a CLIL teaching model. Focusing on its effects on L2 vocabulary development and content knowledge**

## **CHAPTER 1: INTRODUCTION**

### **1. 1 Overview of the problem**

The Language Education Policy of Cyprus, which was drawn up by the Language Policy Division of the Council of Europe, calls into question the standards of foreign language teaching in state education of Cyprus (Council of Europe, 2005). This concern is expressed by both parents and educators (ibid; Kazamias et al., 2005) and it is attributed to various factors such as limited curricular time and the quality of teaching (Xanthou, 2005). However, the Council of Europe perspective stresses that since Cyprus is a multilingual country where several languages are spoken, the aims of education should include the promotion of the plurilingualism of the individual, namely having oral/aural competence in languages other than one's mother tongue.

This chapter begins with an overview of the problem. This includes a description of the current situation in language education in Cyprus followed by stressing the need for an effective approach for enhancing L2 vocabulary, considering directions provided by the Council of Europe and official State documents, among which is language improvement through Content and Language Integrated Learning (CLIL). Next, the CLIL teaching model developed in this study is presented.

#### ***1.1.1 The current situation of language education in Cyprus***

Children in Cyprus are obliged to attend primary school at the age of five years and eight months old in or before September first of the school year they start school (Ministry of Education and Culture of Cyprus, 2004: 8). Primary education in Cyprus lasts six years, lower secondary (Gymnasium) three, and upper secondary (Lyceum) three.

Standard Modern Greek (SMG) is the language of instruction in the state schools of the Greek Cypriot community of Cyprus but students also use the Cypriot Dialect of Greek (CDG) for oral communication. The teaching of Greek takes the greatest proportion of time in primary schools, i.e. 10-14 periods per week (Council of Europe, 2005). English has been compulsory in primary and secondary education for decades as it has played an

important role in the Cypriot society. English exists in everyday life, through the media, tourism and global American culture.

English is the only foreign language currently taught in primary schools. It is introduced in the fourth year. Cypriot children are exposed to English for two 40 minute periods per week. Parents usually consider the level of English reached in schools inadequate, and a significant number of children take private lessons in the afternoon (Xanthou, 2005; Kazamias et al., 2005). Therefore, an approach needs to be implemented in order to provide more opportunities to all pupils in state schools to be exposed to the foreign language for longer periods of time.

### ***1.1.2 Considering directions provided by the Council of Europe and official State documents***

The aims of European Education have been influenced by globalization and social changes (ETUI-REHS Education, 2005) placing emphasis on the scope and efficiency of “language training” (p.81). As a new member of the European Union, Cyprus is struggling to raise the standards in the teaching of foreign languages. This accords well with suggestions in the European Report of May 2000 on the quality of school education drawn up by experts from European Education Ministries (Scheerens, 2004). One of the 16 indicators on the quality of European school education is attainment in foreign languages. This requires the development of methods which can raise students’ self-confidence when speaking in L2. Therefore, a central objective of State Education, as cited in the report of the Committee for Educational Reform in Cyprus (Kazamias et al., 2005), is to increase students’ proficiency in foreign language learning and meet the criterion set in the White Paper (European Commission, 1995), i.e. the “genuine use by all pupils of one Community foreign language at primary school” (p.49) and gradually “develop proficiency in three European community languages” (p.51).

This is pursued by considering the earlier introduction of foreign languages into the primary school, as well as increasing flexibility in order to carry out innovations related to this issue. The Language Education Policy of Cyprus suggests that time distribution related to foreign languages in the curriculum should be reconsidered (Council of Europe, 2005). For example, information and communications technology (ICT) could be integrated into foreign language teaching for a certain period of time.

Content and Language Integrated Learning (CLIL) is suggested by both the Council of Europe and the European Union as a potential approach that could enhance L2 learning (Council of Europe, 2005). CLIL refers to “any form of language education in which subject matter is taught in a second or foreign language. It could be called bilingual education...immersion *and* multilingual education” (Van de Craen, 2001, p.210; Van de Craen & Mondt, 2003). It is postulated that by teaching some areas of the curriculum through the medium of a foreign language, students “might benefit from the experience” (Council of Europe, 2005: 32). Therefore, the European Commission urges in the White Paper that “secondary school pupils should study certain subjects in the first foreign language learned, as is the case in the European schools” (European Commission, 1995: 51), where L2 serves as the language of instruction for certain subjects, mainly in secondary education, while in primary education only physical education is taught via the medium of L2 from the 3<sup>rd</sup> grade in order to combine language learning with language usage (Baetens Beardsmore, 1993). However, although the White Paper’s consideration is made only for the secondary school level, this attempt could also be applied in primary school settings with possible positive academic outcomes. Scientific research in the area could shed more light on this prospect.

The 1995 Resolution of the Council was one of the first legislative attempts concerning European cooperation in CLIL expressing the need to promote innovative methods and particularly teaching disciplines other than languages in a foreign language (European Commission, 2005a). The document on multilingualism (European Commission, 2005b) and the Final Report of the High Level Group on multilingualism (2007) proposed that CLIL increases exposure to foreign language. Thus several European programmes have considered the development of various approaches to language teaching. For example, the second phase of the Community action programme ‘Socrates’ from 2000-2006 paid attention to CLIL type provision, financially supporting activities related to the teaching of disciplines in a foreign language. Similarly, the Erasmus action supported teaching of subjects in foreign languages. CLIL type provision has been suggested as a potential approach for promoting language learning in 2001 which was the European Year of languages (European Commission, 2005a). School systems throughout Europe have undergone substantial changes, following the European recommendations, mainly by adopting some form of CLIL (Van de Craen et al., 2007).

A basic principle regarding modern languages on which the Committee of Ministers of the Council of Europe has based its work to prepare the Common European Framework (CEF) is that “only through a better knowledge of European modern languages will *it* be possible to facilitate communication and interaction among Europeans...in order to promote European mobility, mutual understanding and co-operation” (Council of Europe, 2001: 2). Among the variety of general approaches outlined in the Common European Framework is the direct exposure to authentic use of language in L2 in several ways, such as “participating in courses in other curriculum subjects which employ L2 as a medium of instruction” (p.143). In this vein and having taken into consideration the Barcelona European Council 2002 which emphasized the need for promoting language learning, the Commission of European Communities (2003) communicates, in its Action Plan 2004-2006, that most pupils need to be able to “study at least some of their curriculum through the medium of a foreign language” (p.11). The Action Plan posits that subjects should be taught through at least one foreign language and trainee teachers should study language(s) alongside their area of specialization. These declarations are in line with the position of the recent Pilot Curriculum for EFL in Cyprus Primary Schools (Ministry of Education and Culture, 2006), stressing the value of cross-curricular links. It is proposed that EFL lessons should enable children to consolidate the aims of other school subjects. In this context, learners are involved in interesting, content-based topics. Communication skills have replaced particular language structures as the centre of attention. It is suggested that integration of content learning from other school subjects with foreign language benefits learners’ conceptual development as the children combine foreign language with various other aspects of learning.

The Eurydice survey is one of the actions that were drawn up in the Action Plan 2004-2006 (Commission of European Communities, 2003) to develop content and language integrated learning aiming to collect comparative data on the subject of CLIL type provision in Europe. This survey expresses the need for the development of a specific approach to teaching the non-language subjects in that they are “not taught in a foreign language but with and through a foreign language” (European Commission, 2005a: 7). Therefore, special attention should be devoted both to language teaching and to the educational process while implementing CLIL. An explicit model based on research literature needs to be developed that would have the potential to help teachers who implement CLIL to improve the academic content subject and language performance of their students in order to reach the State and European language aims successfully.

CLIL approach aiming to integrate language learning with other areas of curricular content in order to provide language learning in a meaningful context is a fast expanding phenomenon in Europe and in the rest of the world as the Eurydice survey shows (European Commission, 2005a; Van de Craen et al., 2007). This increasing attention is due to the state of crisis in which the new millennium has found foreign language teaching and learning and the European aspirations of providing a multilingual education (Van de Craen, 2001). CLIL provision is welcomed by educational systems as it is “cost-effective” and “it does not demand extra time in the curriculum” (De Graaff et al., 2007: 605). Add to these, several experts claim that the particular approach carries many benefits for pupils so it is well regarded in many academic forums. For example, in Latvia it is “considered to be the best possible method for learning languages” (Council of Europe, 2001: 53). Several European countries that have measured the impact of CLIL type teaching experienced encouraging results (ibid: 57). This is the reason why the number of initiatives in this area has recently grown.

In Cyprus, the subject on CLIL type provision is being discussed within the education ministry. Primary school teachers are encouraged by the EFL inspectors to implement CLIL instruction and some sporadic cases of implementation have occurred, although only one experimental research study has taken place (Xanthou, 2006) which examined its effects on L2 development and content knowledge of Greek Cypriot students attending mainstream state-financed education. The findings demonstrated the positive impact of CLIL on L2 vocabulary development. CLIL has been implemented as a pilot project in 2007-2008 directed by the Pedagogical Institute of Cyprus and the University of Cyprus, involving five nursery and ten primary schools, as a part of a Socrates Comenius project with encouraging results (Pavlou & Ioannou-Georgiou, 2007). However, there is no official national policy or requirement for teachers to practise CLIL, thereby no state funding supporting this programme. Added to this, teachers are not trained in CLIL during their pre-service training, so the majority of teachers may not feel competent to teach a subject through the L2. Therefore, lack of training and the students’ limited L2 background knowledge restrict the teachers’ willingness to undertake such a task.

Given that “second language learning might be more effective in primary, rather than secondary education” (OECD, 2002: 36), learning through CLIL in the primary school might turn out to be an ideal way to improve the students’ L2. Implementing this approach in the most effective way and exploring its potential outcomes on L2 development and

content subject knowledge may provide a solution to the problem of insufficient L2 standards in primary education.

Students of primary schools in Cyprus who are learning the content of subjects such as Mathematics, Social Sciences and Science in English do not have a strong foundation of English vocabulary. Teachers therefore need to know how to increase vocabulary skills while delivering content subjects in order to make the academic content accessible, adjusting the level of language to the students' proficiency. Identifying key practices based on literature review and classroom research for effective CLIL instruction in the elementary classes can lead to the development of a model that could enable teachers to use this type of instruction more effectively in their classrooms, increasing students' L2 vocabulary knowledge as well as other aspects of the target language.

Clearly an explicit model for delivering CLIL could guide teachers to provide effective content and language instruction for elementary school children in order to promote learning in both areas. Such a model should draw features from high quality instruction for students learning content subjects but also combine key elements from successful second language learning practice. The effectiveness of this model in L2 learning and academic achievement needs to be determined.

### **1.2 The Content and Language Lesson Delivery Model for Elementary classes - (CLELD) Model**

Teaching a subject through English as a foreign language needs to promote both students' literacy and L2 knowledge. However, not much attention has been drawn to the pedagogical formation of CLIL teachers and how this could affect the students' L2 development and subject matter learning (Maljers & Wooning, 2003). Mehisto & Asser (2007) examined CLIL teacher perspectives in Estonia concerning the delivery of quality programming. Not having mastered CLIL methodology is one of the challenges faced by the teachers.

Lee (2005) notes that this task "may require subject-specific instructional strategies that go beyond the general preparation in ESOL or bilingual education" (p.508) received by many teachers. Met (1998) rightly argues that CLIL teachers "need a repertoire of strategies to ensure that students develop both content and language skills" (p.57). The report on the

preparation and qualifications of state school teachers in the USA prepared by the National Centre for Education Statistics discloses that most of the teachers teaching subjects to ELLs do not feel that they are adequately prepared to cope with the demands of the approach. Interestingly, the literature addressing efforts to develop CLIL teachers' practices is still at an embryonic stage as Lee (2005) has observed in the area of Science teaching through L2. Moreover, Echevarria (1996) remarks that a consensus has not yet been reached as to what constitutes a high quality CLIL lesson. Researchers reveal the need for mastering CLIL methodology.

Currently one CLIL model has been developed to be used as a "classroom observation tool *by administrators or by the classroom teacher as a self-evaluative instrument or lesson-planning tool*" (Kirchhoff, 2005: 37). This is called the Sheltered Instruction Observation Protocol (SIOP Model). The SIOP was developed by the National Centre for Research on Education, Diversity, & Excellence (CREDE) and funded by the Office of Educational Research and Improvement, U.S. Department of Education (Echevarria et al., 2004: 16). The model was developed after 5 years of collaboration with practising middle school teachers identifying key practices for effective CLIL instruction in the form of sheltered classes. The SIOP was field tested by observing and scoring CLIL lessons in various settings and it "became a training and evaluation instrument" (ibid: 3, Snow, 1998: 249). The instrument was found by Guarino et al. (2001) to be a highly reliable and valid measure for sheltered instruction effectiveness. However, the effective practices being identified for sheltered instruction for ELLs were the outcome of work with middle school teachers, mainly working with immigrant children who were being prepared for mainstream classes.

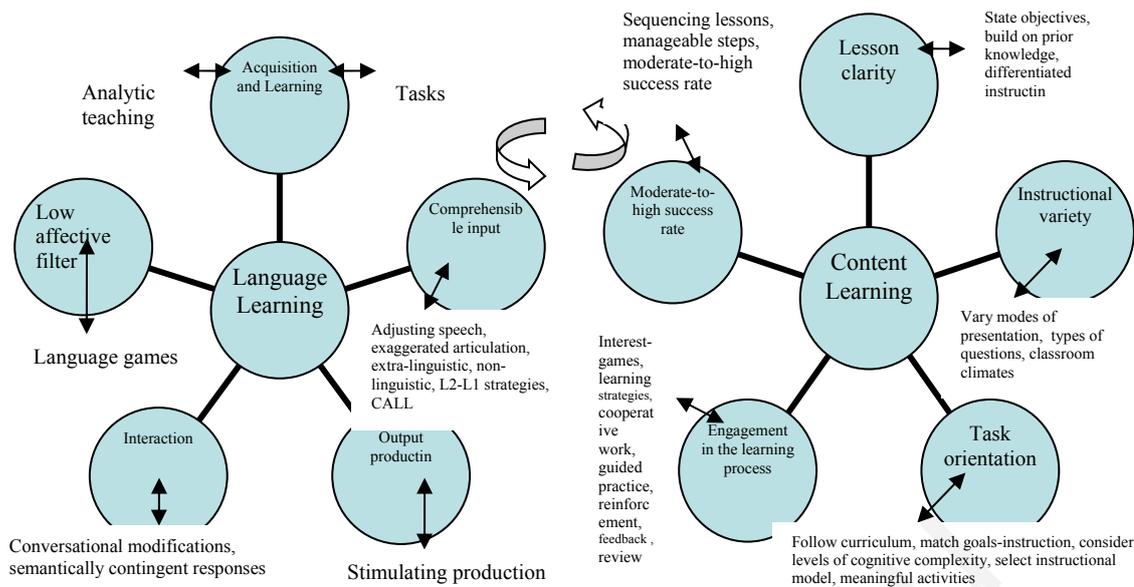
Another observation tool for CLIL classes has been developed by De Graaff et al. (2007) who analysed effective CLIL performance in three secondary schools of the Netherlands, matching it with theoretical assumptions about effective L2 teaching and learning. However, this effort focuses on effective L2 pedagogy ignoring content learning in the CLIL class. Clearly, a model especially designed for primary school CLIL teachers in European settings such as Cyprus preparing multilingual children who will learn the L2 to communicate, is desirable for promoting effective practices in this area.

The Content and Language Lesson Delivery Model for Elementary classes (CLELD) which is developed in the current study is designed to be applied to students at beginning

levels of English proficiency who are learning content through EFL. The CLELD model has drawn heavily on research concerning L2 acquisition, effective subject matter teaching and successful practices in CLIL teaching. It includes not only the items which were considered in more than one effective CLIL lesson delivery models but also items included in teaching models which stressed the importance of techniques not commonly used. The model aims to help teachers with their planning and teaching EFL learners at the elementary stage. Effective instruction is likely to arise, and learner achievement could be enhanced. Students in Cyprus and in countries having similar EFL settings have limited English proficiency and limited exposure to L2. They are taught English for only two 40-minute teaching periods a week starting from grade 4 to 6. So, teachers may need a tool for planning and implementing CLIL lessons with positive academic outcomes. The CLELD model ambitiously aims to fulfil these teachers' need. It is intended for CLIL teachers of non-native students who want to improve their lesson planning and delivery, and supervisors who provide assistance to elementary schools, train, and evaluate teachers.

Teachers can use the model as a planning guide to assist effective implementation of CLIL. The model is operationalized in the Content and Language Lesson Delivery Model for Elementary classes. The model is composed of 34 items in total. The first part of the model involves 13 items related to effective language teaching, grouped into five components, while the second part involves 21 items related to effective content teaching, grouped into five components. The model can provide teachers and supervisors with an instrument for observing and quantifying implementation of CLIL. The model's five components related to effective language teaching are five EFL learning principles identified by research synthesis as being vital in L2 development: focusing both on task and on language, comprehensible input, output production, teacher-student interaction and low affective filter. The five components related to effective subject matter teaching correspond to Borich's (2007) five key behaviours for effective lesson instruction: clarity, variety, task-orientation, student engagement in the learning process and medium to high success rate, forming the theoretical basis for the observation tool developed in this study.

Research synthesis has demonstrated that these items contribute to effective EFL and subject matter learning. The items included in the model involve the common items included in various CLIL models as well as items identified by isolated successful CLIL models. The model is not sequential but its elements can be traced throughout a lesson (Figure 1).



**Figure 1: Content and Language - for Elementary classes- Lesson Delivery (CLELD) Model**

The usability and coverage of the CLELD tool was tested on 26 CLIL lessons; ten Geography, ten Maths, and six Science lessons.

### 1.3 Summary

The Report of the Committee for Educational Reform in Cyprus has recommended principles and standards requiring efforts which provide opportunities for all students to acquire an efficient standard in at least one foreign language in primary school (Kazamias et al., 2005). Unfortunately, primary school children are not experiencing this level of competence (ibid: p.157). As a suggested solution, this study develops a CLIL model which focuses on successful content and language integrated learning for promoting both content knowledge and L2 vocabulary development. The second Chapter discusses the theoretical background and research findings regarding CLIL implementation. Chapter Three reviews research related to L2 vocabulary development and discusses vocabulary development through CLIL. Chapter Four reviews theories and research findings concerning L2 learning and subject matter learning which constitute the foundation for developing the CLIL teaching model. The research design is detailed in Chapter Five while Chapter Six communicates the results from data analysis. Chapter Seven presents a summary of studies, a synthesis of the results, a summary of the current study, conclusions and implications. Finally, Chapter Eight provides recommendations, the limitations of the study and suggestions for further research.

## **CHAPTER 2: CONTENT AND LANGUAGE INTEGRATED LEARNING**

L2 learning has become an essential part of education. Van de Craen & Mondt (2003) attribute this to “the recommendations of the European Commission” (p.209). However, there is “increasing awareness that despite investment of an enormous amount of time and money, the results of traditional foreign language education are poor”(ibid: 209). EFL students in Cyprus do not seem to reach the anticipated level of competence in English at the end of the three year primary school course (Kazamias et al., 2005). In addition, there is little evidence that current EFL methods suggested by the State Curriculum for EFL, such as communicative teaching, have substantially closed the gap (Rodiki, 2004). Therefore, foreign language learning could be integrated with subject matter learning in order to increase exposure to the language without allocating extra time within the curriculum, allow naturalistic early language learning and possibly raise the students’ EFL standards.

This study gathers effective practices related to Content and Language Integrated Learning, henceforth CLIL, in a Model addressing elementary school classes. The purpose of this chapter is to review the literature that provides a foundation for effective practices in CLIL lessons at the primary school level. The literature for this chapter was chosen from refereed journals, books, book chapters written by scholars in the domain of linguistics and education as well as unpublished theses. The studies selected examined effective EFL teaching, L2 vocabulary learning, effective subject matter teaching and evaluating teaching.

This chapter deals with the theoretical background of CLIL, the various types of CLIL programmes and their suitability in educational contexts and research findings concerning the implementation of such programmes in various countries.

### **2.1 Theoretical groundings of content and language integrated learning**

CLIL is rooted on the assumption that students can learn content and simultaneously develop L2 proficiency. The aim of CLIL is to help students understand the content of a subject taught and simultaneously improve their L2 language proficiency; although in CLIL, foreign language learning could be a natural outcome of the learning process.

At present, there is no specific language learning theory accounting for CLIL. However, interest in CLIL has been fuelled by developments in second language acquisition (SLA) theory and practice that should be considered complementary to a multilingual theory (Van de Craen, 2001). CLIL is based on theories which assume that language is acquired implicitly (Krashen, 1982), interactionist theories which value the impact of interacting with the environment in order to learn language (Vygotsky, 1962; Cummins, 1981a), and theories which underline the importance of individual construction of knowledge (Piaget, 1963).

### ***2.1.1 Acquisition/Learning hypothesis***

Content and language integrated instruction was influenced by Krashen's theory of second language acquisition (1982). Krashen (1982) posits a dichotomy between acquiring and learning a language. In his Acquisition/Learning Hypothesis it is assumed there are two different ways of developing L2 knowledge: acquiring and learning. Acquisition takes place when the language skills are developed through use in a way similar to how native speakers learn grammatical rules. Otherwise, when language ability is developed through formal instruction, then this conscious knowledge is called learning. Krashen holds that only meaning focused instruction can meet the first condition. These assumptions stem from Noam Chomsky's model of Universal Grammar (Cook, 1993) claiming that all humans possess the 'seeds' of language so they can easily learn a second language when this ability to acquire the grammar of a language is harnessed at an early age. In this view, the most important aspect of L2 learning is vocabulary acquisition involving both content words with their projections into the syntax and the morphological endings with their parameter-settings that influence the structure of sentences (Cook, 1996).

Krashen (1982) has drawn parallels between first and second language acquisition holding that the conditions of second language acquisition need to resemble those of first language acquisition in order for someone to acquire the second language successfully. Children acquire their mother tongue by listening to the language around them and learn to speak by a process of unconsciously building a rule system from the examples of language presented to them. Therefore, CLIL teachers need to provide input that is modelled after the input that children get from their caretakers.

It is postulated that second language acquisition is not a cognitive process thereby demanding language guidance by the educator. In contrast, it is a natural process.

Learners' inborn mechanisms enable the child to pick up the language when the environment conduces to learning. In this regard, Krashen argues that the focus of instruction needs to be placed on meaning rather than form. In this sense, natural acquisition opportunities which are structured to the smallest possible extent in order to make them comprehensible to the learners need to be provided. Equally important, the language input needs to be at and just above the proficiency of the learner. Last, opportunities for engaging in meaningful use of the target language in a stressfree environment are required. Krashen's 'Monitor Model' assumes that when comprehensible input is presented and the learner does not feel anxiety, then acquisition of language is likely to occur.

These assumptions imply that second language instruction primarily needs to be based on meaningful material just as "natural language is never learned divorced from meaning" (Met, 1991: 281). Although this is most probably not the only prerequisite for foreign language acquisition, exposing L2 learners to meaningful input is vital for foreign language acquisition (De Graaff et al., 2007). CLIL is a meaning-focused learning method where language knowledge is not the ultimate aim but rather a vehicle for instruction (Van de Craen & Mondt, 2003). CLIL provides natural language learning environments because learners acquire the target language in a similar way they learn their home language (Jäppinen, 2005). A natural learning environment is created unlike the traditional language classroom where learners go through the painful process of sorting out structures, vocabulary and sounds (Snow & Brinton, 1997, Marsh, 2003). Just as in the real world where people do not learn languages first and then use them, but learn languages by using them, in CLIL classes children have the opportunity to practice what they learn whilst they learn, hence children learn to 'think' in the foreign language instead of just learning about it. In CLIL classes, the emphasis is not placed on language but on doing something with language, that is acquiring content. The student encounters language learning activities which are not artificial or meaningless. As Brinton et al. (1989: 2) note, in this setting the artificial separation between language instruction and subject matter classes existing in most educational settings is eliminated. In this perspective, language learning becomes more concrete rather than abstract as in traditional language instruction where the focus is on the language itself. In CLIL classroom, learners explore interesting content while they are engaged in appropriate language-dependent activities. Thus, the language learning activities are not artificial or meaningless. Students acquire information via the target language while in the process, they develop their language skills. CLIL provides increased

opportunities for exposing learners to L2 vocabulary in meaningful situations. It is a content-based approach which seems to be an authentic approach to language (Celce-Murcia & Olshtein, 2000). In this language learning environment, words are attached to their surroundings increasing the likelihood of comprehension and retention (Schmitt & Schmitt, 1995). Learners listen, read and produce language orally and in written form in purposeful tasks. Hence, the step from linguistic knowledge i.e. knowing a form, to procedural knowledge i.e. using a form, takes place much faster than in traditional EFL classes as more opportunities for practice are provided, so performance can improve more quickly.

The use of informational content is considered to raise the learners' motivation in the class and therefore promote learning. Content 'can be more intellectually stimulating and challenging for students than is often the case in more conventional language classes' for tertiary level learners (Chapple & Curtis, 2000: 420). By providing interesting texts and activities, content-based learning can reduce anxiety (Crandall, 1987). Focusing on contextualized use of the language instead of relying on correct sentence-level usage enables the student to come across discourse level features in situations which simultaneously facilitate social interaction.

Grabe and Stoller (1997) claim that in contextualized language settings learners are taught useful language that is "embedded within relevant discourse contexts rather than as isolated language fragments" (p.19). CLIL provides a meaningful context for language development as it not only builds on previous learning and interests of students but also considers the learners need the foreign language. Exploitation of intrinsically motivating and intellectually stimulating material enables retention of language elements. Craik and Tulvig (1975) reveal that retention is achieved when depth of processing takes place. They showed that new words which were processed semantically were better learned than words processed phonemically or structurally. In their studies, subjects had to answer questions related to target words which varied according to their depth of processing i.e. appropriacy of a word in a sentence in contrast to word rhyming or structure. It was concluded that learning benefits from semantic processing of the material. The various content sources which are provided in CLIL classes, present coherent information leading to deeper engagement with content, meaningful content learning and improved language abilities. Simultaneously, students are offered opportunities to learn content-specific vocabulary (Murphy & Stoller, 2001).

Although Krashen's theory is not based on empirical data, Dirven & Oakeshott-Taylor (1985) advocate that it is necessary to provide language learners with interesting, meaningful and comprehensible language input which is also relevant to their level of competence.

### ***2.1.2 Social constructivist theory***

Unlike innatists who declare that learners are "programmed" or predisposed to learn language, social theorists of language maintain that the degree of language control depends on the social and interactional contexts in which learners find themselves (Halliday, 1993). CLIL seems to provide such an interactional basis for language learning where students have to interact with their teacher and peers in order to carry out a task (Dalton-Puffer & Nikula, 2006).

Social constructivist theory considers the social environment to be responsible for meaning-making (Vygotsky, 1962). It is assumed that language is the tool which mediates mental functioning so language development is considered to be a social process. Therefore constructing mediation is of prime importance (Lantolf, 2000).

Bruner (1996) holds that learning is not effective when it happens in a one-way direction. Learners should be allowed to 'bootstrap each other' (p.21). In this regard, learning should be facilitated by teacher and peers who can help the individual reach the zone of proximal development (ZPD) that is, the area between the person's actual developmental level and the level of their potential development (Vygotsky, 1978). Newman et al. (1989) hold that the ZPD are "the changes that occur in socially mediated instructions" (p.2).

Students in CLIL classes possess a large zone of proximal development because of the difference that exists between what the students can do on their own and what they can do when provided help from someone else. Students can reach their ZPD when much support is available both from the teacher and peers including explanations and gesticulation (Jäppinen, 2005). Van de Craen and Mondt (2003) aver that a CLIL class in primary school is an ideal environment for scaffolding to occur. Teacher and learners interact in their effort to make sense of activities and get messages across. Pupils ask questions and provide explanations.

CLIL teachers can provide external scaffolding by providing comprehensible activities, feedback and allowing students the responsibility for their own learning (Kaufman, 2004). In this context, teachers need to find out the students' zone of proximal development and then design meaningful and authentic tasks which are appropriate for the learners in order to help them construct new understandings. Mason and Sinha (1993) explain how a Vygotskian model of learning can be applied in the classroom. A natural learning environment allowing learners to get involved in meaningful activities should be created by educators. Students should be guided to self-direct their learning. CLIL environments appear to provide opportunities for active interventions on the part of the teacher and more able peers that scaffold learning experiences, allowing the learner to gain explicit information which can be usefully organized and practised (New London Group, 1996). In the external activity phase learners deal with independent learning activities either alone or with peers but being coached by the teacher. Gradually, children move to the internal activity phase of learning where they perform inquiries on their own.

### ***2.1.3 Cognitive constructivist theory***

The cognitive constructivist theory of learning claims that learning involves individual construction of knowledge which builds on prior learning (Piaget, 1963). Learners are active agents and engage in their own knowledge construction by integrating new information into their schemata and by making meaningful associations. In this sense, interacting with one's environment leads to mental growth.

Constructivist theory undertakes a holistic view on learning. It postulates that meaningful contexts are a prerequisite for learning to occur, providing a rationale for the CLIL approach. More recently, research suggests that information is stored in the brain in networks (Caine & Caine, 1991). Conceivably, learning is more powerful when many and strong connections are created. New material which is linked to prior knowledge is likely to be better retained, as knowledge is interconnected. As Bruner (1968) characteristically notes 'an unconnected set of facts has a pitifully short half-life in memory' (p.31). Unless knowledge is tied together with sufficient structure it will most possibly be forgotten. Using prior knowledge to understand text is critical as it provides connections in memory linking past with new information (Bransford & Johnson, 1972). Information which has a greater number of connections to related knowledge, promotes better learning as content is more coherently presented and therefore easier to remember. In CLIL classes, content acts as the driving force for making connections between new and prior knowledge. The more

the number of connections related to prior knowledge is increased, the greater learning is enhanced. On the contrary, facts and language skills taught in isolation need much more practice and rehearsal before they can be internalized. Grabe and Stoller (1997) avow that the use of coherently developed content sources allows students to call on their own prior knowledge to learn additional language and content material.

Language learning in a constructivist framework is based on the importance of context, suggesting that ‘vocabulary and grammar *should* be taught in clusters related to given contexts or topics, as opposed to lists of vocabulary...’ (Met, 1998: 38). In CLIL, students deal with meaningful tasks requiring them to retrieve prior knowledge, thereby strengthening the links between language features previously learned and others which are practised in the present. This has an ultimate positive effect on language learning.

#### **2.1.4 Language development theory**

Another hypothesis providing support for content-centered language learning is grounded on the assumption that humans develop two different kinds of language proficiency: social and academic language (Cummins, 1981a). Social language is informal and cognitively less demanding as a result of being ‘highly contextualized’ (Crandall, 1993: 114). It involves the language skills used in interpersonal relations. Academic language is more ‘formal, abstract and cognitively demanding’ as it is not contextualized (ibid: 114). Cummins assumes that social language is rather easy to acquire, by taking only one to two years whereas academic language is more difficult taking from five to seven years (Crandall, 1987: 6).

Cummins’s (1981a) dichotomy of language proficiency into Cognitive Academic Language Proficiency (CALP) and Basic Interpersonal Communication Skills (BICS) implies that it may be useful to find a way which develops both sides of language. Postponing content instruction until students develop more advanced academic language ignores students’ needs, interest, and cognitive levels. CLIL instruction seems to satisfy this criterion by promoting both sides of the target language. By using content-area texts and tasks as a vehicle for strengthening L2 proficiency educators may enable the development of both academic concepts and target language skills.

The common issue stressed by all four theories described above is that learners require substantial and meaningful contextualized language input. This idea meets the

requirements of the European Council (2001) as described in the Common European Framework that the “most important thing a teacher can do is provide the richest possible linguistic environment in which learning can take place without formal teaching” (p.139). Such a rich linguistic environment may require increased meaning-focused exposure to L2 input (Nassaji & Fotos 2004) in a content-oriented, discourse-based language teaching environment such as CLIL. In this framework, students can be exposed to authentic or simplified discourse that provides students with examples of contextualized usages of the target language.

Learning target language in context may allow deeper and more complex learning to take place. This happens because the context allows for target items to be displayed in their natural environments. Halliday and Hasan (1985) define context as “the physical, social and psychological background in which language is used” (p.5). Context includes the topic, the setting and a purpose. These elements are meaningfully organized in CLIL learning environments. For instance, learners may deal with the natural environment of a particular country in Geography (topic and setting) so they search for the flora and fauna of the country (purpose).

#### ***2.1.5 Current views on language learning: A language learning model along a cognitive information processing framework***

Segalowitz (1997) bases his assumptions about language learning on a cognitive information processing framework developed by Ackerman (1989) and Anderson (1976). In Segalowitz’s model, developments in knowledge, linguistic performance and cognition take place simultaneously, adopting a complex theory of language learning. In this framework, language learning is influenced by “behavioural and cognitive flexibility, developmental processes, earlier and later learning as well as motivation and reinforcement” which emphasize “individual learning differences’ instead of ‘universal aspects of learning” (Van de Craen, 2001: 212). Knowledge moves from declarative to associative and finally to procedural state. At the first stages of language learning, knowledge is declarative or factual which on its own may not allow the learner to be able to talk and the cognitive load may be too high. It then moves to the associative stage where the learner makes use of both cognitive and linguistic processes in order to carry out simple conversations. Finally it becomes procedural that is automatized, imposing less cognitive load on the shoulders of the learner as the rules are gradually internalized. Simultaneously, linguistic performance starts from an error prone stage where beginners’

thinking interferes negatively imposing a heavy cognitive load, moving to a less error prone stage of intermediate ESL students involving a lower cognitive load and finally reaching native like performance of advanced learners involving a low cognitive load.

This view is in harmony with a more complex – interactionist theory of language learning such as the one suggested by Hill (1980) considering the kind of relationship which may exist between language comprehension processes and cognitive processes. This relationship has been characterized as ‘direct’ by current neuroscientific positions (Kutas, 1998).

## **2.2 Arguments against CLIL**

A number of arguments appeal against CLIL. Van de Craen (2001) outlines five arguments: the possibility that multilingual education will inhibit the learning process, first language knowledge will fall behind, the individual’s learning capacities will slow down, immigrant children benefit from CLIL but not autochthonous pupils, and nowadays students are multilingual when leaving school, so this type of education is not necessary.

Regarding the first argument, it is fair to report that the learner at the first stages of CLIL may encounter a high cognitive load by the L2 and the subject knowledge (Segalowitz, 1997). CLIL classes may place a high cognitive load on the learner’s shoulder involving both content-and-language demands. Educators may have misgivings regarding students’ content learning through the medium of the foreign language as students may not have the abilities to comprehend, synthesize, compare or evaluate information in the L2. However, scaffolding and self-correction that take place continuously in the CLIL class disaffirm this view. Scaffolding usually takes place informally when the teacher and/or the peers correct or expand on what a student has said. More importantly, this natural interaction occurs spontaneously as a part of a meaningful conversation; therefore it is accepted by the interactants. Similarly, correction is faced differently in CLIL environments as the teacher may be more tolerant to correction of form by the learner. These processes seem to lower the level of cognitive load. The practice provided in CLIL classes increases production, improving performance. Further, linguistic performance is likely to perform more quickly in a CLIL class allowing students to move from declarative to procedural knowledge.

A related argument against CLIL is the risk of crafting a curriculum around a single content subject. Davison and Williams (2001: 51-70) demur the benefits of sustained content and language learning pointing out that in such curricula, language coverage is greatly limited to the specific subject area which is taught through the L2, therefore disadvantaging learners. However, careful planning and application of the approach to units of various subjects is likely to compensate for this limitation.

Second, although some parents and educators may worry that early immersion or learning content through the L2 may affect negatively the development of the mother tongue, this fear is not well-founded (Cummins & Swain, 1986). Research suggests that there is no negative impact of immersion programmes on students' native language development (Genesee, 1987). Marsh (2003) reports that there is no evidence supporting that the development of first language is threatened by low (5-15% of teaching time) to medium exposure (15-50% of teaching time) to CLIL. Marsh (ibid) notes that CLIL usually incorporates "trans-linguaging whereby both the target language and the first language are actively used in the classroom" (p.76). Longitudinal research in the Netherlands showed improvement in L1 Dutch- and English L2 after being exposed to CLIL for six years (Marsh, n.d. a). These results coincide with research findings related to CLIL in Estonia. The students' L1 development was not found to be adversely affected by their involvement in CLIL. Similarly, the L1 test results of Estonian learners were higher than those of the control group which was exposed to subject matter learning through L1 Russian (Mehisto & Asser, 2007).

The student's first language does not necessarily fall behind because what should matter is the quality of the time spent with a language and not only the quantity. Moreover, in a country such as Cyprus, students' Greek L1 pervades their out-of-school life. Furthermore, the development of L1 oral and writing skills is not endangered. As it is clearly stated in the White Paper "contact with another language is not only compatible with becoming proficient in one's mother tongue, it also makes it easier" (European Commission, 1995: 47). A number of studies involving primary immersion programmes displayed better performance of immersion students in L1 skills, although instruction through L1 was much less than students taught through L1. Swain (1975) investigated the writing skills of grade three French immersion pupils and discovered that non immersion pupils used less complex syntactic structures in their L1 English compositions than immersion students. Higher performance in some language skills was also reached by

French immersion students participating in the Ottawa immersion by grade 5 as opposed to their counterparts in the control group (Barik & Swain, 1978). Tremaine's (1975) findings are in conformity with the aforementioned studies. The students of grades 1, 2, and 3 involved in total French immersion exhibited higher levels of comprehension of L1 syntactic structures in contrast to the pupils that were daily exposed to 75 minutes of L2 teaching. Cummins and Swain (1986) conclude that evidence leaves little room for doubt that in order for content-based learning through L2 to succeed, students should initially be taught literacy skills in only one language. When these are well-established in L1, then children will transfer to the L2. Research suggests that L2 acquisition depends on the learners' level of proficiency in their home language (Cummins, 1981b). Accordingly, if CLIL takes place very early, then confusion might occur. In the case of state schools in Cyprus, pupils take the EFL course at grade 4 when they have already mastered sufficiently their L1. According to the 'interdependence principle: To the extent that instruction in Lx is effective in promoting proficiency in Lx, transfer of this proficiency to Ly will occur provided there is adequate exposure to Ly...and adequate motivation to learn Ly' (ibid: 87). Due to this interdependence in cognitive aspects of language proficiency, specific aspects of L1 language learning transfer to the L2. Therefore, a sound basis in L1 is required for L2 to be learned.

The counter argument against the third position that pupils' learning abilities will slow down is that this is not likely to take place in a learning environment enriched with scaffolding that encourages self-correction (Van de Craen, 2001).

Fourth, if immigrant children benefit from CLIL, then it could be assumed that autochthonous pupils should also reap benefits from this approach. Indicatively, preliminary research reveals benefits for foreign language learners (Xanthou, 2006).

Last, reports on students' level of L2 knowledge do not really draw a flattering picture (Council of Europe, 2005). Students do not become multilingual so easily. So, CLIL may be the route for enhancing L2 development.

### **2.3 CLIL historical background**

Although content-based language instruction is a current trend in language teaching, its pedagogic value has been recognized several centuries back. Kelly (1969) quotes St.

Augustine as having said in 389 A.D. that “once things are known knowledge of words follows...we cannot hope to learn words we do not know unless we have grasped their meaning” (p.36). For many centuries, upper-class Europeans have appreciated the importance of meaningful exposure to the second language, thereby sending their children to stay in regions where they would use the target language.

The application of content-based instruction in second and foreign language teaching is not completely revolutionary as it has been put into practice in Canada’s immersion education from the 1970’s onwards (Harley et al., 1990a: 153) and in the ‘foreign language across the curriculum’ movement in the U.S. and Britain.

In Canada, immersion bilingual education began in 1965 as a new way to teach French to English- speaking children (De Graaff et al., 2007). French immersion programmes were developed in Quebec “in response to social and linguistic inequities between French- and English- speaking Canadians” (Genesee and Gándara, 1999: 670). The programmes aimed to improve the inferior status of French in the country. Although French was considered to be an official national language which had demographic significance as it was the native language of one fourth of the population it was disadvantaged in language use. English was favoured in bilingual contexts as well as in language attitudes, which marginalized the speakers of French and the French language. In the 1960s referred to as the “Quiet Revolution” (ibid: 671), sociopolitical action was undertaken in the Quebec’s French community in order “to redress the imbalance in power between English and French” (ibid: 671). Immersion was developed as a way to improve the quality of L2 French instruction. The programmes aimed at increasing competence in French language and raising appreciation of the language and culture. The ultimate goal was to improve relationships between English-speaking and French-speaking citizens. Studies of immersion students have indeed shown that in the primary grades, immersion students exhibited positive attitudes towards French Canadians (Lambert & Tucker, 1972). Although results seemed to be encouraging, most of the students involved in these studies come from middle-class families. Therefore it is not yet known whether the findings can be generalized to all students.

Unlike Canadian immersion, which aimed to promote English speakers’ understanding of French Canadian culture, bilingual education in the United States served different aims. The majority of programmes aimed to transition children out of their home language into

English without paying attention to intergroup issues. The outcome was to promote prejudice against non-English languages. Dual-language programmes were developed to include speakers of two target languages, in which instruction was provided in both languages aiming at cross-cultural understanding by valuing other languages and giving them greater prestige. Unfortunately, studies have shown that the native English speaking children received more attention than their non-native counterparts perhaps because their parents enjoy a higher status and are more active. This influence forced the teachers to place primary focus on the educational needs of English speaking students. In brief, both Canadian immersion programmes and dual-language bilingual programmes in the U.S. have emphasized intergroup divisions in their effort to teach the L2 target language in countries where learners can encounter the L2 in out-of-school contexts.

Content-based instruction (CBI) was applied in the 1980s in the United States when approaches were needed to promote simultaneous content and language learning for a growing number of English language learners (ELLs) in the schools (Schleppegrell et al., 2004). Snow (1998) reviewed research on content teaching through ESL in the U.S. carried out by Sheppard (1994; 1997) finding that around 15 percent of U.S. state schools involve some form of content-based ESL instruction. This trend is attributed to “the rapid influx of second language learners” (Snow, 1998: 244).

A comprehensive study has been conducted by Sheppard (1994; 1997) at the Centre for Applied Linguistics in the U.S.A. surveying 2,992 programmes with some form of content and L2 integration. Interestingly, the survey revealed that 79 percent of these programmes did not require English proficiency for entering the programme, thus indicating that students might not need a certain level of intermediate proficiency in order to cope successfully with content-based ESL instruction. More recently, Rhodes & Branaman (1999) report that a survey that was carried out by the Centre for Applied Linguistics shows that 31% of U.S. elementary schools offer content and foreign language integrated instruction.

CLIL is currently enjoying an increasing popularity in the world’s educational scene. Several applications of this approach have been reported world-widely involving a wide range of situations focusing on learning a content subject through the L2. Crandall (1993) reviewed studies related to integrated language and content instruction reporting interest in the area in many parts of the world, particularly in countries where part of the curriculum

is taught through English as a medium of instruction. Much work has been carried out in Canada, Australia, and South Africa. The educational reform in Argentina gave the opportunity to bring changes in foreign language teaching by considering content-based instruction and integration of disciplines (Snow et al., 1998).

The Canadian immersion has influenced European approaches of integrating content with a foreign language (Swain & Johnson, 1997). In the 1970s and 1980s replication of content-based instruction approach was attempted in Europe. However, European contexts are not exactly the same as the Canadian context or the situation in the U.S.A. where teaching subjects through L2 was used “for contexts in which minority language students acquire proficiency in a dominant target language” (Marsh, n.d. a: 58).

The term CLIL was adopted by the European Network of Administrators, Researchers, and Practitioners as a generic umbrella term referring to any activity in which a non-language subject is taught through a foreign language while both have a joint curricular role (Marsh & Marsland, 1992). CLIL in Europe can be conducted by native or non native teachers in any language, quantity, subject, during any period and at any proficiency level (Hartiala, 2000).

In European CLIL, students primarily learn reading and writing through their home language unlike immersion settings where this cognitive development occurs through the foreign language (Seikkula-Leino, 2007). The mother tongue of immersion teachers is the target foreign language of the students (Swain and Lapkin, 1982). Prior knowledge of the target language is not required in the first stages of immersion. At least 50% of instruction in immersion settings should be done through the foreign language in contrast to at least 25% in CLIL settings. Although both immersion and CLIL aim at enhancing foreign language learning, in the first case, the objective is acquiring fluency in both L2 and L1 while in the latter, the goals concerning L2 learning may vary (Seikkula-Leino, 2007). Added to this, CLIL in Europe differs from Canadian immersion in homogeneity of learners' starting levels (Marsh, 2002).

Marsh (n.d. a) claims that theoretical and methodological issues resemble each other despite differences in application. Therefore, “some generalities *are* worthy of observation and comment which interlink across contexts” (p.70).

The CLIL methodological approach has become a popular and fast developing phenomenon in Europe. As revealed by the Eurydice survey (2005) “the initiatives in the field of CLIL have increased in recent years” (European Commission, 2005a: 55). CLIL type provision is part of mainstream school education in most countries at primary and secondary levels (Baetens Beardsmore, 1993). This provision is offered to between 3% and fewer than 30% of students at primary or secondary levels. In around a third of these countries CLIL also exists in pilot projects. A wide applicability of CLIL has recently taken place. For instance, in the Netherlands, more than 90 secondary schools used CLIL in 2006-2007 (De Graaff et al., 2007). In Estonia, the CLIL programme, which is nationally coordinated, has expanded from four schools to 48 institutions including kindergartens (Mehisto & Asser, 2007). Denmark, Greece, Cyprus, Portugal, Iceland and Liechtenstein are the only European countries in which CLIL provision does not exist due to historical factors or geographical remoteness (European Commission, 2005a).

The ‘European Schools’ existing since 1958 and situated in Brussels, Mol, Munich, Culham, Varese, Karlsruhe and Bergen develop the students’ home language while they also ‘promote a European identity through instruction for all pupils in at least 2 languages’ (Baetens Beardsmore, 1993: 122). Schooling aims to build up proficiency in a second language while students will learn non-language subjects and be examined. By the end of primary school ‘approximately 25% of the time-table is taken up via the L2’ (ibid: 127). A difference between the Canadian immersion model and European schools is the emphasis given to formal L2 instruction. European Schools allow L2 teaching as a distinct subject prior to using it as a medium for teaching content. While being used as a medium of subject matter instruction the L2 remains as a separate subject of the curriculum.

European Schools respect the students’ different linguistic backgrounds.

CLIL approaches in Europe are adapted to the multilingual and multicultural European settings which are tolerant to linguistic and cultural differences allowing a ‘movement towards a ‘lingua franca’, that is L2 is learned as a means of communication between speakers of various native languages (Leman, 1993: 87, Baetens Beardsmore, 1993: 126). L2 English has spread as ‘a lingua franca for both international and intra-national communication’ (Hoffmann in Cenoz & Genesee, 1998: 143). European students of various nationalities learn L2 English to communicate whereas French students in the USA seem to be assimilated in immersion classes in order to preserve national unity. The U.S.,

sheltered content instruction aims at preparing students to enter mainstream classes where they are integrated with L1 English-speaking students (Crandall, 1993). CLIL is adopted by countries in the European Community as a means to promote ‘plurilingualism, particularly ... achieving the MT+2 formula’, mother tongue plus two community languages, since it is considered to be an ‘educational innovation that suits the times, needs and aspirations of learners’ (p.11) (Marsh, n.d. a, Marsh, 2003). Through CLIL it may be possible to reach the goal presented in the White Paper (European Commission, 1995), considered by many people as utopian: trilingualism for European Union citizens.

Jäppinen (2005) reports that “European CLIL programmes have various aims related to culture, environment, language, content, and/or learning” (p.149). Such programmes may involve different quantities of L1 and L2 depending on the content (subject). Therefore, although language is an essential feature of a CLIL programme, language learning may not always be the focus of instruction. Van de Craen (2001) opposes to transferring research findings related to Canadian immersion programmes to European contexts. However, Jäppinen (ibid) avows that although studies related to immersion and bilingual settings can help CLIL implementation by providing some findings, European CLIL is a new phenomenon and there is not enough research in the area.

The types of content-based instruction for teaching ESL or EFL will be described: theme-based, sheltered, adjunct, immersion, Cognitive Academic Language Learning Approach (CALLA). Related research conducted world widely will be discussed focusing on research carried out in elementary school settings.

## **2.4 Forms and levels of CLIL**

Content-based language teaching postulates that language can be taught through the medium of subject matter. In this view, language is not the immediate object of study but the means to teach content. Throughout the process, incidental language gains are likely to occur (Brinton et al., 1989: 5).

Content-based instruction has been characterized by Snow (1991) as a method with many faces. Many forms and levels of CLIL exist varying from partial use of a second language in a subject to total immersion and from a few minutes in nursery classes to whole programmes in secondary schools. The council of Europe requires a minimum of 25% of

the lesson to be conducted in a foreign language in order to describe the class as a “plurilingual CLIL class” (Marsh & Marsland, 1999: 23). Language across the Curriculum, Language for Specific Purposes and Immersion Education are some approaches of content-based language teaching which have been developed following the direction of language and subject matter integration.

#### ***2.4.1. Language across the Curriculum***

School language policies have been formulated following the Language Across the Curriculum movement which began with the Dartmouth Conference in 1966 in England (Barnes et al., 1969). Language across the Curriculum was primarily used as a means of developing all L1 language skills following the suggestion of the British government in 1975 (Brinton et al., 1989). Moreover, students should be expected to get engaged in meaningful activities. Crossing all subject matter areas was considered to be an effective way to achieve this objective. It has been offered to native English speakers at the post secondary level by British and North American educators as a means of accessing activities in which language interacts with content. In this way, students were allowed to refine language skills. Gradually, the original focus was extended to involve L2 learning (Corson, 1990). Second language teaching has been influenced by this movement. However, a major difficulty faced when such language policies were attempted in schools was a lack of acceptance over the scope of the policy and the inability to modify school structures in order to involve the intentions associated with the language policy (May & Wright, 2007). Therefore, discussions were raised regarding teaching discipline-specific content without possessing professional qualifications, thereby causing complaints from other teachers or superficial teaching of content, which did not differ greatly from the content of any language teaching material. A “theorized approach” (ibid: 373) was thought to be required in order to implement literacy across the curriculum. Teachers should have professional knowledge regarding language learning processes. Another issue identified by May and Wright is the necessity to change school structures in order to consider the inclusive intentions of language across the curriculum policies. This could be achieved if language policies are cross-curricular, although this is difficult as school curriculums usually have rigid subject matter boundaries.

#### ***2.4.2 Language for Specific Purposes***

LSP courses have mainly developed in Britain being more common at the university level responding to academic needs of respondents. Such courses are also directed to adult learners serving real life language objectives related to certain occupations.

#### ***2.4.3 Immersion Education***

Immersion education was developed in Canada aiming to develop “fluency in an initially unknown language through content-based teaching in the second/foreign language” (Swain & Lapkin, 2005: 170), where students were “introduced to schooling via the L2” (Harley, 1993: 246). Second and foreign language instruction in Canada was based on content-based language teaching. A French immersion project which begun in 1965 was based on intensive exposure to the L2. The participants, which were English-speaking kindergartners, received the curriculum through French. Year-by-year research findings showed that subjects exhibited success in both the L2 and subject matter. Immersion is now a mass educational movement in the whole country. Lack of success is likely to be shown for immigrant pupils learning the L2 if total absence of instruction in their L1 happens (Brinton et al., 1989).

Recently, a number of content-based instructional models have emerged in the L2 teaching field. Next, three ways for integrating language with academic subjects are described: theme-based language instruction, sheltered content instruction and adjunct language teaching. The characteristics which distinguish the three models are examined.

### **2.5 Content and Language Integrated Learning models**

Among the most common variations in foreign language education, the theme-based language courses, sheltered subject matter instruction and adjunct/linked courses are most commonly used mainly for university level students (Brinton et al., 1989: 14).

The models of content-based language instruction form a continuum depending on whether the emphasis is placed on content or on language (Met, 1998). Content-driven approaches such as immersion and sheltered subject-area courses are placed at one end of the continuum emphasizing content-learning objectives: immersion, partial immersion, sheltered subject-area courses. In contrast, language-driven approaches are placed at the other end of the continuum. These approaches aim at language practice through the use of

content. In this sense, language courses which are built around themes may have a different level of commitment to their objectives related to content learning.

The CLIL continuum is described by Wesche and Skehan (2002: 207-208) as having two different end points. 'Strong' forms are placed on one end, while 'weak' forms of content-based instruction are placed at the other end. Strong forms focus on learning subject matter whereas weak forms emphasize language learning. The strong forms are Met's (1998) content-driven approaches emphasizing the mastery of nonlinguistic subject matter. On the other hand, the weak forms of content-based instruction are parallel to Met's language-driven approaches. Seemingly, there can be approaches to content-based instruction that do belong neither to the one or the other side of the continuum. Such approaches demonstrate more balanced commitment to both content and language learning needs of the students. For instance, adjunct courses fall in the middle of the continuum as they combine subject area courses with language support courses. Theme-based courses fall at the weak side of the continuum, focusing on language learning, whereas sheltered instruction is on the strong side emphasizing content learning.

### ***2.5.1 Theme-based instruction***

Theme-based or topic-based instruction aims to develop the learners' L2 academic language skills through interesting subject matter content. So, content is usually taught by a language teacher and not a subject specialist. Linguistic objectives are already set in the curriculum, so themes are selected for their relevance in providing suitable contexts and examples to meet the objectives. Major curricular units are organized upon themes which need to be appropriate to student interests. Therefore, a language curriculum is designed around specific topics drawn from content areas forming the backbone of the language course. For instance, several unrelated topics may be used in a two month topic-oriented course such as healthy diet, air pollution and respiratory disease. The topic can be introduced as a reading text, new words are used in discussions, audio taped materials are used for practising listening, and writing tasks are used to consolidate what has been learned. Topic-based courses may include a variety of text types, teacher presentations, video presentations, news articles and guest lecture talks. The aim is to enhance learners' academic language skills through interesting content. Oral and written texts are used for exploring grammar, vocabulary and productive skills, making oral presentations, responding to questions etc.

In contrast to traditional language courses in which topics are used in isolated activities related to one of the four language skills, topic-based language courses involve contextualization of activities. Materials in topic-oriented courses are either teacher-generated or adapted from various sources and effort is made to integrate the four skills while approaching the topic. Exposing students to this kind of activities is likely to provide opportunities for higher levels of language processing such as “comparing” and “synthesizing” (Brinton et al., 1989: 15).

Theme-based courses place emphasis on language aims. They constitute the weakest form of content-based instruction models aiming to develop students’ L2 communicative proficiency in contrast to stronger versions aiming to master the subject matter.

Theme-based model is relatively easy to implement, as there is no demand for organizational or administrative adjustments. Language instructors therefore operate autonomously selecting topics to match pupils’ interests. Theme-based programmes can be developed for EFL learners of any age and level of proficiency, from beginning to advanced students (Crandall, 1993; Leaver & Stryker, 1989).

Theme-oriented modules are offered at the elementary and secondary levels of the Los Angeles Unified School District (LAUSD) as part of its programme for developing English. Students who are Limited English Proficient (LEP) in grades 5-7 attend theme-based instruction on various topics, such as map skills by language teachers who are trained in content ESL instructional techniques. Allen and Howard (1981: 535-550) describe another theme-based programme in the Ontario state school system offered to grades 9-10. The programme aimed to provide links between language and ESL learners’ subject-area courses. Chamot and O’Malley (1987) refer to the Cognitive Academic Language Learning Approach (CALLA) which was developed in order to help the LEP students of the U.S. state schools. This approach aimed to smooth the transition from ESL classes into mainstream subject matter classes focusing on academic language enhancement activities. Similarly, in the state schools of Vancouver, British Columbia, a theme-based second language course has been implemented since 1981. The teacher’s book includes several sample lessons and useful materials to be used in the K-12 classroom (Early et al., 1986).

Programmes of this type have been implemented in postsecondary level EFL settings such as in Indiana University and Northern Arizona where students study language and civilization in the first case and Greek mythology in the second through the medium of French. The WESL Institute of the Western Illinois University, the University of Southern California and the American Language Centre (ALC) developed theme-based courses in ESL context (Brinton et al., 1989). Although it was admitted that students were provided opportunities to work on their L2 fluency, a call for better methods for combining form, function and content was heard.

### ***2.5.2 Sheltered subject matter teaching***

Sheltered instruction is a term used in the U.S. A sheltered content-based course is “taught in a second language by a content specialist to a group of learners who have been segregated or sheltered from native speakers” (Brinton et al., 1989: 15). It should be differentiated from European settings where CLIL learners are not segregated from native speakers. In sheltered teaching, second language learners are deliberately separated from native speakers of the target language in order to be taught content in their level of proficiency in the L2. In this way, students can be exposed to a more comfortable learning environment where they “can benefit from the linguistic adjustments made by the teacher” (Räsänen & Marsh, 1994: 20). The content specialist has previously taught the same course to native speakers and needs to be trained and sensitized to the students’ language needs as well as the principles of the language acquisition process (Crandall, 1993) in order to make instruction more “accessible” to ELLs (Short, 1994: 583). In this way a supportive atmosphere can be provided which can reduce learners’ anxiety and necessary adjustments in language use can be made to enable comprehension. Alternatively, some authors such as Gaffield-Vile (1996) refer to the possibility that the instructor may be a language teacher with subject matter knowledge.

Sheltered instruction aims at developing language abilities. However, its overall purpose is content learning rather than language learning. Therefore, this model constitutes a ‘strong’ form of content-based instruction. By placing students in the same linguistic boat it is anticipated that they may reach gains from the linguistic modifications, such as simplified speech made in classroom communication and lesson delivery (Curtain, 1986). Reading texts need to be selected for their clarity while emphasis is placed on reading and listening rather than on productive skills. The sheltered class teacher may adapt the language of the oral or reading texts, using some language techniques, i.e. visuals, graphics, cooperative

work, in order to enable learners of various L2 proficiency levels access knowledge (Spanos, 1989, Freeman et al., 1987). Appropriate materials can be adapted or created and review handouts and exercises can be prepared. Crandall (1993) points out that more emphasis is “placed on learning through verbal interaction and experience than on textbook reading and teacher lecture” (p.116) stressing the need to investigate whether less content is being learned in this way. Spanos (1989) observes that many of the techniques used in sheltered courses are found to act positively on both weak and strong first language learners. L2 research may shed more light to whether positive outcomes of CLIL in L1 learning apply to L2 learning.

Sheltered instruction was originally developed in Canada at the University of Ottawa as an alternative to the conventional university foreign language class (Edwards et al., 1984). Following this programme, intermediate level students of English and French as a second language attend sheltered classes of ‘Introduction to Psychology’ given in their L2. Psychology has been offered to learners at a lower second language proficiency level than the usual through structured content, emphasizing receptive learning and providing appropriate textbooks. In this way, students are exposed to the L2 through readings, oral and written communication taking place in the content course. The course is offered to Canadian students who want to develop their functional second language skills in English or French, and to foreign students being admitted to university programmes. Brinton et al. (1989) note that of the approximately 175 students being involved in sheltered courses through 1985, only 2 failed their content course. The teachers who participated exhibited enthusiasm although they had increased work load because they saw positive results in the L2 development. They also witnessed increased self-confidence on behalf of the students. Another sheltered programme has been implemented at the Graduate School English Language Centre in Beijing, China (Brinton et al., 1989). Gaffield-Vile (1996) showcases the development of a sheltered sociology course in Britain. The model was designed to develop language and study skills and therefore combined subject content with English language development. Reading skills were developed through sociology texts, where students practised skimming and scanning for key ideas, summarizing and interpreting information in diagrammatic form. Writing skills were enhanced through essay writing, listening was developed through grasping the gist of aural texts, while speaking was enhanced through giving information, agreeing or disagreeing, requesting clarification and giving oral summaries of main ideas. Gaffield-Vile (1996) maintains that sheltered courses provide an effective way of integrating language and content learning for learners

whose language skills have not yet been developed, thus helping them to progress successfully in subject matter courses.

Sheltered instruction in English is offered in the U.S. as a means to prepare minority students for mainstream classes. However, if the number of minority students is not sufficient to create sheltered content instruction, then both English-speaking and nonnative students are placed in the same class and are offered sheltering instruction (Cochran, 1989) where learning is based on verbal interaction instead of approaches such as textbook reading. Although some teachers worry that sheltered programmes result in reduced content (Penfield, 1987), it has not yet been made clear whether this approach produces less learning outcomes.

A great disadvantage of the sheltered model is the difficulty to find content area instructors familiarized with the language needs of limited L2 proficiency learners or L2 language educators with a strong background in teaching the content subject.

### ***2.5.3 Adjunct courses***

Adjunct courses are directed to students who attend regular content courses but who lack the competence to follow the course successfully if additional help is not provided. So, a language course is linked to an academic course aiming to assist an existing discipline class (Snow & Brinton, 1988). Students attending the adjunct language instruction are enrolled concurrently in both a language and a content course. Learners are offered sheltered instruction in the language course and integrated teaching in the content course where second language learners attend the same class with native students. The subject matter instructor in an adjunct course concentrates on academic concepts while the language teacher focuses on language skills such as writing or reading, offering contextualization of language learning through the academic content. In this way, the adjunct classes serve as support classes for regular subject matter courses. Such programmes could have history with ESL writing, Geography with ESL reading etc. Murphy and Stoller (2001: 4) remark that both sheltered and adjunct approaches lead to the non-superficial exploration of a content area by focusing on a topic that remains constant for the duration of an entire course.

Implementing the adjunct model requires great cooperation to ensure that the curricula of the two courses complement each other, and modifications are necessary in order to

achieve this (Brinton et al., 1989). Synchronization between instructors is considered vital. The two classes need to have a syllabus which can be negotiated. Blanton (1992) advocates that the adjunct model “requires a willing interaction and co-ordination among teachers in different disciplines so it may be administratively difficult to arrange” (p.287). Both language and content instructors need to attend meetings to decide on the aims of the programme. The English syllabus needs to be coordinated with that of the subject matter course; the L2 English instructor needs to get familiarized with the content, and can often attend the content class. Complementary assignments need to be discussed by both content and language teachers. The adjunct model is disadvantaged in that it is normally directed to learners with advanced language skills in order to help them to be involved in content lessons with native learners. Its aim is to introduce students to the demands of university work. The seven week UCLA Freshman Summer Programme in the United States aiming to offer freshmen a smooth transition from high school to college is an example of implementing the adjunct model. This drawback has led many authors to provide support for more holistic or thematic approaches as a means of promoting language acquisition and linking language to content (Blanton, 1992; Benesch, 1992).

Theme-based, sheltered, and adjunct courses consider content as the organizing principle of the lesson. A topic remains constant “long enough to lead to the nonsuperficial exploration of a content area” (Murphy & Stoller, 2001: 4). Language is viewed as a medium for learning content and content is the resource for language learning. Information is acquired through contextualized language. Authentic materials are used in all models such as newspaper articles, audio- and video-tapes, which are not produced particularly to be used in a language class. Teachers adapt or supplement these materials to match students’ linguistic level. However, although adaptation is usually necessary to ensure clarity of content, students may sometimes need to come across unadapted texts as a form of ‘reality test’ for teaching compensatory strategies (Brinton et al., 1989: 93). Specific strategies are used to help children comprehend the material presented in the class. Frequent comprehension checks, exemplification and advance organizers are used to accommodate the needs of L2 learners.

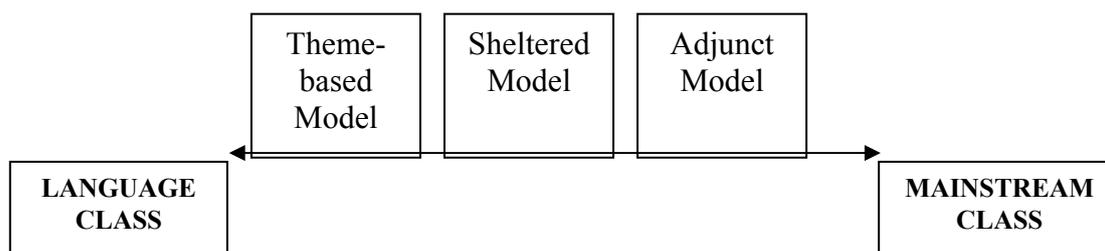
The three models differ in the course purpose and learning focus. While in the adjunct courses both content and language objectives are given equal importance, content learning in the theme-oriented language courses and language learning in sheltered content courses are considered incidental. Regarding the instructional format of the models, the level of

explicit integration of language and content differs. The language course has a content orientation in the theme-oriented model whereas in the sheltered model the primary focus is learning content. In the adjunct model integration of language and content aims is achieved. Therefore, instructors assume different responsibilities in the various models. The language instructor assumes responsibility for both language and content instruction. The content instructor has responsibility for content and language instruction in the sheltered model and finally in the adjunct model, the language teacher assumes responsibility for language instruction whereas the content instructor is responsible for delivering content. Student population differs in the models. Topic-based and sheltered courses shelter second language students when presenting material whereas in the adjunct model, ESL students are segregated in a language course but are also enrolled in a content course where they attend lessons with native speakers. The focus of evaluation also differs. Learners in theme-based courses are evaluated on second language development whereas students in sheltered courses are evaluated on content knowledge. Students in the adjunct programmes are evaluated in both language and content courses.

The theme-based model seems to be appropriate in settings where there are no content courses available. Minimal changes in the institutional structure are involved even when interdisciplinary links can be made. Furthermore, this model may be provided to students of all levels of language proficiency. Brinton et al. (1989) believe that neither the sheltered nor the adjunct model is appropriate for lower levels of second language proficiency due to the “inherent linguistic and conceptual complexity of academic subject matter” (p.20). The sheltered model seems to be suitable for intermediate to high intermediate levels, whereas the adjunct model can be implemented at high intermediate to advanced levels of proficiency. As far as the materials used in the classes are concerned, theme-based teaching involves authentic materials from newspapers, radio broadcasts etc which have been adapted for language teaching purposes. Commercial ESL texts may also be used as supplementary material. In sheltered and adjunct courses the content texts are selected to the learners’ language proficiency level. Graphic organizers may be used in the reading materials.

The three models of content-based instruction can be viewed as different points on a continuum as different levels of content integration, where authenticity of materials is implemented. To illustrate, if the extreme left of the continuum represents the traditional

language class, and the opposite point the mainstream class, the models can be placed on the continuum according to their proximity to the two types of classrooms (Figure 2).



**Figure 2:** Models of content-based instruction (Brinton et al., 1989: 23)

Brinton et al. (1989) restrict the use of the three models to postsecondary settings. However, further research could show the applicability of the models in elementary school settings.

Next, the outcomes of CLIL implementation concerning students' attitudes, L2 vocabulary development, and academic gains are discussed.

## **2.6 Implementing Content and Language Integrated Learning**

Research findings regarding students' academic gains are at a preliminary stage. However the majority of research findings available, seem to support learning content through the L2. A number of CLIL models have been implemented in various educational levels in many countries of the world, witnessing successful outcomes.

In this study the research outcomes of CLIL implementation both inside and outside Europe will be considered.

### **2.6.1 Studies revealing negative outcomes or no benefits**

Macnamara (1966) studied L1 English primary school students who were being provided Irish education. The pupils were almost one year behind in problem arithmetic in comparison to their counterparts taught through English. They were found to be disadvantaged only in the area of arithmetic, although not in mechanical arithmetic. However, the study could have provided more valid results if the experimental immersion group had taken the test through their L1 English or both languages instead of their weaker language.

Torrance et al. (1970) findings demonstrate that more than one thousand children at grades 3, 4, and 5 who were being provided education through L2 English in Singapore, exhibited a significantly lower fluency level at the Torrance Tests of Creative Thinking. However, the study lacks information on the exact level of L2 use in the classroom as well as whether the control and experimental groups were tested in terms of IQ.

Skutnabb-Kangas and Toukomaa's (1976) findings accord with the results of earlier studies showing that bilinguals do not reach the same academic standards as their monolingual counterparts. More specifically, Finnish migrant children in Sweden exhibited below than the satisfactory level in both L1 and L2. The level of literacy skills that was accomplished was much lower at the age of seven to eight years than at the age of ten, indicating that the level of student's knowledge of L1 affects significantly L2 acquisition. However, more information on the bilingual learning conditions would have provided an explanation about the students' deficit. Similarly, Dodson and Thomas's (1988) studies examining the effects of Welsh immersion revealed that primary school students who were taught in their home language were more able to grasp concepts than immersion students.

Evaluation of the Canadian bilingual education experience did not show the positive outcomes that were predicted, namely, improved language skills (Harley et al. 1990a; Lightbown & Spada, 1994). Students involved in immersion programmes did not reach the level of oral production of their francophone peers (Cummins & Swain, 1986). To the surprise of the researchers evaluating the Canadian bilingual education experience, early immersion was not necessarily linked to L2 development. More specifically, "early immersion students tended to make proportionally more use of relatively high-coverage verbs..." and even worse "they showed evidence of fossilized errors..." (Harley et al. 1990b: 23). This could be attributed to the focus placed on content learning in CLIL environments. Swain's (1988) studies of French immersion programmes have shown that content teaching is not linked to good second language teaching as it does not draw attention to functionally appropriate form-meaning connections. This is possibly due to the fact that "correction of content takes precedence over correction of form in order to preserve the communicative flow" (Swain, 1988: 76).

More recently, Langman (2003) conducted a yearlong case study of a seventh-grade classroom taught Science by a content specialist trained in ESL teaching. As it was shown,

although the use of ESL strategies such as non-linguistic representations and defining objectives were effective in content learning, they did not enhance students' academic English. Learners were reduced to "incidental language learning opportunities" (ibid, 2003: 14) as they did not receive any explicit language instruction. Therefore, little English language improvement was observed.

In a large-scale study on the effects of CLIL on Swedish students' L2 vocabulary development, it was revealed that the size of the learners' L2 English vocabulary was influenced more by reading English texts outside of the school curriculum than CLIL per se (Sylvén, 2004). The fact that CLIL was not decisive on the outcomes of vocabulary tests, requires CLIL methodology in order to increase the positive outcomes of CLIL on L2 vocabulary development.

Mehisto and Asser (2007) carried out a study in order to examine the stakeholders' perspectives about CLIL teaching in Estonia. Research instruments included a questionnaire which was administered to both experienced and inexperienced CLIL teachers teaching in grades 1-5. Seventy-three percent of the 41 teachers participating in the study reported that one to three students in their classes were not eligible for studying in CLIL due to academic weaknesses, lack of motivation and discipline problems. The researchers argue that an organisational response is required to address these students' needs instead of excluding them from the programme.

Wannagat (2007) reports the negative effects on subject matter achievement of CLIL students. The researcher examined the academic results of 66 students in two L2 English-taught history classes in Hong Kong and Germany in the age range 15 to 16 (grades 9 and 10). These results applied to students of all ability levels. Wannagat attributes this failure to the way that English as a Medium of Instruction was implemented and that instead of switching to mother tongue medium education, "a thorough reform of the EMI system" (ibid: 680) should have been considered. A CLIL lesson delivery model seems to be necessary in the field in order to improve academic results.

Seikkula-Leino (2007) cautions that CLIL students may not manage to reach maximum results in subject matter learning. CLIL participants attending grades 5 and 6 in a Finnish comprehensive school have reported that they have faced difficulties in comprehending content. More importantly, their self concept was significantly weaker than that of the

students who were learning content through L1 Finnish. Teachers admitted that they sometimes encountered problems achieving their goals describing CLIL as very demanding for students; pupils are learning content while simultaneously trying to overcome communicative problems. Learners may be exposed to a great amount of unknown vocabulary which may affect negatively their self-concept.

### ***2.6.2 Positive attitudes towards CLIL***

Students have demonstrated positive attitudes towards the CLIL approach by exhibiting increased motivation and interest levels (Chapple & Curtis, 2000, Grabe & Stoller, 1997). Similar findings have been observed in Hong Kong with tertiary level learners (Chapple & Curtis, 2000), in Australia with primary school learners (Chapell & DeCourcy, 1993), and in Indonesia (Chadran & Esarey, 1997) where efforts have been made to integrate language and content.

More recently, Merisuo-Storm (2007) examined the attitudes of bilingual students provided 20% of the lesson through L2 English and found out that these were significantly more positive than those of the pupils in monolingual classes. The researcher realized that the learners “enjoyed using the English language” (p.231). In particular, the children in the bilingual classes exhibited significantly more positive attitudes towards speaking in English than the children in the monolingual classes. The researcher concludes that continuing and further developing CLIL is worthy.

### ***2.6.3 Studies revealing foreign language gains***

Evidence suggests that CLIL can be an effective approach for language teaching at all stages of instruction, from primary school to university levels in both second and foreign language teaching classrooms.

Early studies examining the L2 performance of children involved in early total immersion have found a significant difference favouring immersion students. For instance, Barik and Swain (1975) evaluated the performance of pupils in grades K-2 involved in the French immersion programme in Ottawa public schools. Results were compared with those of pupils attending the regular English programme. Immersion pupils exhibited a considerably higher level of achievement in French than pupils of corresponding levels being taught French-as-a-second-language. Barik, Swain and Gaudino (1976) examined the results of the Peel County Bilingual programme implemented in Canada, in grades 8, 9,

and 10, for the year 1973-1974. The tests showed that the students in the bilingual programme continued to score significantly higher than their counterparts in the regular L2 French programme on almost all measures of French achievement. Findings coincide with those of Brinton, Snow and Wesche's (1989) study which revealed that students involved in content-based classrooms demonstrated significant gains which usually exceeded those of pupils in traditional ESL classes. However, in the Barik et al.'s (op cit) study "the learning of useful French vocabulary was more progressive in the regular programme" (pp. 110-111). There had been no significant increase in the amount of useful L2 French vocabulary scores of the grade 10 bilingual group from that obtained the previous year. These outcomes demonstrate that a 'plateau' of useful vocabulary is reached in bilingual classes in the first two years.

More recently, Stoller (2004) reports that empirical studies indicate that the students being involved in such courses exit the courses with improved language abilities. These findings accord well with the results of CLIL implementation in Estonia where the students involved exhibited development in the four language skills of the target language (Mehisto & Asser, 2007).

Short (1994) investigated English language learners in middle school Social Studies classrooms. A series of lessons which integrated language and content objectives were implemented. Retention of new vocabulary was achieved due to the extensive use of graphic organizers.

Merisuo-Storm (2007) found that the students being involved in bilingual instruction for the first two years of primary schooling "acquired a considerable amount of English vocabulary" (p.231). These children which were attending three bilingual classes in three different schools were able to recognize words in written and oral form unlike their monolingual counterparts which were attending three classes of the same schools. Similar gains have been observed in 6<sup>th</sup> grade CLIL classes in Cyprus (Xanthou, 2009). Research review related to the learning outcomes of European CLIL carried out by Dalton-Puffer (2008) shows benefits on vocabulary and receptive skills.

Efforts to integrate content and language learning have also occurred at the tertiary level. These are mainly drawn to "sustained content language teaching", that is, integrating one subject area into language classes for an extended period of time (Murphy & Stoller, 2001:

3-5). The majority of studies coming from tertiary education show positive outcomes from CLIL implementation (Burger et al., 1997). Kasper (1997) for instance, evaluated the long-term influence of content-based ESL instruction comparing the performance of students being enrolled in content-based courses with that of learners who attended non-content-based courses. The first group scored higher in L2 English examinations. Burger and Chretien (2001) investigated the oral language development of students attending a university psychology course at the University of Ottawa and an adjunct language course. Learners seemed to have measurable gains in fluency and accuracy of oral language skills.

#### ***2.6.4 Studies revealing positive academic outcomes (content knowledge gains) and cognitional development***

There is a great concern as to whether CLIL students can keep up in their academic performance with students attending classes in their home language (Cummins & Swain, 1986). The majority of research findings suggest that students acquire content area knowledge when instruction is carried out in the L2 similarly to the way they acquire it when they are taught in their native language. Early research examining the effects of French immersion revealed that students taught through L2 were not weaker in the subject taught than their counterparts who were taught through their mother tongue. The performance of pupils in grades K-2 involved in the French immersion programme in Ottawa public schools was investigated by Barik and Swain (1975). Throughout grades K-2, the pupils in the two programmes performed equivalently in mathematical skills and showed the same level of cognitive development. Similar findings have been reported by Genesee (1987). Grabe and Stoller (1997) reviewed research showing that content-based instruction can be effectively implemented in K-12 ESL and foreign language contexts allowing effective content learning. Stoller (2004) reviewed articles related to implementing content-based instruction between 1990 and 1998, and discovered that the different forms of CLIL enable students to “continue their academic development while also improving their language proficiency” (p.262). The limited number of controlled empirical studies demonstrates that CLIL students acquire content-area knowledge and simultaneously develop their language abilities.

Gilzow and Branaman (2000) describe seven successful early-start foreign language programmes supported by two projects funded by the U.S. Department of Education: the National K-12 Foreign Language Survey Project and the Improving Foreign Language Education in Schools Project. Five of these projects were content-enriched with some

concepts from subjects such as Geography, Maths and Science being taught in the foreign language. The other two programmes involved teaching school subjects in the second language, as these were immersion programmes.

Stohler (2006) did not find any significant differences in content learning between learning subject through L1 and learning through L2. The researcher interviewed pupils at grades 4 to 9 in schools of Switzerland after attending lessons in L1 and then in L2 German or French. The same group of children were equally successful at reproducing information after attending a lesson in L1 and in L2, indicating, that “in either case the pupils are capable of reproducing the conceptual fields taught in class” (p.44).

Marsh (n.d. b) assures educators that CLIL can broaden the learner’s conceptualization or the way of thinking, while working with another language. That is, understanding of concepts is enriched while the student thinks in different languages expanding “conceptual mapping resources” (p.8). In this way, better association of various concepts can be achieved.

Research evidence assures educators and parents that CLIL students will not fall behind. Van de Craen et al. (2007) describe the results of a CLIL project in Brussels, where CLIL was implemented in three primary schools. Students were taught one subject matter in French for approximately 2 hours a week while the rest of the subjects were taught in Dutch. A standardized Mathematics test comprised of 9 subtests was administered in the three CLIL schools and in one control school in order to examine students’ cognitive development. Findings suggest a positive effect of CLIL on cognitive abilities.

Kasper’s (1997) study comparing students’ performance in content-based versus non-content-based ESL classes in tertiary education, revealed that the first group was positively influenced by the approach, thus exhibiting better performance during instruction as well as after the content-based experience.

Merisuo-Storm (2007) examined the outcomes of bilingual teaching on the development of students’ literacy skills. The three bilingual classes of three different schools in Finland involved 20% of the instruction in L2 English. Students’ development was observed throughout the first two years of primary schooling. As it was shown, the literacy skills of the CLIL students e.g. mathematical skills and memory, were significantly better than

those of their counterparts in the monolingual classes. These findings corroborated the findings of earlier studies demonstrating more successful concept formation by bilinguals. For instance, Liedke and Nelson (1968) examined concept formation of French-English bilingual grade 1 students finding that their performance was significantly better than the performance of the control group which was matched for IQ and was taught content through L1. This could be attributed to the increased amount of social interactions which take place when learning through L2, involving constant scaffolding from teacher and peers, thereby offering more experiences. Liedke and Nelson's findings concur with Bain's (1975) who found that grade 1 French-English bilinguals were more successful with rule discovery than their counterparts who were taught content through English L1, despite the fact that although the two groups were matched for IQ. The study is limited in that there is not much information about the bilingual learning conditions.

Coonan (2007) conducted a three-year study with secondary school teachers in Italy aiming to explore the effects of CLIL on both language and non-language subject. Interviews revealed that the majority of learning operations during the lesson were "transforming" and "interpreting" rather than "finding" and "transferring" (p.633). It was revealed that in CLIL the teachers employ an interactive mode of teaching including both a T – SS interaction and a SS – SS interaction in contrast to lessons conducted through L1 that would be frontal at a 90% of the lesson. CLIL teachers seem to realize that the latter mode, which aims simple transmission, is inadequate. Comprehension in CLIL classes cannot be taken for granted. The teacher needs to design interactive activities in order to facilitate input and output processes. The researcher concludes that the L2 used in the CLIL class adds a cognitive burden to the learners, affecting positively the way they learn content. Because of this burden, the teachers make more efforts to help students learn content. At the same time language growth is nurtured in a content-based environment, using the L1 only as an instrument to diminish the learning difficulties that may occur.

Serra's (2007) longitudinal study of CLIL implementation in three Swiss primary schools reveals successful learning of Maths of L1 German students learning subject through L2 Italian. The researcher concludes that "the development of Mathematics proceeded at the same pace and produced comparable results as in monolingual classes" (p.600).

Seikkula-Leino (2007) reached similar conclusions in her investigation of how successfully 116 students from grades 5 and 6 had learned content in CLIL classes of a Finnish

comprehensive school. The language of instruction did not cause any major differences in learning content. Pupils of similar ability level seem to be able to succeed in both ways, although learning through the mother tongue may provide more opportunities to overachieve. However, CLIL students have the privilege to be provided more opportunities to reach a high level of proficiency unlike traditional subject matter learning through L1.

Research on the implementation of CLIL in Estonia (grades 1-5), attests to the programme's success. Curriculum expectations in Mathematics and Science are met by Estonian students who are studying the subjects through the medium of Russian (Mehisto & Asser, 2007).

Van de Craen et al. (2007) point out that in primary school settings subject matter learning can be equally effective in CLIL classes as elsewhere. Moreover, CLIL students' cognitive development may be even greater when they have attained a high level of L2 skills. Barik and Swain (1976) provided empirical weight to this hypothesis. A longitudinal study was carried out over a 5-year period (grades K-4) on pupils attending a French immersion programme. Repeated measures analysis showed that the immersion group had a higher IQ-measure than the pupils taught through L1. Furthermore, students with higher L2 skills involved in Canadian French immersion had significantly better performance on two out of three IQ tests than students with low L2 skills. The IQ scores of the second group remained the same after three years whereas the first group increased their performance.

Cummins and Swain (1986) conclude that "there may be threshold levels of linguistic competence which a bilingual child must attain both in order to avoid cognitive disadvantages and allow the potentially beneficial aspects of becoming bilingual to influence his cognitive functioning" (p.18). A satisfactory level of competence at both L1 and L2 may be required in order to allow positive effect of CLIL on cognitive functioning.

Language is a part of one's thinking process (Vygotsky, 1962). The CLIL approach assumes that the foreign language as a main tool in the thinking process and not just a vehicle for instruction. This implies that thinking processes can be studied through content learning. Jäppinen (2005) examined Finnish mainstream L1 students' thinking and learning processes in CLIL classes. Cognitive development was examined in terms of

concepts and conceptual structures. The study involved 669 learners ranging from 7-15 years attending L1 mainstream schools being divided into three age groups: 7-9, 10-12, and 13-15. The experimental group (335 learners) was taught through an L2, while the control group was taught through the learners' first language by 46 teachers in total. The results showed that the second age group aged 10-14, exhibited faster cognitional development. CLIL learners create "analogical learning systems" (ibid: 153) based on their first and foreign languages which influence learning. This analogical reasoning process involves finding similarities and differences between the foreign language and the mother tongue on semantic, cultural and social bases. The results showed that younger learners faced some difficulties learning abstract concepts through a foreign language, while older learners did not exhibit differences perhaps because the subjects' difficulty did not allow much exposure to CLIL. In general, the study demonstrates that Finnish CLIL classes support students' "thinking and content learning" (p.162). More specifically, findings show that getting involved in CLIL at the age of 7-9 can be more demanding than being taught through the first language. One should therefore select topics related to students' immediate environment when learners are very young. However, learners can gradually attain the required abilities to cope.

Wannagat (2007) underscores that CLIL facilitates the enhancement of subject matter knowledge. A related research review by the researcher suggests that learners in CLIL environments are involved in processes which develop concepts more precisely. Learners are allowed to analyze, hypothesize, develop learning techniques and finally enhance their autonomy.

Recently, CLIL type education is increasingly being considered as a brain stimulant which can finally "enhance the brain's learning capacity" (Van de Craen & Mondt, 2003: 209). Learning in this context can be viewed as an added value to the development of brain since "complex learning environments are better than simple ones" (ibid: 211).

The Chomskyan approach posits that the language faculty is a distinct system located in the mind/brain with its initial state being the same to people (Chomsky, 1986). Appropriate experiences enable this faculty to reach a certain state which undergoes peripheral changes such as acquiring new vocabulary. This view is challenged by neuroscientific views which consider the existence of a special system responsible for language learning as non realistic (Van de Craen & Mondt, 2003).

Collectively, research findings suggest that CLIL may have positive outcomes on learners' second/foreign language. However, scientific research regarding CLIL implementation, particularly in primary school settings, is still at an embryonic stage. Van de Craen et al. (2007) note that "in 2006, research evidence on the outcomes of CLIL learning and teaching on different levels in different countries is scattered, non systematic and very incomplete" (p.3). Researchers do not seem to have reached a consensus on the efficacy of the particular programme in both content and L2 knowledge. Gramkow (2001) talking about the Danish CLIL experience in primary and lower secondary schools, in the project TL2L (Teaching and Learning in a Second Language) – the others being the Netherlands, Sweden, and Bulgaria - urges the need for "more investigations into the effects of CLIL teaching" i.e. "more dissemination of experiences and results" (p.13). Further, Wesche (1993: 74) stresses the need for carrying out more longitudinal studies related to content-based language learning in order 'to confirm linguistic, academic and attitudinal outcomes of content-based approaches' and therefore dispel educators' misgivings that it may not have positive outcomes. Chapple and Curtis (2000) stress the need to investigate students' perspectives on learning content in EFL settings which is an aspect being absent from the literature on the use of this approach. Lee (2005) carried out an extensive research review of studies in the area of CLIL at the elementary and secondary levels, finding that research in Science learning and teaching through L2 English involved mainly qualitative methods, and unfortunately very few experimental or quasi-experimental studies.

Brinton et al. (1989) stress the need for more empirical data in order to determine the effectiveness of CLIL programmes. Dalton-Puffer and Nikula (2006) point out that "there is still relatively little research on European CLIL education" (p.242) while the existing studies have concentrated on the effects of the approach on L2 and content mastery. How CLIL instruction can best be implemented and evaluated has not yet been considered. Tzvetkova and Kirilova (2001) report the results of CLIL implementation in grades 9 to 11 in Bulgaria as a part of the TL2L project mentioned above. The teachers' questionnaire identifies the need for "developing CLIL methodology taking into account...the changes in the sphere of education in general" (p.27). Cammarata (2009) has explored foreign language teachers' experience of learning to teach using content-based instruction. Data consisted of texts collected during interviews conducted with three EFL teachers enrolled in a professional development programme. One participant pointed out that CBI is more suitable for elementary schools than for universities, as the elementary curriculum is more thematic. However, the findings suggest that the implementation of CBI can be a

“professionally intimidating experience” (p.580). The need for the teachers to wear two hats, by having to deal both with content and language, caused feelings of incompetency. This challenge seems to add to the teachers’ “fear of becoming instructionally ineffective” (p.576). One of the participants confessed that “as a language teacher, I am not an expert in economics, politics, history...sometimes I feel I am not qualified” (p.576).

Implications impose the need for “developing models demonstrating in-class instructional performance of CBI” (p.580) in order to scaffold the learning process. When CLIL is successful then learners can “master both language and content through a reciprocal process as they understand and convey varied concepts through their second language...” (Wesche and Skehan, 2002: 220). In order to have successful outcomes in CLIL classes, then CLIL methodology may need to be considered.

The development of a CLIL lesson delivery model that would help teachers to improve instruction may prove to be useful in the area. Teacher-led action research projects are desirable in order to obtain rich data.

### **Evaluating CLIL learning**

Evaluating how well foreign language students have mastered content involves some problems. Both in sheltered courses and in the content part of adjunct courses, learners are evaluated on content mastery. Normally, this evaluation needs to resemble how L1 learners are treated when learning content in L1.

Instructors of foreign or second language learners confront this serious situation when preparing tests. Students acquiring content are disadvantaged when evaluated due to underdeveloped second language skills. If accurate language is required, the second language learner may have difficulties to demonstrate content knowledge. Brinton et al. (1989) provide some examples of causing difficulties to L2 learners such as tests involving long readings, verbally tricky multiple choice distractors, essay questions and research papers. Instead, focusing on brief and less verbally demanding tasks could be a possible adjustment of content evaluation.

Assessing ELLs’ subject matter knowledge has been characterized by Lee (2005) as “one of the thorniest difficulties in educational policy and practice” (p.508) as definite

conclusions related to whether ELLs should be assessed in L1 or L2 have not yet been reached. Cummins (1981a) has formulated the interdependence hypothesis suggesting that cognitive academic knowledge is stored in a specific place and can be retrieved and used in either L1 or L2. However, the prerequisite to succeed in this is an adequate or threshold level of linguistic knowledge in both languages in order to protect the student from being underrated when L2 proficiency is not adequately developed. For instance, a summary of nine years of testing students involved in early total immersion in Ontario showed that they performed equally well or even better than their L1 English comparison groups (Swain & Lapkin, 1982). Accordingly, when the L2 skills are not sufficient children find difficulties in coping with the subject content taught in the L2. For example, one or two years exposure to the L2 was not found to be adequate for late immersion students in grades 8, 9, and 10, whose performance was often inferior to the comparison group in middle school classes (Barik et al., 1976). Only when immersion students were offered L2 French instruction all school years before the immersion year could keep up, at the secondary school level, with the standards of their counterparts taught content in L1 English (Genesee et al., 1977). When CLIL students do not possess the necessary L2 skills, “testing in a second language is a risky business if one wishes to measure accurately subject content knowledge” (Cummins & Swain, 1986: 40), because children may not precisely reflect their exact level of knowledge.

Although assessment in L2 may increase test validity by diminishing the effects of students’ first language, current approach as suggests the incorporation of L1 in CLIL assessment. Solano-Flores & Trumbull (2003) argue against assessing Science learning through L2, suggesting that L2 students should be given the same test items in both L1 and L2 in order to reach greater understanding of the interactions among the test takers’ L1 and L2 knowledge, their content knowledge, and the linguistic and content demands of the test. Assessing in L2 may not allow ELLs to demonstrate knowledge in their L1, thereby underestimating their content knowledge. In other words, information may be missed when assessed in L2 English. Assessing in L1 would prioritize students’ L2 knowledge over their content knowledge. However, one should consider that if instruction is mainly in the L2, then assessment in the L1 will not uncover an accurate picture of content knowledge. Although research by Hampton and Rodriguez (2001) showed that the fifth-grade students performed comparably when responding either in their L1 or in L2 English, it seems fairer to administer assessment tests in both L1 and L2.

Good evaluation instruments should meet some criteria. The student's performance needs to be structured through an elicitation procedure. The test could include highly structured multiple-choice or fill-in-the-blank items and move to interview questions and open-ended topics (Brinton et al., 1989). Test scoring needs to reflect the criteria set by educators in other subject matter courses which attribute more importance on content coverage than on correct language use.

The evaluation procedure needs to be fair in order to ensure reliability of findings. This refers to the test's consistency when handed to different individuals or with the same individual on different occasions (ibid: 191). In order to have consistent measurement, careful scoring is required which is linked to clear instructions. Moreover, tasks should not provide opportunities for guessing, the test's format needs to be familiar to eliminate confusion and the length of the test needs to represent the learner's performance. Finally, frequent evaluations can provide a holistic picture of the student's performance.

## **2.8 Summary**

CLIL is based on the premiss that developments in knowledge, language and cognition take place simultaneously. In this framework, theories support that language acquisition happens implicitly, linguistic interaction promotes language learning, and the individual constructs knowledge by creating links between prior and new learning.

Research findings reveal positive impact of CLIL on students' L2 development and particularly L2 vocabulary enhancement. Content learning can also take place successfully in CLIL classes. However, several studies did not show the improvement in L2 development that was predicted. Moreover, some studies revealed that subject matter learning in CLIL classes was insufficient as compared to learning through L1. Thus, the use of appropriate CLIL methodology can help raise the standards of students' achievement in the CLIL class.

Chapters Three and Four shed more light on effective L2 vocabulary instruction, effective EFL teaching and subject matter teaching. Research findings in these domains will form the basis for the development of the CLELD model.

## CHAPTER 3: L2 VOCABULARY DEVELOPMENT THROUGH CLIL

The chapter describes vocabulary knowledge and presents research findings in the area of effective L2 vocabulary learning. Vocabulary learning through CLIL is discussed.

### 3.1 L2 vocabulary development

Vocabulary development is “arguably central to language acquisition and use” (Zimmerman, 1997b: 17). It is perhaps the most important aspect of the target language acquisition. Interestingly, the teaching and learning of vocabulary has not only been undervalued in the field of second language acquisition (ibid: 5) but has also been a matter of controversy in the field of language pedagogy. Word lists were a core element of the language curriculum both in the grammar-translation approach that was codified by Karl Plotz in the 1880’s and in the reading approach and situational language teaching of 1930s (Celce-Murcia & Olshtain, 2000, p.73). After this era, linguists realized that over-concern with vocabulary gives learners the impression that language learning is just the accumulation of words. So, vocabulary teaching was suppressed in the audiolingual or structural approach, dominant from the 1940s through the 1960s being rooted on the belief that language learning is a process of habit formation; therefore new words were introduced in order to make the drills work. The structural frameworks were “fleshed out with words at a later stage when students were more certain of their lexical needs in particular situations” (Rivers, 1983: 118). Since the 1970s, communicative approaches declare that new words can be learned indirectly by exposing learners to the target (L2) language. It is assumed that students learn words through oral and written contexts. For this to be accomplished considerable exposure to the language must be experienced by the learner, and the course content needs to be based on “activities that are contextualized” (Zimmerman, 1997: 14).

Since vocabulary is a vital aspect of L2 acquisition, educators need to expose learners to an effective approach in promoting L2 vocabulary development. Searching for the prospect of an effective approach to vocabulary learning, a deeper knowledge about how people learn words needs to be sought. Therefore, in what follows, the nature of a word and what vocabulary learning involves are described. Various approaches to vocabulary learning are discussed such as learning unknown words through word pairs and their possible relation to deep comprehension is examined. The importance of activating prior knowledge is stressed and learning vocabulary in context is presented as an approach taking this

principle into consideration. A discussion follows about which teaching method should better be used when learning vocabulary in context. For this reason, the meaning-inferred method and the meaning-given method are compared. Modifying discourse through input elaboration and enhancement in order to increase comprehensibility of contextual input is discussed. The importance of active processing when learning L2 vocabulary as well as the significance of multiple exposures to a word are raised. Learning a subject through the medium of the L2 seems to be an approach satisfying the aforementioned learning conditions.

### ***3.1.1 What does a word involve?***

In order to define the nature of a word, the distinction between function and content words needs to be made. Function words are articles, pronouns, prepositions, conjunctions, auxiliaries etc., which are considered to belong more to the grammar of the language. On the other hand, content words are nouns, verbs, adjectives and adverbs providing meaningful links within sentences. Testing word items usually focuses on measuring knowledge of content words.

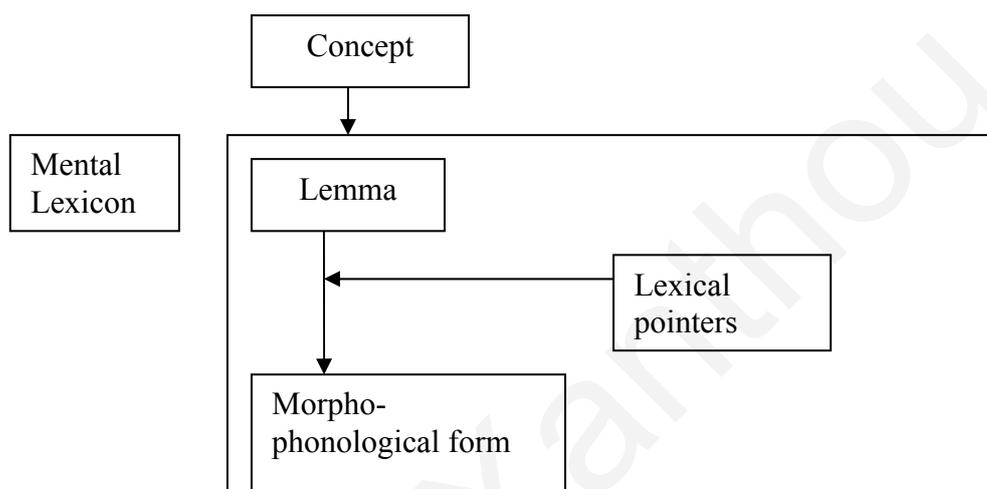
As far as the variety of word forms are concerned, Read (2000: 18) notes that the base and inflected forms of a word are considered by researchers as instances of the same lemma.

### ***3.1.2 Describing vocabulary knowledge***

Vocabulary learning is deeper and more complex than just memorising a word's meaning. Full understanding of a word is comprised of many aspects of a word's knowledge. Cronbach (1942) referred to a multidimensional model of vocabulary knowledge. This involves knowledge of a word's referential meaning including the extensional relations between referent and concept, knowledge of intentional relations to other words in the vocabulary, such as paradigmatic (synonymy, antonymy, hyponymy) and syntagmatic relations such as collocational restrictions and knowledge of a word's syntactic and morphological restrictions. Similarly, Richards (1976: 83) posits that lexical competence refers to the knowledge of the kind of words which are usually associated with the target word, the word's syntactic behaviour, the derivations that can be made from the form of a word, its semantic value and the different meanings linked with the word.

Concerning how the meaning of a new L2 word is linked to its form, Radford et al. (1999) present a model illustrating lexical entries (figure 3). They explain that words exhibit an

arbitrary relationship between meaning and form: words have both meaning and phonological as well as orthographic structure. This implies that the lexicon or mental dictionary of a language may contain a kind of stored entry for the language's lexemes. The authors present a model of a lexical entry based on the work of the psycholinguist Levelt. It is postulated that a lexical entry consists of its lemma and its form information. Lemma information involves meaning and syntax. Form involves morphological information and phonological forms this lemma can take in speech. CLIL environments expose the learner repeatedly to both the semantic form of the target word and its morpho-phonological form, thus strengthening this relationship.



**Figure 3:** A view of the structure of the mental lexicon, illustrating a lexical entry (Radford et al., 1999: 233)

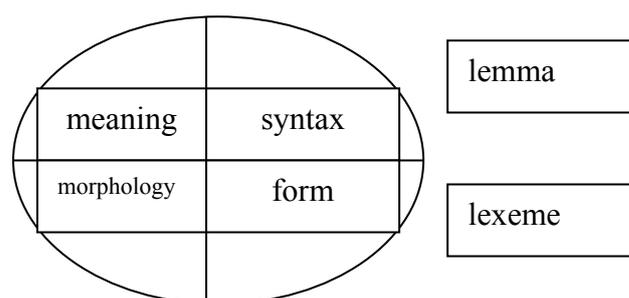
This model distinguishes concepts such as objects from lexical entries as the first are represented on a prelinguistic level. It postulates that lexical entries involve two forms: the semantic form which refers to the word's meaning and the morpho-phonological form. Therefore, a lexical entry or lexeme consists of its lemma and its form information. The lexical pointers serve to connect the semantic representation of a lexeme with its form.

Learning a new word is a process which starts with a meaningful encounter with the word and continues with integration of its linguistic features in the mental lexicon (Schmitt, 2000). In this incremental process, repeating novel phonological patterns at first stages of foreign language learning allows storing phonological information in short-term memory (Ellis & Beaton, 1993). This information is transferred to long-term memory when a more stable representation is acquired (Wagner & Torgesen, 1987). By producing the new word (i.e. through repetition), the L2 learner has more possibilities to retain it in working memory (Speciale et al., 2004). Masoura and Gathercole (1999) examined the links between phonological short-term memory and the ability to learn foreign language

vocabulary finding that the ‘children’s learning of foreign vocabulary may be particularly highly dependent upon temporary phonological memory’ (p. 386). In Masoura and Gathercole’s study, the foreign vocabulary scores of forty-five Greek EFL learners aged between 9 and 11 years, were significantly associated with repetition scores ( $p < .05$ ). Producing the word more than once, helps encoding the details of the new phonological form and consolidating the novel phonotactic patterns for learners with a mean age 24.2 years (Ellis & Beaton, 1993). Research demonstrates that foreign language vocabulary acquisition is associated with repetition of unfamiliar nonwords (Service, 1992). The role of phonological memory and phonological awareness in English L2 word learning was examined by Hu (2003). Measures of phonological memory and phonological awareness were given to 58 Chinese 6-year-olds. The outcomes show that phonological memory supports foreign language word learning.

Studies dealing with L2 vocabulary acquisition assume that new meanings undergo a mapping process (Ellis, 1995; Bogaards, 2001) where L2 lexical forms are linked to concepts which already exist in the learner’s conceptual or semantic system. If the new meaning does not already exist, then it is created throughout the learning process. The word’s form appears to be a paramount element in creating a link and transferring the word to long term memory. Bogaards (2001) examined 15 year old Dutch students learning French as a foreign language. The researcher underscores the importance of knowledge of form for learning new meanings. In the case where the meaning of an L2 word is not the same to its L1 translation, then the L2 word is likely to be mapped to another concept. Thus, in the process of L2 vocabulary acquisition, re-mapping or restructuring of conceptual features may occur.

Jiang (2000: 47-77) based his assumptions on Levelt’s model to present a psycholinguistic model of L2 vocabulary acquisition in an attempt to explain the remapping process (Figure 4). When a root word enters the mental lexicon, this lexical entry involves two components: the lemma component and the lexeme component. The first includes semantic and syntactic information whereas the second one contains morphological and formal information.



**Figure 4:** The lexical entry in the mental lexicon (Jiang, 2002: 619)

When the learner sees an L2 word, its relevant L1 translation provides lemma information related to the word's meaning and syntax. By contrast, the lexeme information (i.e., morphology, pronunciation etc) does not enable L2 word use so it is gradually put aside. By increased exposure to lemma information, a strong connection is created between the L2 word and its lemma component. Therefore, mapping from the L2 word to its L1 translation moves to the word's meaning, creating a direct link. This lemma information is necessary to the word's use.

Vocabulary ability has been defined by Chapelle (1994: 163) as both language knowledge and the ability to use language in context. It therefore involves the context in which the target word occurs, vocabulary knowledge and metacognitive strategies for using the word. The traditional view defines context as the sentence in which the target word occurs. Gradually, integrative views have influenced the notion of context expanding it to include the whole text which the learner needs to draw on in order to figure out the word items. More recently, the communicative point of view considers as context the influence of the social and cultural situation in which the word item occurs on its meaning.

According to Chapelle (1994), vocabulary ability basically involves vocabulary knowledge which includes vocabulary size and knowledge of word characteristics. Vocabulary size is the amount of words that an individual knows. Measuring learners' size of vocabulary aims to estimate the number of words they know by testing whether they know a sample of items from a word list. Chapelle states that vocabulary ability involves the use of metacognitive strategies. Language users employ these strategies to monitor the ways that they use vocabulary knowledge while communicating. Metacognitive strategies are usually operated unconsciously although cognitive demand of the task forces a person to

use the strategies more consciously. Blum-Kulka and Levenston (1983) describe some metacognitive strategies used by language learners such as paraphrasing, namely describing a word item instead of mentioning the word, code switching which takes place when the learner gives a word in the L1 in order to substitute for an L2 word which is not known, using superordinate terms, i.e. general terms, to refer to a specific word (as in flower for daisy) and appealing to authority involving questions such as ‘How do you say ‘X’ in English?’.

Nation (1990) added the issue of receptive versus productive vocabulary i.e., the ability to recognize a word when hearing or seeing it as opposed to the ability to use this word when speaking or writing. In this sense, extended knowledge is required in order to be able to use a word.

### ***3.1.3. Word pairs and the ‘Depth of processing hypothesis’***

The traditional approach to vocabulary learning favours systematic vocabulary learning which is based on lists of L2 words presented together with their L1 translations that learners have to memorize. The use of traditional methods in teaching vocabulary, such as the meaning given method, i.e. that is providing definitions for newly encountered words assigned out of context and then memorizing them, are often used by teachers who may want to save time and deal with simple and familiar ways of teaching new vocabulary.

Nation (1982) carried out a research review of the experimental findings on foreign vocabulary learning, accumulating evidence showing that word pairs (L1-L2) can be used to learn a large number of words in limited time. One of the studies showed that thirty four word pairs per hour were learned. Nation concluded that the particular technique is a good way of being initially exposed to L2 vocabulary. L2 vocabulary learning has been examined by Masoura and Gathercole (1999) who investigated the links between the phonological short-term memory measures and knowledge of native and foreign vocabulary of primary school learners. Results provide evidence that “in the initial stages of foreign language acquisition, new words are learned via associations with native words” (p.387). More recently, it has been demonstrated that rote memorization of L1-L2 equivalents is a more effective vocabulary learning technique for university students than displaying multiple meaning associations related to a new L2 word (Sagarra & Alba, 2006). However, it would seem reasonable to note that the majority of word pairs are not wholly synonymous in terms of cultural or grammatical aspects. Connotation between the

synonymous pairs may differ as well as collocation or register. Therefore, presenting words in isolation does not provide adequate lemma information (Radford et al., 1999), thereby raising the risk of misunderstandings.

A related issue is working with lists of words which are semantically associated with each other such as word sets (train, bus, aeroplane, motorbike). It is supported that presenting L2 vocabulary in semantically related sets can profit learners. This is based on the assumption that the learner is enabled to notice the differences between items that are similar in meaning (Seal, 1991). However, empirical evidence supporting this assumption is slim and related to advanced learners of tertiary education (Cohen, 1963; Finkbeiner & Nicol, 2003). Research has shown that learners take longer to learn semantically related words than dissimilar ones. Higa (1963: 170) has found that semantically related words are more difficult to learn than lists of words which are not related. This may be attributed to the possibility of interference effects among the related words of a list. The university students in Tinkham's (1997) study performed better with thematically related items than with semantically associated ones. The researcher examined vocabulary learning from sets of words which can be encountered in a particular theme such as 'frog', 'green', 'hop', 'pond', 'slippery' and 'croak'. It was concluded that clustering of similar items may impede rather than enhance learning, suggesting a more thematic way of organizing new L2 vocabulary. Waring (1997) confirmed Tinkham's findings, warning against the danger of encountering related new words simultaneously. These outcomes have been tested with primary school students reaching similar results. Erten and Tekin (2008) have shown that presenting semantically related vocabulary may even hinder learning. In their study, the 60 fourth graders learned more semantically unrelated sets than related ones, and the difference persisted in the long term. It is proposed that presenting new words in unassociated sets may need to be promoted to facilitate vocabulary learning.

Learning vocabulary through word lists runs the risk of acquiring superficial knowledge. Depth of vocabulary comprehension may not be reached through word pairs or word lists, because the learner may not obtain full understanding of the L2 word. In order to achieve this, several kinds of word knowledge are required such as a word's grammatical characteristics, its form –spelling and pronunciation–, the words it usually appears with and its relationships to other semantic concepts (Nation, 1990).

The 'Depth of processing hypothesis' assumes that learners are more likely to remember new words if mental processing is deep enough, involving elaborate thought and manipulation of the new word (Craig & Tulving, 1975: 268). Hence, unlike processes providing superficial learning such as rote repetition, deeper semantic processing allowing the target word to be grouped with other conceptually related words might enhance learning to greater extent. The provision of L1 translations for L2 words may not lead to complete word knowledge. So, teaching practice may need to promote knowledge about a word's semantic meaning. CLIL settings allow such opportunities for the learner to see the semantic context in which a new word occurs.

### ***3.1.4 Activating prior knowledge***

Second language vocabulary acquisition research demonstrates the importance of activating prior knowledge. Schmitt and Schmitt (1995) stress that an essential principle which needs to be considered when designing vocabulary programmes is to incorporate new words into language that is already known. This is due to the formation of a rich network of interwoven associations around old-established words. So, when new words are integrated into this network, these associations enable their recall. This issue of connecting new and known information is also stressed by Stahl (1983), Stoller and Grabe (1993) and Martin et al. (2002) who support that connecting the target words to students' already known words and concepts enables new vocabulary learning. Therefore, the primary goal of vocabulary instruction should be to present new concepts that can be applied to the student's already existing knowledge.

New learning must be built on what the learners already know. Learners may use extralingual or contextual cues in order to draw on their knowledge of the world. Carrell (1983) refers to familiarity with the content area of the text, that is the prior knowledge about a topic, as an important type of background knowledge aiding text comprehension of advanced ESL learners. Hudson (1982) demonstrates that the positive effects of externally induced schemata prior to reading, on reading comprehension of EFL/ESL students planning to attend universities, is even greater at lower levels of proficiency than at higher levels. The use of intralingual cues can also help the learner to identify the meaning of words. For instance, specific suffixes may indicate certain notions.

Activating prior knowledge can become really helpful in L2 development. This has been demonstrated by Palmberg's (1987) experiment where twenty-one 11-year-old pupils had

to read two passages from an English fairytale without title or pictures. Familiarity with the topic facilitated their general comprehension of the text and inference of unfamiliar word meanings. Results showed that prior knowledge enabled the subjects to succeed. Children of this age exhibited a tendency to use extralingual cues to a greater extent than interlingual cues as the text was familiar to them. CLIL provides a learning environment which takes prior knowledge into consideration, allowing semantic and other associative links.

### ***3.1.5 Learning vocabulary in context***

Language is considered to be “a network of interdependent systems – discourse, syntax, semantics, phonology, pragmatics – rather than as a multi-layered structure” (Rutherford, 1987: 145). All these systems should be taken into consideration when learning a foreign language. Nation (2001) explains that in order to attain full understanding of a word, one must get to know the morphological properties, spelling, pronunciation and syntactic functions of the word. The learner needs to understand a word’s meanings, its association with other words and to come across the contexts in which the word may be used. Henriksen (1999) calls the process of acquiring word meaning: “semantization” process, as it ‘involves both mapping meaning onto form and network building’ (p.307). The latter refers to “fitting the words together in semantic networks” (p.308). These are some important aspects of word knowledge suggesting that there is much more to vocabulary knowledge than a single associative link between an L2 word and its equivalent in L1 for effective vocabulary learning. This consideration has driven the trend in the 1990s to encourage learners to learn vocabulary in context instead of memorizing lists of isolated word items.

Comprehension of oral and written discourse takes place most likely when students make meaningful connections between vocabulary and the contexts in which it is found. Content-based second language learning courses are classroom environments conducive to these conditions. Integrating content and language (CLIL) allows learning new vocabulary in the environment of meaningful context.

Nation and Coady (1988) define context as “morphological, syntactic, and discourse information in a given text” (p.102). Either transparent or vague, contextual information seems to be vital for comprehension. The context alone position is based on the claim that learners can learn the vocabulary they need from context i.e. by reading extensively.

Coomber and Peet (1993: 580) posit that ‘context should be the first choice’ even for beginners because context provides the necessary information to comprehend the target vocabulary. As it has been said “a word is known by the company it keeps”. When the learner sees the target word in context, s/he learns the syntactic and semantic features of the word inductively (ibid: 584). Syntactic features help the reader determine relationships of words in phrases and sentences, focusing on the grammar of the sentence. For instance, the location of the word ‘measure’ in the sentence ‘We measure the size of an angle using degrees’ is a clue that it is probably a verb. The semantic aspect enables the reader to focus on word meanings and their interrelation in context. In the example provided above, the verb ‘measure’ takes a human subject and a prepositional phrase. McKeown et al. (1985) advocate that learning will be facilitated if the learner is allowed to form semantic networks around learned words. In their study, they examined the components of an effective vocabulary programme; the contribution of the nature and frequency of vocabulary instruction on the knowledge of words was investigated. Three classes of fourth-grade students participated in the study. One of the three classes received traditional instruction involving associations between words and their definitions, the second one received rich instruction providing elaborated word meanings and various contexts, while the third one received extended instruction with more activities to promote the use of learned words. The last type of instruction exhibited more benefits over the second, whereas the second one showed benefits over the first, indicating the advantage of presenting new words in diverse contexts as well as offering repeated exposures to the target vocabulary.

Coomber and Peet (1993) comment that learning words in contextual settings allows students to see the words “in action” (p.584). They believe that a word does not have a stable meaning on its own, since its meaning is strongly related to the words around it. The authors suggest some word activities encouraging thinking in contexts such as true-false statements presenting target words in contexts, matching exercises requiring to apply words to situations or complete sentences (ibid: 585). Since it is really important to understand the semantic context with which the word is associated, studying words in isolation may have to be avoided because as Coomber and Peet (ibid: 581) advise “it does not help students learn meaning vocabulary”. Vocabulary, according to Gauthier (1991: 195-202) should be taught using contextual setting which is highly meaningful and interesting raising the possibilities of remembering words for all proficiency levels. Duffelmeyer (1984) has proved that “context facilitates the ascertainment of word

meaning” (p.103) both for poor and good readers. Participants were grade 8, secondary school pupils. The subjects that learned new words through context did better than those dealing with isolated lists of words. Similar findings have been reported by Shu et al. (1995) who investigated children’s learning of word meanings while reading. Their study examined American and Chinese third and fifth graders who had to read one of two cross-translated stories. The subjects were then tested on the difficult words, and the outcomes revealed significant incidental learning of words in both countries. The results suggested that incidental acquisition of word meanings through reading is a natural process.

Ooi and Lee Kim-Seoh’s (1996: 52-58) research corroborated the findings of prior research. Therefore, it is proposed that vocabulary teaching should depend on the integration of lexis, grammar and discourse, and that this can be achieved if lexis is taught in context and in particular through reading. The researchers communicate evidence demonstrating that lexical competence should be understood as competence for use rather than just knowledge of the word’s meaning. The students participating in their study had to complete two texts with a total of 100 deleted items. Data analysis of the study showed that the students exhibited incomplete appreciation of ‘contrast within similarity’ (ibid: 53), i.e. indicating the difference in the meanings of similar words. Inadequate knowledge of correct collocations was also exhibited, namely being aware of the habitual co-occurrence of specific words i.e. the verb give and not the verb tell usually co-occurs with the noun idea. Finally, subjects showed inadequate knowledge of word derivations (ibid: 55). Ooi and Kim-Seoh (ibid: 56) conclude that ‘lexical competence implies more than just knowing what a word means’. They aver that other kinds of knowledge apart from knowing a word’s meaning contribute significantly to vocabulary learning. This knowledge includes knowing what differentiates one word from other words which seem to have the same meaning, other possible meanings of a particular word, a word’s derivations, its associative links with other items in the lexicon, its syntactic behaviour and the role of the particular situation and function in the way the word is used. It is stressed that vocabulary instruction should “go beyond just helping the learner to internalize dictionary meaning” (ibid: 56). Learners need to be sensitized to differences in shades of a word’s meaning. Traditional learning of word lists cannot make learners aware of why one word should be chosen or rejected over another one. Clearly, deeper vocabulary knowledge should be sought. The researchers suggest that it can be useful to present target items in collocation with other words. This can draw attention to syntagmatic relationships. Therefore, it is proposed that the teacher should favour the integration of

lexis, grammar and discourse in contrast to providing predetermined word lists. However, their suggestion refers to vocabulary gains through reading which can help the learner to “process language use at a deeper level” (ibid: 57) and notice semantic networks and other associative links that are likely to promote learning. Clearly, other kinds of language activities can also contribute to enhancing vocabulary learning to a greater extent such as listening, speaking and writing about meaningful material involving target words.

Encountering new vocabulary in context, such as when carrying out tasks through the medium of L2, enables the learner to see the words that a new item is usually associated with. Therefore, s/he can acquire collocational competence, i.e. learn lexical chunks. This is considered to be a key aspect of language learning (Nation, 1990; Lewis, 2000), as learners are allowed to produce language more quickly (Hill, 2001).

Using lexical sets is considered to be another way of approaching L2 vocabulary. These are specific groups of items sharing certain formal or semantic features (Crystal, 1997). However, Nation (2000) examined research on learning vocabulary in lexical sets finding that a growing body of research indicates that learning is made more difficult than it should be. Furthermore, trying to teach related words together, unrealistic situations either in oral or written form can be used. Nation (ibid: 8) concludes that course designers and teachers need to appreciate that items in sets such as months are best learned when not presented together. Words need to be presented as in normal communication situations. Hence, the use of topics and themes help meeting this criterion.

Several researchers affirm that when learners determine a word’s meaning from context, instead of being provided with its definition, they learn that word’s semantic and syntactic features inductively (Coomber & Peet, 1993). Retention is enhanced when learners are involved in figuring out the word’s meaning. The target item is seen in action, surrounded by other words, each one associated in its own way with the word. Learners are likely to feel a kind of ownership of the word’s meaning and word associations in the way they have formed these in their mind in their own way. Therefore, it can be postulated that encountering the target word in contexts, such as the subject matter contexts provided by CLIL lessons, enhances vocabulary development and recall of words, as opposed to relating them with definitions and synonyms. Zimmerman (1997a) revealed that the postsecondary L2 students of the pilot study she conducted confirmed the position that context assists the word-learning process. Similarly, Nagy and Herman (1987) conclude

that meaningful encounters with target words contribute to their acquisition, so they should be sought. The researchers point out that deep word knowledge will only occur with additional multiple encounters with the new words.

Gipe (1980) investigated the effectiveness of four methods of vocabulary instruction: context method, category or word list method, dictionary method, and association method. Statistical analysis proved that the context method was significantly more effective than the other three for both good and poor readers. Coady (1997) carried out a synthesis of research studies which had examined effective L2 vocabulary acquisition and accumulated evidence that exposure to meaningful and comprehensible language enhances vocabulary knowledge. He reached the conclusion that “if the language is authentic, rich in content, enjoyable, and, above all, comprehensible, then learning is more successful” (ibid: 286). The learner needs to come across the total linguistic environment in which a word or phrase is surrounded. This can provide information which aids comprehension and retention. Thus, presenting target words in context may need to be a teacher’s selected teaching strategy as opposed to presenting words in isolation.

In light of the aforementioned research findings it would seem reasonable to suggest that meaningful language encounters are eligible for vocabulary acquisition. CLIL methodology provides content-based language environments where contexts demonstrate the pragmatic value of target words, eliminating the danger of creating contexts which may not respond to reality.

Criticism of the context method has been voiced by researchers who did not find lexical inferencing from context an effective learning strategy and the large amounts of learning from context which was expected was not shown (Anderson and Shifrin, 1980; Haynes, 1993) casting doubt on the possible L2 gains of CLIL teaching. For instance, Jenkins et al.’s (1984) study did not show substantial learning of words from context for the 5<sup>th</sup> graders who participated in the study. The amount of new vocabulary learnt was less than might have been anticipated. Moreover, Kern (1989) and Auerbach and Paxton (1997) found that L2 readers are not competent enough in order to deal effectively with new words as compared to L1 readers. In the first study, instruction in reading strategies appeared to be necessary for developing inferencing skills of intermediate level learners of French attending university. In the second study, it has been shown that raising metacognitive awareness is important for enhancing L2 reading proficiency.

Carter (1987) notes that it has not been convincingly shown that the benefits from encountering words in contexts related to knowledge of a word's form or meaning are much greater than providing the word's translation. Evidence is provided by several researchers such as Krashen (1989) who analyzed the results from 144 studies providing evidence for the Input Hypothesis and in particular for the acquisition of vocabulary through reading and oral language. However, it should be noted that only three of the articles being examined had investigated L2 acquisition; the rest dealt with L1 acquisition and therefore the findings may not be as convincing as they seem. Nation (2005) notes that research has not been successful in demonstrating that the best way to learn target vocabulary is to encounter new words in context. However, it is concluded that teaching words in isolation allows learners fewer chances of learning new words. It is emphasized that activities involving new vocabulary need to provoke interest and provide opportunities for word repetition. Moreover, learners need to see a word's generative use that is they have to encounter it in more than one contexts.

Whether learners are successful in guessing the meaning of unknown words is an issue of controversy. For instance, Bensoussan and Laufer (1984) examined whether primary school EFL beginners guess correctly and whether they do not attempt to guess at all, and discovered that they commonly make incorrect guesses or no guess at all. As it was shown, the usual reaction of first graders to unknown words being encountered in reading texts was not guessing. In general, the subjects linked the target words with meanings that were not relevant to the text's context. Further, some target words were confused with others which seem or sound similar, some idioms were mistranslated or the wrong meaning of a word was given to some words which had more than one meanings. Moreover, better students did not guess more, allowing the researchers to side with more explicit vocabulary teaching. On the other hand, Liu and Nation's (1985) findings affirm the contrary. The subjects in their study were able to guess correctly the meaning of the vast majority of unknown words. However, the subjects were teachers attending a postgraduate course in teaching English as a second language. These advanced learners had to guess the meaning of some English words which were replaced by non-words.

Concerning the processes that L2 learners engage in when they guess the meaning of new words, research evidence shows that a number of clues are used by them. Haastrup (1987) asked some Danish secondary learners of English to work in pairs in order to guess the meanings of unknown words. The clues which were used by the subjects were grouped

into three categories: interlingual, intralingual and contextual. Interlingual clues involve drawing on L1, intralingual clues concern the help from general knowledge of English whereas contextual clues are related to world knowledge and the text's content. Several subjects faced difficulties in interpreting how they guessed the meanings of words. Although learners may succeed in inferring the meaning of unknown words, retention of the word meanings may not be guaranteed. That is, the learner may guess the meaning of an unknown word in order to comprehend either an oral or a written text but once the task has finished, long-term memory of the meaning may not be accomplished. Further research needs to be conducted in this area in order to shed light on the importance of inferring the meaning of unknown words in context.

It is of great interest whether the strategies used by learners to communicate should better be taught to them or not. Research evidence reveals contradicting findings. For instance, the secondary school subjects, aged 15-18, in Dornyei's (1995) experimental study were offered a six-week training in strategies used for communicating such as circumlocution and finally observed that they could give significantly better definitions than their counterparts in the control group. While the potential positive results tempt the educator to provide strategy training, researchers such as Kellerman (1991) argued against the idea of training by showing that Dutch learners transferred the strategic skills used in their native language to L2 English and therefore assumed that teaching strategies may not be necessary. Presumably, these strategies involve cognitive processes which have been developed through the L1.

Paribakht and Wesche (1997) investigated the impact of instructional intervention in the context of meaningful language use on L2 vocabulary acquisition. The subjects were exposed to two different instructional treatments. In the Reading Plus (RP) treatment, learners had to read four texts and then do some vocabulary exercises involving the target words. On the other hand, in the Reading Only treatment (RO), learners had to read four texts and then read another text which included the target words instead of dealing with vocabulary exercises. Five groups of vocabulary exercises were used in the RP treatment responding to a hierarchy of mental processing activity: selective attention, recognition, manipulation, interpretation, and production. Findings showed that the RP treatment brought significantly greater gains than the RO treatment ( $p < .000$ ). It is therefore suggested that the use of specific vocabulary exercises increases gains in vocabulary learning.

### ***3.1.6 The Meaning-inferred method versus the meaning-given method within the incidental learning paradigm***

Whether learners can acquire L2 vocabulary through intentional learning which is activity intended to develop word knowledge, or develop vocabulary through incidental learning as a by-product of the learning task is a controversial issue. Since traditional vocabulary learning techniques, i.e. memorizing word lists, are not supported by recent trends in language learning (Read, 2004), language pedagogy may need to favour incidental language learning approaches. Incidental learning is the by-product of cognitive activity. In this context, vocabulary learning is contextualized, providing the learner a richer environment of a word's meaning as compared to paired-associate exercises. However, guessing a word's meaning does not mean that vocabulary acquisition occurs. The information provided by the context which could assist meaning making may also allow the learner to comprehend meanings without necessarily knowing or learning the unknown words (Nation & Coady, 1988). Research shows that L2 vocabulary acquisition cannot take care of itself "without the need for any substantial pedagogical intervention" (ibid: 147). Therefore, learners may need to witness both the meaning and the form of a word, as research review on attention and memory shows that noticing is necessary for L2 vocabulary development (Robinson, 1995). Paying attention to new vocabulary may be necessary for enhancing the outcomes of incidental learning (Schmidt, 1993). The issue arising here is to find which conditions should be met in the incidental learning paradigm in order to maximize vocabulary learning.

Currently, the implementation of communicative and context-based approaches raises questions as to the amount of pedagogical intervention required when encountering new words incidentally. When encountering new words in context, students may either infer the meanings without paying attention or be provided the word meanings. A number of studies suggest that inferring word meanings can lead to incidental vocabulary learning (Dupuy & Krashen, 1993) and higher levels of retention than getting the meaning (Berlyne et al., 1968). Read (2000) supports that inferring word meanings allows deeper processing than learning lists of new words out of context. The student may learn some aspects of the target word's meaning which would not be able to be perceived in the word list approach. Active involvement in discovering the words' meanings seems to lead to more effective vocabulary acquisition for elementary school students than more direct methods, including finding a word's meaning from the dictionary (Beck et al., 1982). In this vein, students need to be encouraged to guess word meanings from context, as context constitutes a rich

source of information (Sternberg & Powell, 1983). A word may involve both internal and external context. The first type of contextual clues refers to the morphological structure of a word which includes a word's prefix, stem and suffix cues. The latter refers to semantic information, including physical features of the word, such as shape and colour, the class of things the word belongs to and its use and purposes.

Several studies have shown that inferring the meaning of new words from context is not the best method for vocabulary development. For instance, Bialystok (1983) showed that the information contained in the texts is usually vague, so the learners may reach incorrect inferences. Therefore giving the meaning of a word leads to higher levels of retention than inferring meaning from context. Similar findings have been reported by Schatz and Baldwin (1986) who conducted three studies in order to examine the extent to which context helps students infer the meanings of unknown words. The results showed that encountering words in context does not lead to higher performance than responding to words in isolation. Thus, it could be concluded with caution that context on its own may not lead to faster and more efficient L2 vocabulary acquisition. Nassaji's (2003) results mirrored those of previous studies (Prince, 1996; Kelly, 1990). The adult intermediate level learners in his study encountered difficulties in their effort to infer meanings from context. The words' morphology caused confusion as it pointed to other semantically unrelated words. This indicates that direct instruction may need to be provided along context-based learning for maximising vocabulary gains from context. Huckin and Coady (1999) surveyed empirical research on the mechanism of incidental acquisition involving intermediate level learners and university students, reaching the conclusion that 'guessing from context has serious limitations' (p.189), as imprecise meanings may be inferred.

Hulstijn, Hollander and Greidanus's (1996) study has shown that the provision of intentional learning after incidental learning is vital in promoting L2 vocabulary acquisition for advanced foreign language students. Mondria (2003) provided further substantiation to this conclusion. Getting the meaning led to similar retention level as inferring the words' meaning in secondary school contexts. This may be attributed to the limited time devoted to the memorizing activity in the meaning-inferred method which can lead to placing emphasis on associating the word with its context and not its form. It is concluded that by adding a memorisation stage to incidental vocabulary acquisition then word retention can be improved. Recent research review conducted by Read (2004)

provided further documentation that direct study of L2 vocabulary is required along incidental vocabulary learning methods.

Activating mental effort seems to be necessary for retaining a word. Hulstijn (1992) observed that when assistance was provided in the margin of the text, such as a clue to enable learners figure out the word's meaning, they retained it better than when a translation was given to them. Hulstijn found a positive relation between activating mental effort when learning an unknown word and retaining the word. Watanabe (1997) examined the incidental-learning effect of the following conditions: inferring from context, being provided explanations after the target word in the text and being provided either single or multiple-choice glosses in the margin. The Japanese college students who had to read a passage with 16 target words glossed in the margin and given a single or multiple-choice marginal gloss had significantly better results on three unexpected vocabulary posttests than their counterparts in the no cue and appositive conditions (p.303). Similar findings have been reached by Jacobs et al. (1994) who investigated marginal glossing and its effect on vocabulary learning. The 87 native English participants studying Spanish at the university level who read texts with glosses exhibited significantly better results than their counterparts in the immediate vocabulary post-test but not in the delayed post-test administered four weeks later. This is likely due to the possibility that the use of glosses does not enable retention in long-term memory as it may not offer enough opportunities for the learner to process the meaning of new words, in spite of the fact that participants expressed preference for glossing and favoured glosses written in their L1 Spanish. This explanation applies also to Watanabe's (1997) finding related to the non significant impact of the translation task on university students' L2 learning. Students were allowed to write down the meaning of a target word in the L1 in order to understand this and find an appropriate L1 word from the mental lexicon that represents the meaning. This task aimed at engaging students in more elaborate processing of the target words but did not finally help them remember the connection between the form of the word and its meaning (p.302). More active involvement with new vocabulary seems to be necessary for effective L2 acquisition.

Review of vocabulary acquisition research points to the importance of depth of processing when learning unknown vocabulary, which is more likely to lead to recall as concluded by research in human memory ( Craik & Tulving, 1975, Jacoby et al., 1979). In this sense, while CLIL lessons allow the learner opportunities to encounter new vocabulary in

context, some intentional learning through language focus activities may be required in order to provide further involvement with the new words.

### ***3.1.7 Input elaboration and enhancement***

In order to reap the benefits of incidental vocabulary acquisition, comprehensibility of input might be a prerequisite. Krashen and Terrell (1983) posit that acquisition is highly related to the input being comprehensible. For this to be achieved, the meaning of key elements in the utterances needs to be understood. It is therefore assumed that comprehension of vocabulary is necessary for acquisition to occur (p.155). Comprehending an oral or written text may need the involvement of a certain amount of unknown words otherwise the learner may be intimidated as well as unsuccessful in figuring out the meanings. For instance, Hu and Nation (2000) hold that around 98% text coverage, i.e. the density of one unknown word in 50 running words may be required for L2 learners to achieve unassisted comprehension of a reading text.

Comprehensibility of input may be further enhanced through interactional modification of the conversation taking place between more proficient and less proficient L2 interlocutors. In this vein, Long (1983) has advanced the interaction hypothesis which assumes that the comprehensible input which results from attempts to negotiate communication difficulties, facilitates L2 acquisition as it helps to make salient language features which are problematic to learners. Research on native speaker/ non-native speaker conversations suggests that modifications of the interactional structure of conversation can promote SLA (Long, 1983).

An issue raised at this point is whether discourse should be modified or not in order to enable L2 learners benefit the most from incidental vocabulary acquisition. Regarding how input can be modified in order to become comprehensible, more information related to unknown words can be provided in the text in order to enable guessing their meaning. Schouten-van Parreren (1989) describes this type of context as being pregnant. That is, rich information surrounds target words helping learners to infer the meaning more easily and successfully. Pregnant context is similar to Beck et al.'s (1983) pedagogical context, which is teacher developed, aiming to promote vocabulary learning as opposed to natural context which is not modified.

Modifying L2 texts in order to enable learners understand L2 features may take the form of elaboration and simplification. Elaboration is used to explain the meanings of target words and it can take the form of paraphrasing. Research with young L2 learners is definitely required to illustrate the potential effects of input elaboration. Text is made easier to understand by not removing language features. Simplification on the other hand, involves removal of what the writer or teacher considers as difficult words or syntactic structures for the level of the L2 learners, although these will perhaps need to be acquired at a later stage.

Specific target language features may be modified or enhanced in order to promote L2 language acquisition. Enhancement of text aims to attract the learners' attention to target language features in order to make them notice the gap between their current language proficiency level and the target linguistic attainment. For this reason, Schmidt (1990: 129-158) highlights the role of consciousness in L2 acquisition. He claims that attention is necessary for acquisition to take place. The theorist reviewed current psychological research and theory related to consciousness and reached the conclusion that noticing L2 linguistic features is an essential condition for turning L2 input into intake. Incidental learning is effective when the learner's attention is focused on the target feature to be learned.

This assumption has been advocated by a growing number of researchers such as Truscott (1998). In order to accomplish noticing of language features, typographical enhancement can be used in written input (White, 1998) and intonational enhancement in oral input.

In view of the absence of empirical research on the impact of typographical input enhancement on incidental L2 vocabulary acquisition, Kim (2006) undertook a study in order to explore how 297 Korean college-level EFL learners acquired English vocabulary incidentally from reading. It was revealed that lexical elaboration, either explicit or implicit does not enable form recognition of previously unknown L2 words from reading (Kim, 2006). Interestingly, explicit lexical elaboration helps meaning recognition of previously unknown word items. Typographical enhancement does not help either form or meaning recognition of L2 vocabulary. Most importantly, "lexical elaboration (either explicit or implicit) and typographical enhancement combined aid meaning recognition of previously unknown L2 vocabulary from reading" (p.365). Results point to the possible positive impact of explicit lexical elaboration on recognizing the meanings of L2 words. Moreover, by enhancing typographically a text, the effects may be maximized. Therefore, it could be assumed that lexical elaboration and typographic enhancement could be used in

oral and written classroom discourse in the CLIL classroom in order to maximize linguistic gains.

### ***3.1.8 Active processing***

“Active processing” has been identified as an important factor associated with effective vocabulary acquisition (Mezynski, 1983: 273). The researcher reviewed eight studies on vocabulary learning, out of which seven involved fourth, fifth or sixth graders. Findings suggest that when students learn by doing something involving target words in context, this makes the process of learning active. Slamecka and Graf (1978) found that generational effects are powerful. Research in human memory demonstrated that creating seems to be more effective than responding to materials being prepared for learners. Preparing projects related to a topic involves using the target word in contextual writing which enables the learner to link new with prior knowledge. Moreover, active involvement with new words is required for building strong vocabularies. “Class discussions, word games, and other language activities” can provide active involvement with words (Coomber & Peet, 1993: 587).

Celce-Murcia and Olshtain (2000) note that many studies of L2 vocabulary learning are short-term experiments therefore “we still know very little about... what works best pedagogically” (p.94). They therefore conclude that studies concerned with more “holistic and task-based language use will ultimately provide more revealing insights about vocabulary acquisition and use” (ibid). Learning a subject through the medium of L2 appears to provide many opportunities to the learner to process new vocabulary actively in order to communicate and present content-related information. This process can have a positive impact on vocabulary learning.

### ***3.1.9 Recalling the new word – Repeated exposures***

Schmitt and Schmitt (1995) pointed out that another important principle that has to be taken into account when designing vocabulary programmes is that of allowing opportunities to the learner to recall a new word. This act enables learner to recall the target word again at a later stage. Nation (2001) claims that the learner has to undergo three psychological processes for successful vocabulary learning. After noticing the existence of the target word the learner has to retrieve this knowledge. Retrieval serving receptive purposes asks the learner to notice the word’s form either orally or in text and retrieve the proper meaning. On the other hand, in the case of retrieval for productive

purposes the learner has to communicate the meaning retrieving the word's form from the mental lexicon. It is suggested that the greater the number of retrievals, the stronger the link between the form and the meaning becomes. Finally, generative use is the last stage in the processes described by Nation, which takes place when words are used in different circumstances, forcing the learner to reconsider the knowledge obtained for the word so far.

Considering Nation's proposal, teachers should not rely only on practising the new word through receptive activities but also to assign activities requiring production of the new word orally or in written form. Baddeley (1990) reviewed general memory research indicating the importance of the 'retrieval practice effect' stressing the need for learners to produce target words within limited time of instruction. Further, target vocabulary needs to be recycled to be learnt.

Research review on vocabulary learning by Mezynski (1983) identified the amount of practice as an essential factor linked to effective vocabulary learning. However, reviewing through traditional drilling on definitions may not be as effective as exposure to a number of meaningful experiences. This is the reason why learning new vocabulary in context needs to be taken into serious consideration. Schmitt and Carter (2000) posit that learning vocabulary through reading can be effective as it provides the repetition necessary to establish new words in the learner's mind. Reading context allows elaborating and expanding the richness of knowledge about target words. Knowing solely a word's single meaning sense may not be enough to allow the learner to produce the target word competently. Knowing a word well involves knowing various lexical aspects such as its syntactic behaviour and the semantic environments it usually appears in. The researchers propose the use of narrow reading, that is "reading on the same topic over the course of a number of texts" (ibid: 5). Hwang and Nation (1989) explain that learners become familiarized with a particular topic, acquiring background knowledge for future exposure. The researchers analyzed 20 sequences of four running stories and 20 groups of four unrelated stories and found that more repetitions of low frequency words occur in running stories. In this way, the vocabulary load is reduced to a greater extent, and better conditions for vocabulary acquisition are provided as target vocabulary in related topics recurs, facilitating learning. Schmitt and Carter (2000) undertook a corpus analysis of two sets of newspaper readings to show how vocabulary load is lowered in the case of narrow reading-related stories. It was found that content words, i.e. words carrying meaning, recur

more frequently in topic-related texts and fewer individual words or word types occur implying that this type of exposure reduces the vocabulary load on the L2 learner. Constant recurrence of words is assumed to make the related stories more understandable, allowing learner to manipulate texts. In the pedagogic scene, a content-based approach allows dealing with a particular topic for a sustained period of time providing recurring exposure to new vocabulary with potential positive outcomes.

Providing several exposures to new words enables knowledge of the words to grow. A single exposure cannot be considered enough to learn a new word. It can only enable word recognition. Nation (1990) reviewed several studies which found that learners need to be exposed to five to sixteen repetitions in order to learn a new word.

Herman et al. (1987) report that the probability of learning a word from context after a single exposure is .05 only. Repeated encounters with target words can expand word meanings and illustrate new associations with that word. Rott (1999) examined the effect of exposure frequency on intermediate learners' incidental vocabulary acquisition. Results showed that six exposures produced significantly more vocabulary knowledge than two or four exposures. Similarly, Vidal's (2003) empirical study through academic listening revealed that frequency of word occurrence was a good predictor of vocabulary gain.

Since a single exposure to new L2 words results in limited acquisition, then multiple exposures to these words seem to be necessary for consolidating knowledge. Learners need to meet target vocabulary repeatedly in various texts over an extended period of time. This observation points to the potential benefits of teaching a subject matter through the medium of the L2 as an approach favouring multiple exposures to L2 target vocabulary.

CLIL lessons provide reading texts and oral contexts which allow frequent repetition of new words, thereby offering opportunities to the learners to learn and retain new L2 vocabulary.

L2 learners are able to understand and use a new word when they acquire the word's pronunciation, morphology, syntactic functions, meanings, collocations or association with specific words, and the particular context in which the word may be used (Nation, 2001). The various aspects of word knowledge are acquired throughout repeated exposures to the word. On first exposure to the word, which could be an oral encounter, the learner is likely to remember the sound or an aspect of the sound, such as the number of syllables. When

seeing the word in written form, the learner is likely to remember the number of the word's letters. Further exposures and use of the target word can help building up and consolidating the word's essential formal and semantic features (Schmitt, 2000). In this way, the learner can get to know a variety of word knowledge aspects (Schmitt, in press) and therefore s/he will be able to use the new word in the right contexts appropriately.

Developing deeper knowledge and intuition about the word such as a word's register constraints and collocational behaviour comes only later. According to Henricksen (1999) acquiring word meaning involves not only the learners' initial process of mapping meaning onto form but also the ongoing process of network building, that is "constructing and reorganizing their interlanguage semantic networks" (p.307). First, a new word is added to the lexical store through the process of labelling, which is linking the concept to a sign. Finding which things can be packaged together under the same label follows. Overextension or underextension may be observed, i.e. using a particular word for either many or too few concepts respectively while trying to expand or narrow down the range of meaning or reference of a word item. Extensional links are created and then the lexical store is reordered or changed. Semantic knowledge of a word item involves definitional, referential, or extensional links of a word as well as understanding its semantic relation to other words of a person's mental lexicon. This view surely contradicts the idea that learning a word is just a simple matter of learning its definitive meaning(s). Attributing an isolated, fixed meaning to a new word does not seem to help in developing a word's full meaning. Vygotsky (1962) explains that a word might initially be linked to an object and after that to another, just as an overcoat changing owners. In this sense, a word's meaning develops from primitive generalizations to abstract concepts (p.213). Taken that a staged development in the acquisition of a word's meaning occurs, then proper classroom methodology needs to be implemented in order to facilitate learning of both formal and semantic features of unknown words.

Hulstijn (2001) considers the psycholinguistic aspect of vocabulary learning holding that the theoretical significance of whether the learner's attention was drawn to new vocabulary incidentally or intentionally in order to succeed in retaining words in long-term memory is not much. What really matters "is the quality and frequency of the information processing activities (i.e., elaboration on aspects of a word's form and meaning, plus rehearsal) that determine retention of new information" (ibid: 275). He maintains that from a pedagogic

point of view, intentional and incidental learning need to be treated as complementary activities when teaching beginners and intermediate-level EFL learners.

Research shows that retrieval of the target words and multiple exposures to the new vocabulary have a positive impact on L2 vocabulary retention. CLIL environments promote retrieval of the new words through content elaboration which gives learners opportunities to encounter the new vocabulary repeatedly.

### ***3.1.10 Learning L2 vocabulary in subject matter classrooms***

Teaching a subject through the medium of the L2 (CLIL) appears to provide opportunities to the L2 student to learn vocabulary in context, activate background knowledge, process actively the new words and have multiple exposures to the new vocabulary.

Robinson (2005) bears this observation out in the study she conducted in order to identify the processes involved while developing L2 word knowledge in subject matter classrooms. The subject teachers' practice was explored as they explained, defined and used L2 key vocabulary in Geography and Science lessons as well as the outcomes of their practice on secondary school children's learning.

Observation revealed frequent repetition of the key vocabulary by the teachers (Robinson, 2005: 433). For instance, during two minutes of discourse the teacher said the word 'friction' 17 times. A child expressed the feeling that word repetition was an effective way of signalling the importance of the word item. An EAL student was able to recall only a part of the phonological knowledge as well as the semantic link between the oral form of the word and the context. Data demonstrated that a single exposure cannot provide full sense of a word's form and meaning. In general, frequent repetition of key words in Geography and Science provided more opportunities to the children to notice target words. Another important finding was that the pupils used the key words when the teaching strategies focused on encouraging students' active participation in the development of meaning (ibid: 439). For instance, a teacher managed to elicit the target words 'friction' and 'force' by involving children both physically i.e. pushing each other, and mentally i.e. visualising the feeling of the force of the wind. In this framework, the oral gap filling strategy was used with positive outcomes. For instance, when the teacher said '...well here I am ... at... ...I'm at the ...I'm at the...' the children responded 'the mouth'. The teacher went on saying 'OK here I am at the mouth of the river... and I'm sailing down...'

(ibid: 440) continuing the conversation while eliciting key content words by the students. The use of narratives provided meaningful contexts which stimulated retrieval of vocabulary.

Robinson (2005: 442) observed that the teacher in the CLIL class used linguistic frameworks allowing incremental building of sentences. For instance, the meaning of the key word “buggy” was developed incrementally, that is new information was gradually added allowing the teacher to control the grammatical complexity of the text. For instance, the teacher initially said: “A buggy is a very, very simple vehicle”. Then, new information was added: “It’s a very, very simple moving object”. Finally, the sentence was reformulated into: “so it’s going to be a very, very simple moving four wheeled object or vehicle”. The consistent grammatical structure of the statements, i.e. noun phrase, verb phrase and adjective phrase, decreased the amount of cognitive processing required, attracting attention to the new information presented each time. The repetition “... a very very simple...” signalled that new information was coming to be added to their developing concept of the target word. These processes of simplification and reduction of linguistic input enable clarification of meanings, thereby strengthening the links between word and meaning.

Research on L2 vocabulary development suggests the importance of encountering both the lemma and the lexeme information of a new word, activating prior knowledge, learning vocabulary in context in combination with intentional learning and input elaboration, active processing of new vocabulary and being provided multiple exposures to the new words. These conditions are met in the CLIL classroom.

### **3.1.11 Summary**

The aim of this section was to examine the potential impact of various principles and approaches on L2 vocabulary acquisition by surveying related research.

Research review on L2 vocabulary learning reveals the importance of activating prior knowledge, learning vocabulary in context, active processing of new vocabulary, recalling the new words and being provided multiple exposures to new word items. Intentional learning and input elaboration can enhance vocabulary learning. CLIL environments can provide these necessary prerequisites for effective vocabulary learning. CLIL learners

encounter new vocabulary in context, thus they are exposed to both the semantic and the morpho-phonological form of new words. Prior knowledge is activated because new vocabulary is allowed to be integrated with prior learning. In this way, associations are created which enable the recall of new word items. Active processing takes place as the students learn new vocabulary by doing something meaningful involving new words. During the process of learning content and meaning making, CLIL learners are provided repeated exposures to new vocabulary. At the same time, they are offered opportunities to recall new word items in order to communicate content-oriented information. This act of retrieval is assumed to enhance retaining the new words. However, the positive effects of intentional learning in the CLIL class should not be discounted. Mental effort into learning the new word items may be necessary. Therefore, input elaboration and enhancement can be effective strategies for increasing comprehensibility of contextual input and thereby enhance vocabulary learning.

## **CHAPTER 4: RESEARCH IN THE AREAS OF L2 TEACHING AND SUBJECT MATTER TEACHING –THE KEY PRINCIPLES OF THE CLELD MODEL**

The chapter presents a research review of studies in the field of L2 teaching and subject matter teaching. The findings form the basic principles for constructing the CLELD model developed in this study. The purpose of this research is identified and the problem is then stated. Next, the research questions are presented followed by the relevant hypotheses. The reason why this study is significant is explained and a brief summary is presented in the last part.

### **4.1 Effective L2 teaching**

According to the curriculum the aim of teaching English as a foreign language in Primary School is to enable learners “to communicate effectively in various situations, become sensitive to language appropriacy and develop a positive attitude towards the English language and culture” (Ministry of Education and Culture of Cyprus, 1994: 175). The relevant objectives primarily include the development of oral communication, i.e. listening and speaking skills. Pupils are expected to listen and respond to simple instructions and questions, give simple instructions and ask questions, describe pictures, events or experiences, understand simple stories and reproduce them. Secondly, written communication also needs to develop including reading and writing skill. Pupils are expected to read aloud or silently and comprehend simple passages, write sentences in the affirmative, negative and interrogative form with correct grammar and spelling and produce short guided texts (ibid: 175-176).

In order to achieve the above aims and objectives while also learning a subject, teachers need to be armed with a specific repertoire of instructional strategies. Met (1998) stresses the need for L2 content teachers to “understand how language develops and be familiar with current pedagogical practices in language education” (p.56). CLIL research, e.g. on French immersion programmes, has shown that subject matter teaching through L2 does not necessarily develop L2 learning (Swain, 1988). Snow et al. (1989) comment that “it is unlikely that desired levels of second/foreign language proficiency will emerge simply from the teaching of content through a second or foreign language” (p.204). Snow (1998) identifies the need for “upgrading the skills of the content-area teacher with regard to language-sensitive content instructions” (p.258) when teaching in a CLIL class. If CLIL is to be effective, language teaching needs to be carefully designed. Coyle (2007) suggests

“drawing on existing research in related to *CLIL* fields such as immersion, bilingual education, LEP and EAL” (p.558). The mushrooming interest in research related to effective L2 instructional strategies has revealed the effectiveness of several teaching strategies in the L2 classroom which should be taken into account in the development of a *CLIL* lesson planning instrument as they are found to promote students’ involvement in the lesson. As Coonan (2007) states, the more students in *CLIL* classes are actively involved in the learning process, “the greater the guarantee of success from the language point of view” (p.626).

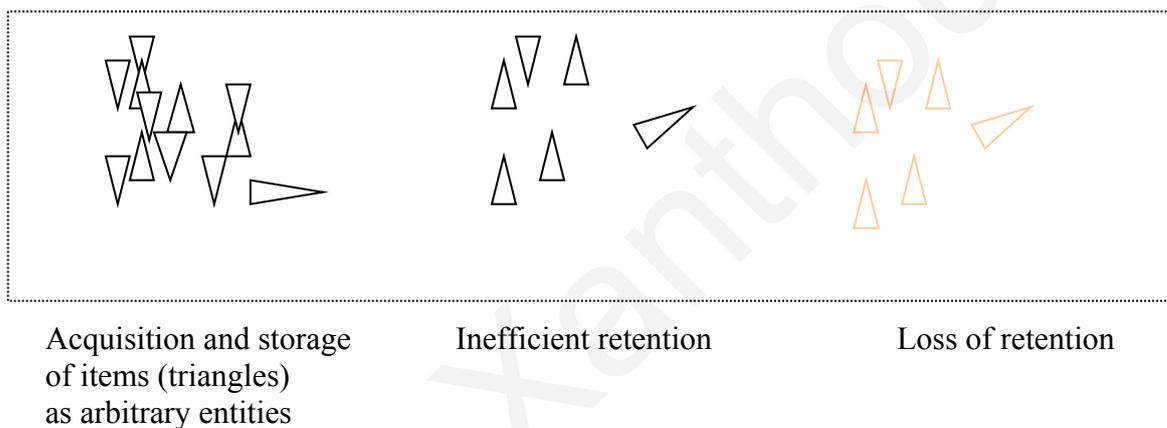
Therefore, L2 acquisition theories and effective EFL instructional strategies may need to be considered in the development of a *CLIL* lesson delivery model as they are found to promote students’ involvement in the lesson.

#### ***4.1.1 Pursuing both acquisition and learning***

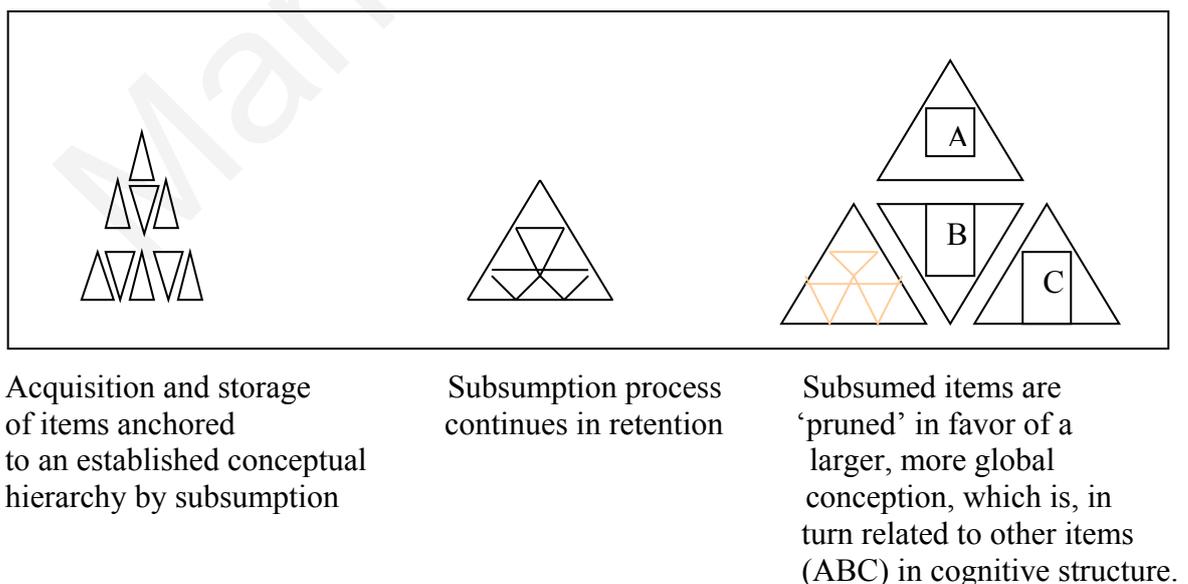
Krashen assumes that L2 acquisition takes place subconsciously when the learner uses language for real communication in meaningful situations. In contrast, learning is a conscious process occurring through study which leads to metalingual knowledge of the language (Krashen, 1982). These two different kinds of knowledge are supposed to be stored separately, namely the second cannot be turned into the first. However, this assumption is unclear about how the learnt knowledge cannot enable the development of acquired knowledge. Krashen favours acquisition and appeals against learning. However, if learnt knowledge can be converted into acquired knowledge, and if acquired knowledge can enhance learning then this proposal may be questioned or at least require further review. Interestingly, more recently, Ellis (1996) has pointed out that “explicit knowledge is being viewed as a facilitator of implicit knowledge, by enabling learners to notice features in the input and compare them to their own interlanguage representations” (p.363). The reverse could also be true, i.e. while the learner is mastering the L2 through implicit learning in environments such as *CLIL*, the ability to acquire more formal explicit knowledge may be enhanced. If this turns out to be true, then both acquisition and learning are required. In this vein, *CLIL* teaching could involve some explicit language focus for better academic outcomes.

Krashen’s notion of language acquisition bears resemblance to the meaningful learning theory developed by Ausubel. Brown (1994: 79) quoted Ausubel (1968) as having said that unlike meaningful learning, rote learning is a process of acquiring knowledge as

“isolated entities that are relatable to cognitive structure only in an arbitrary and verbatim fashion, not permitting the establishment of *meaningful* relationships”. Meaningful learning is assumed to take place when new knowledge is related to already established entities in cognitive structure. New material is subsumable or relatable to stable elements. Cognitive structure is parallelized to a system of building blocks. In the rote learning case isolated blocks which are not related to one another are acquired. These blocks do not contribute to the functioning of the structure. In the meaningful learning situation, blocks are integrated into already established clusters of blocks. Figure 5 demonstrates a visual representation of the rote learning case whereas figure 6 shows meaningful learning.



**Figure 5:** Visual representation of rote learning and retention (Adapted from Brown, 1994: 80)



**Figure 6:** Visual representation of meaningful learning and retention (Adapted from Brown, 1994: 80)

The difference between the two types of learning lies in their efficiency to cause long term retention of material into memory. William James (1890) referred to meaningful learning more than a century ago by stating that “in mental terms, the more other facts a fact is associated with in the mind, the better possession of it our memory retains” (p.662).

Unlike the grammar-translation method, which is far detached from authentic communicative needs as it places emphasis on language rules and translation, the communicative approach has emerged to address the needs of EFL and ESL learners. This approach is based on the premise that natural acquisition happens subconsciously through communication and natural interaction (Krashen, 1982). In this sense, natural communicative contexts need to be provided for language acquisition to take place. These contexts are considered to be important for the learner as they allow obtaining data with which interlanguages can be constructed (Van Lier, 1988).

Communicative interaction is considered by several researchers as fundamental to language acquisition so it may need to be pursued in L2 learning (Halliday, 1978; Pica, 1988). Meaningful activities are likely to attract all students’ interest, helping them to learn a foreign language. Performing a task gives opportunities to intermediate level EFL college students to learn about the target language feature while communicating in order to carry out the task (Fotos & Ellis, 1991). Meaning raises the need of the learners for communication and simultaneously their level of motivation. So, if target language is presented in meaningful context, it has more possibilities to be learned. Collentine and Freed (2004) claim that communicative contexts force learners of all proficiency levels in the class to “use the L2 as a tool for participating in important social and interpersonal functions” (p.155). They suggest that if teaching avoids placing target language in conversational contexts, this may mislead learners that they know something without realizing its appropriateness and context.

Unlike drilling, which does not allow space for choice but treats all students the same, communicative methodology takes into account learners’ experience and feelings. Thus, encouraging meaningful communication in the L2 classroom is likely to advance language acquisition for all linguistic levels. In this pedagogical framework, all learners are enabled to manipulate the linguistic system in order to use it spontaneously to express messages (Littlewood, 1981).

Interestingly, research has shown that teacher-made communicative tasks in the EFL class may or may not raise real communication. Gatbonton & Segalowitz (2005) argue that, although almost all language teachers favour the use of communicative language teaching, they do not really apply the method. A communicative environment should promote real interaction by allowing students to work together in order to complete a task, and meet the language needs to involve pragmatic functions. Content-based L2 teaching likely promotes meaningful communication and interaction, by carrying pragmatic functions, and thereby possibly enhances second language learning. Swain (1988) points out that “content teaching is considered communicative teaching par-excellence” (p.68).

Anderson (1990) formulated a cognitive learning theory for instruction which draws attention to integrated content and language. In this view, learning undergoes three stages; at the cognitive stage learners retrieve information from memory in order to solve some basic problems with content and language; at the associative stage, links to related knowledge are strengthened; at the autonomous stage, automatic performance is achieved allowing further concept learning. The theorist concludes that the presentation of coherent and meaningful information leads to deeper processing and the creation of more links between related knowledge, which allows better learning.

Hinkel (2006) highlights the trends in L2 teaching which started in the 1990s and 2000s and appear to continue affecting instruction in the foreseeable future. It is concluded that current perspectives on L2 teaching are influenced by “integrated and dynamic multiskill instructional models with a focus on meaningful communication” (p.113), namely teaching multiple language skills in an integrated and contextualized manner. Instructional practices such as content-based, task-based, and problem based teaching seem to serve integrated language teaching.

Snow et al. (1989) claim that “for young children cognitive development and language development go hand in hand” (p.201). The child uses the language to understand the surrounding world. Although language and cognitive development naturally coexist in first language acquisition, traditional L2 pedagogy separates these two domains. In real life settings, people use language to talk about meaningful matters and not about language itself. However, in schools, language learning and subject matter learning are taught independently, overlooking that content needs to be communicated in the first case and that language can be used as a means to teach content in the second case. In CLIL settings, subject matter provides interesting topics which motivate the learner to use the L2 in order

to access content. In addition, the subject carries real meaning, providing a cognitive basis on which language features can be constructed. Otherwise, language features will be learned out of context, separated from conceptual values.

Marsh (n.d. b) compares language learning to learning how to play a musical instrument or football. One cannot learn how to master a musical instrument if not allowed to touch a keyboard, or learn football if not allowed to kick a ball. Effective learning requires “experiencing both learning about the instrument, and having hands-on practise at using the instrument, at the same time” (ibid: 6). This applies to language learning, and CLIL seems to satisfy this condition by providing opportunities to the children to practice target language features when they encounter them. CLIL helps learners acquire L2 in a natural way, helping them to focus on a topic rather than on language itself.

More recently, De Graaff et al. (2007) observed and analysed 9 video-taped CLIL lessons involving students from 12 to 17 years, identifying examples in CLIL lessons at secondary school level where the teachers facilitated meaning-focused processing in their effort to achieve effective CLIL teaching performance. For instance, they stimulated meaning identification, e.g. “Can you explain the cartoon?” (p.614), checked meanings through clarification checks, e.g. “Do you understand what I am saying?” (p.614) or confirmation checks, e.g. “Do you agree?” (p.615), they used both implicit and explicit forms of corrective feedback to help students clarify meanings and allowed them to practise through oral and written tasks, such as matching exercises and writing down in notebooks the difficult words. The researchers claim that exposure to language can be effective if processing is meaning-focused. This enables connections to knowledge from long-term memory allowing storing and retrieving new input. Although their observations validate theoretical assumptions, more research is required on the effects of effective CLIL teaching performance on students’ language development. Input processing could be more successful when focusing not only on meaning but also on form.

#### 4.1.1.1 Task-based or experiential teaching and analytic teaching

Kumaravadivelu (2006) traces the major trends in L2 teaching methodology beginning from 1991. The researcher spots the shift from communicative language teaching to task-based language teaching. Communicative language teaching (CLT) was developed as a response to the audiolingual method which was characterized by the abusive manipulation

of the L2 linguistic structures and features. The CLT proponents advocated the use of activities simulating meaningful interactions which occur in the real world. Savignon (1991: 263), remarks that CLT “views competence in terms of social interaction”, building on Austin’s (1962) speech act theory which illustrates how interactants use various speech acts (inform, request etc), Halliday’s (1973) functional view of language emphasizing meaning transfer, and Hymes’ (1972) communicative competence theory involving sociocultural and interactional competence. Meaning negotiation and information sharing are considered to be of primary importance outpacing creativity and the purposeful use of language. Despite the so perceived popularity which welcomed the new approach, related research did not confirm its “authenticity, acceptability, and adaptability” (Kumaravadivelu, 2006: 62). To begin with, “engagement with meaningful negotiation” (p.62) in the classroom does not always exist. Communicative activities may or may not lead to meaningful communication (Thornbury, 1996). Kumaravadivelu (1993) analysed two classroom episodes of lessons following CLT only to find the absence of genuine interaction in one of the two. Secondly, CLT has not been accepted by many scholars as a revolution in language teaching. For instance, Widdowson (2003) notes that CLT does not constitute a radical break from traditional language methodology. Instead, Kumaravadivelu (2006) concludes that “the principles and practices of CLT would reveal that it too adhered to the same fundamental concepts of language teaching as the audiolingual method it sought to replace, namely the linear and additive view of language learning, and the presentation-practice-production vision of language teaching” (p.63). Last, researchers around the world cast doubt on the adaptability of CLT to suit different contexts (Prabhu, 1987; Shamim, 1996; Li, 1998; Yu, 2001; Sato, 2002; Jarvis & Atsilarat, 2004). The outcome of these findings and feelings has led the trend towards task-based language teaching.

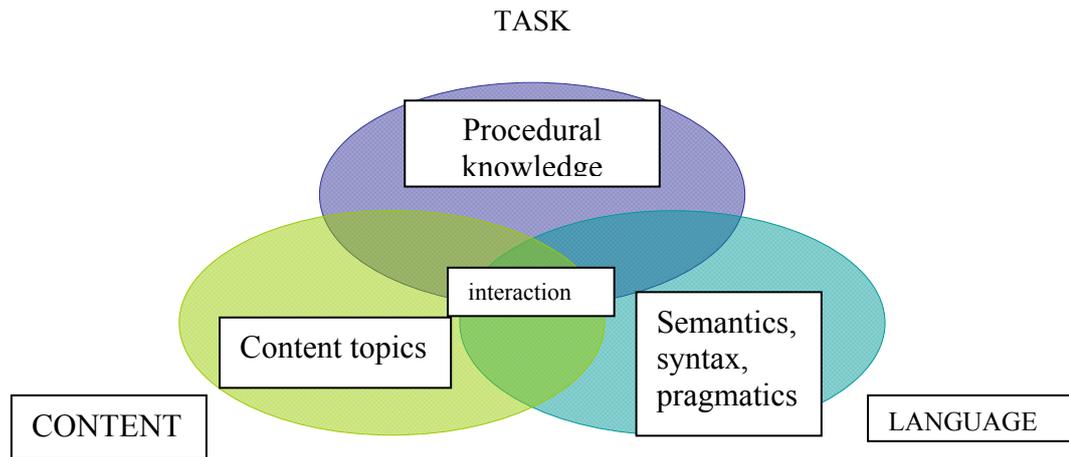
Richards and Rodgers (2001: 161) stress that teaching needs to be based on the “task principle”, holding that learning is promoted when language is used for carrying out meaningful tasks, and on the “meaningfulness principle” according to which the learning process is supported when language is meaningful to the learner. Task oriented activities are those which satisfy the following criteria: “meaning is primary; there is a goal which needs to be worked towards; the activity is outcome-evaluated *and* there is a real-world relationship” (Skehan, 1998: 268). Language teaching is organized using information-gathering, problem-solving, and evaluative tasks (Markee, 1997). Real-world tasks motivate the learner and activate “natural acquisitional processes” (p.277) due to the task’s

relationship to the real world, hence interlanguage development is likely to occur. Task-based learning places emphasis on ‘doing’ something with the language in order to accomplish an aim. More recently, Ellis (2003) carried out a synthesis of earlier definitions and succeeded in presenting a definition which takes into consideration all the recent trends in language pedagogy: placing emphasis both on meaning and form, integrating language skills, considering pragmatic properties, psycholinguistic processes, social interaction and authentic communication.

Keck et al. (2006) investigated the link between task-based classroom interaction and L2 acquisition by synthesizing the findings of all experimental, task-based interaction studies published between 1980 and 2003. It was shown that task-based interaction using tasks requiring interaction such as jigsaw, information gap, narrative (and problem-solving) results in medium to large effect for vocabulary acquisition. However, the small number of studies related to vocabulary acquisition in this environment requires more research relating task-based interaction to vocabulary acquisition.

Content-based instruction is considered to be the “pedagogic manifestation” of task-based approach (Skehan, 1998: 276). Assigning task-based activities in CLIL classes seems to be an effective way to enable the development of both the target language and subject matter knowledge. Crandall (1993) suggests using task-based learning in CLIL environments.

Short (2002) presented the Language-Content-Task (LCT) framework which employs the active involvement of the following three components in the process of learning in sheltered social classes in middle school: knowledge of the target language (L), knowledge of the content area (C), and knowledge of how tasks (T) can be completed successfully (Figure 7). In this perspective, “some explicit attention to all three domains is critical for English language learners’ school success” (Short, 2002: 18). Teachers need to deal with content, language and tasks both separately and interactively (Stoller, 2004). Therefore, CLIL methodology needs to consider the interaction of language, content and task as learners need to pull together their knowledge in all three domains in order to participate actively in the lesson.



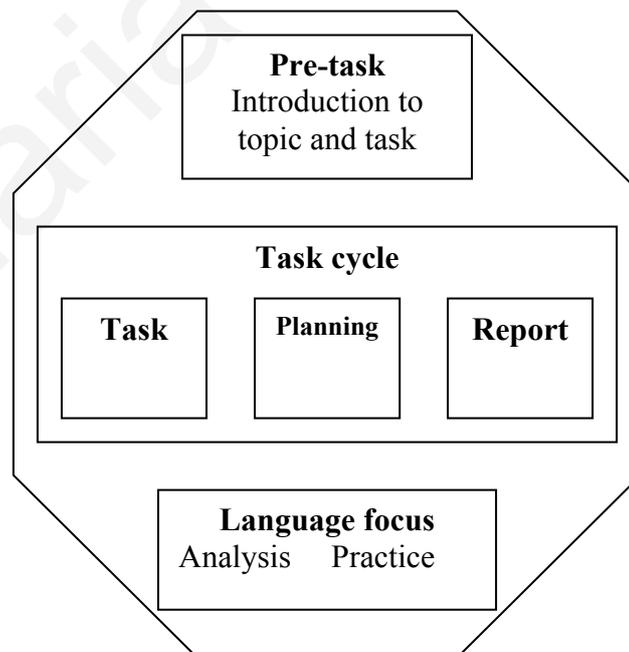
**Figure 7:** Language-Content-Task Framework (adapted from Short, 2002: 20)

Regarding language, teachers need to develop students' semantic and syntactic L2 knowledge as well as pragmatic knowledge related to how English is used. In this regard, explicit instruction may have its place in the CLIL class in the effort to teach students the four language skills. Content involves the concepts introduced in the CLIL lesson which are normally drawn from subject curriculum objectives. Tasks provide opportunities to students to practise content knowledge or assess retention of information. Students' knowledge of the three domains can be pulled together in the overlapping areas of the circles. In this way, specialized vocabulary is practised in the area shared by content and language. Tasks scaffolding content understanding are situated in the overlap of content and task areas. These tasks help students understand how subject matter knowledge is applied to real-life situations e.g. role plays. Directions given for tasks are placed at the intersection of language and task areas. Understanding and participating in the co-construction of content knowledge is placed at the intersection of the three areas. Interaction can be achieved when students are allowed to 'interact with the content being presented and the tasks being assigned, using spoken and written English' (Short, 2002: 20). In order to succeed in this, learners need to be told how interaction should take place, e.g. through guidance in "cooperative group participation" (ibid: 20).

This model has been applied by Short (2002) to sheltered Social Studies classes at secondary school level in the U.S. Four middle school classes with students of intermediate levels of English L2 proficiency were involved in the study. Discourse

analysis of the data showed that language learning, e.g. through explicit instruction in vocabulary development, was the area that received the least attention. Content and tasks received more attention than language learning. Short (2002) noticed that the teachers did not focus on explaining word meaning. Target words were not written on the board, students did not copy them into their notebooks and key terms were not reviewed towards the end of the lesson. She concludes that explicit language instruction should be provided to CLIL learners including the area of vocabulary acquisition. Short (2002) suggests creating “tasks that practice and apply language and content skills” (p.23). For instance, graphic organizers can be used to illustrate content and simultaneously practise a particular language function. Venn diagrams help learners understand similarities and differences choosing appropriate content information while using the language structures of comparing.

Willis (1996) presents a framework for task-based L2 learning (Figure 8). This framework, which has not yet been tested experimentally for its effectiveness in promoting L2 learning, includes three components: pre-task phase, task cycle and language focus. The first part of the lesson involves the introduction to the topic and task. Useful words are highlighted and task instructions are explained. The second part includes planning (draft can be prepared) and carrying out the task as well as reporting results. The last part involves analysis and language practice of new words.



**Figure 8:** Task-based learning framework (adapted by Willis, 1996: 38)

Language focus activities include practice activities, such as completing phrases, dictionary exercises, i.e. matching word with definition as suggested by Santana-Williamson (2002), and language games, such as word bingo with the new vocabulary, word anagrams and spelling games (Coomber and Peet, 1993).

After the task is carried out, the teacher needs to ensure appropriate consolidation and integration of new language forms into already existing L2 knowledge. Focusing on language in a CLIL environment may prove vital for the learners' L2 development.

The Second Language Approach to Mathematics Skills (SLAMS) developed by Cuevas (1984) for grades K through 12, places emphasis on both the delivery of Mathematics content and the development of language skills. So, activities are designed focusing both on Mathematics content and language development. After the exploration of students' prerequisite skills and the activities for accomplishing content objectives, ESL activities are carried out specifically designed to increase the learners' level of competence in the English-language skills required to master content through the target language. Similarly, the Cognitive Academic Language Learning Approach (CALLA) which was designed for LEP students preparing to enter mainstream education provided language development activities in order to enhance students' language skills along with the use of learning strategies for learning content.

Pica (2000) reviewed teaching principles and techniques finding that communicative activities do not bring learners to the expected levels of proficiency because learners' attention is drawn mainly to the comprehensibility of input while little attention is paid to the "forms that shape the input" (p.6). Therefore, it seems reasonable to suggest that content-based language teaching can be more effective when it combines meaningful communication related to the content and intentional language development. Langman's (2003) case study of a seventh-grade Science classroom showed that the use of ESL strategies, such as visuals, facilitated content learning but did not enhance L2 knowledge. The limited English improvement that was observed called for more "focused language instruction" (p.24). Short (1994), reporting on the first phase of a project examining effective practices in CLIL middle school Social Studies classes, referred to the use of explicit vocabulary instruction, involving the development of word webs and the creation of associations between target words and other known words, as effective ways to teach vocabulary. Visual representations, such as pictures, helped the students associate words with their meanings. Target vocabulary was not always left to the learner to infer. Swain

(1988) concluded that subject matter teaching is not necessarily good language teaching. Evidence showed that focusing on meaning does not allow acquisition of all language features. So, some language-focused instruction along with content teaching may be required.

More support for the need of focusing on language comes from Schleppegrell et al. (2004) who investigated history teaching through L2 English at the middle school level. The researchers used class observation, interviews and discourse analysis to prove that when students are helped to focus on language, they can better understand content concepts. The use of a functional focus on language is recommended for enhancing content-based instruction in history classrooms, as knowledge in this area cannot easily be constructed hands-on. It is concluded that focusing on language is required to help CLIL learners gain control of the language, through which content is constructed. According to Schleppegrell et al. (2004), various questions can be used to help learners understand messages while deconstructing the language in textbooks. For example, 'what' questions help students 'identify action verbs', and 'how' questions can be used to 'analyze agents and receivers of actions' (p.87). Functional linguistic analysis may add benefits to CLIL learners' L2 development as it helps students to develop academic language by exploring the language choices to transmit meanings. The new vocabulary which has been encountered and explored in this context could be acquired and retained for long.

Mohan and Beckett (2001) provide more support for the role of a systemic functional linguistic approach in developing students' L2 proficiency in content-based classrooms. The researchers have demonstrated this by analyzing recast sequences involving grammatical and lexical features expressing causal meaning. Scaffolding involved corrective recasts or reformulations of university students' utterances. The positive outcomes of this type of language focus activity could be examined for younger learners in primary school CLIL classes. This type of investigation could be extended to focus on students' acquisition of the lexical aspects of the target language.

An overview of current developments and trends in second language teaching was carried out by Hinkel (2006). Research findings reveal that meaningful input on its own is not adequate for developing syntactic and lexical accuracy in the target language. It may be the case that polarizing meaning-based and form-based instruction is not constructive. Instead, this situation may reflect a recurrent pattern of destructive ideological swings in

L2 teaching theory and practice. It seems that both bottom-up and top-down abilities need to be promoted in the L2 class. Kim (2006) found that the use of both implicit i.e. paraphrasing, and explicit lexical elaboration i.e. providing a synonym, helps meaning recognition of vocabulary.

Short (1994) stresses the importance of focusing on vocabulary when teaching content through the L2. However, Robinson (2005: 429) acknowledges the concern that the National Curriculum documents do not provide any guidance on how pupils can be helped in studying subject matter through English as an additional language (EAL) and learn vocabulary more effectively. She notes that there is an absence of a distinctive EAL pedagogy which integrates English language teaching with subject knowledge and particularly investigating the processes of building vocabulary knowledge is built in mainstream classrooms. Robinson (2005) disclosed the “lack of attention paid to the form of the key words” in CLIL classes (p.433). She concluded that the year 5 and 6 - primary school students were unable to express conceptual understanding of words linguistically because the teachers did not focus on the structure of the words but concentrated only in transmitting the meaning. Pupils should also acquire the semantic and the syntactic and morphological knowledge of a word. Listening passively to the teacher’s explanations does not seem to promote deep word processing. Instead, learners need to be engaged in physical and mental activities which can involve them in the generative use of vocabulary. Robinson (ibid: 444) argues that a more explicit, systematic and principled approach to vocabulary teaching should be adopted by the National Curriculum policy.

De Graaff et al. (2007) have identified the facilitation of form-focused processing as one out of five basic conditions related to effective CLIL teaching performance. Formal instruction seems to be necessary for raising students’ awareness of language form. In this view, a CLIL teacher could draw learners’ attention to specific language features. These features may involve both grammatical and lexical aspects of the target language. Both implicit and explicit techniques could be used to achieve this, such as clarification requests and recasts in the first case and explicit correction or metalinguistic comments (giving the grammatical rule) in the second. However, these techniques were observed in secondary schools. More research is required in elementary level classes.

Coonan’s (2007) examination of 288 secondary school CLIL teacher log books in Italy uncovered the teachers’ tendency to consolidate new vocabulary through language focused

activities. Teachers mentioned the use of activities such as ‘pronunciation, definitions, glossaries, memorising of words, lexical reinforcement’ (p.636) etc.

Skehan (1998) notes that the three phases for task implementation, namely pre-, during-, and post-task are promising in developing L2. Therefore, he suggests that teacher-led action research projects in this area are desirable (Skehan, 1998). Swan (2005) holds that, although a task-based approach is justified by the claim that linguistic features are acquired through noticing during communicative activity, he points out that empirical research has not yet confirmed the superiority of task-based learning over traditional instruction.

Harley (1993) explored how L2 instruction in content-oriented classrooms can be provided so as to optimize young learners’ language learning in the French immersion context. The researcher suggests that the existence of the two approaches does not imply that they are mutually exclusive. Allen et al. (1990) report that the two approaches are complementary and they enhance L2 development in French immersion programmes. On the one hand, experiential learning increases the exposure to authentic language use, being especially effective in promoting the incidental learning, which is considered to be a characteristic of young children. However, Harley (1993) argues that this strategy may succeed in providing optimal conditions for developing the target language in the classroom. Learning subject matter content through the medium of the L2 can not guarantee that students will notice form-function relationships. The great exposure of immersion students to L2 comprehensible input through subjects such as Mathematics, Science, history, and Geography allows them to perform as well as their counterparts in achievement tests who are taught subjects in their L1 (Genesee, 1987). However, this exposure does not guarantee a native-like level of linguistic performance (Harley et al. 1990). A restricted range of language functions and vocabulary may be presented in a CLIL class. Besides, in the content-oriented L2 classroom, there are not many opportunities for learners to produce discourse as the teacher does most of the talking. However, Swain (1985) claims that production is necessary for promoting L2 syntactic processing. L2 vocabulary acquisition may require production involving the target words. Allen et al. (1990: 66) note that in grades 3 and 6 of immersion classrooms, learners respond to questions in short utterances ranging from one or two words up to a single clause. Interestingly, this situation exists not only when content is taught via the L2 but also when students are taught a subject through the L1 (Swain, 1988). Overestimating students’ L2 abilities may be another possible disadvantage of content-based L2 teaching. Language demands may be posed which are

beyond the current L2 level of the students (Stern, 1990). Resorting to L1 in order to distinguish the meaning of concepts which appear to be synonyms is one way of coping with the above situation. Using word items with general meaning is another way to transmit meaning, as identified by Harley (1992) who examined L2 development of English-speaking students in Canadian French immersion classes. Second language production data from interviews with students at grades 1, 4, and 10 were analyzed. Findings revealed that the impact of L1 in L2 verb use and differences from the English verb system pose difficulties for the L2 learner. This “crosslinguistic influence” (ibid: 180) occurs to all stages of L2 acquisition. Outcomes suggest that although experiential learning seems to be important for L2 development it may at the same time be insufficient in ensuring continuing L2 growth. This is due to its inadequacy in creating conditions for the learners to notice L2 linguistic features (Schmidt, 1990). Therefore, it seems that focusing on language to a certain degree could prove vital in CLIL classes. Swain and Lapkin (1989) carried out a research review examining observational data from immersion classes reaching the conclusion that “where language practice is isolated from the substance of content lessons, linguistic competence does not appear to improve” (p.158).

In this vein, Stern (1990) imposes the need to find ways of providing experiential teaching with certain analytic support. Allen et al. (1990) suggest the use of analytic teaching strategies for French immersion classes. Analytic teaching serves to make these features salient for learners who might not notice them with experiential teaching. However, analytic teaching may emphasize accuracy discouraging at the same time the learner to produce the L2. Concentrating on isolated forms may not allow the learner to see how these relate to meaning. The absence of opportunities for meaningful use of forms is likely to make the learner unable to use them in genuine communication. The integration of analytic teaching into experiential learning needs not to be conceptualized in a decontextualized manner as it has been observed (Swain and Carroll, 1987). Harley and Swain (1984) emphasize that the L2 input needs to provide “ample opportunity to observe the formal and semantic contrasts involved in the relevant target subsystem”, not necessarily in an explicit manner, as well as “activities requiring the productive use of such forms in meaningful situations” (p.310).

A few experimental studies have been undertaken in an attempt to show that language instruction in immersion classrooms can effectively encourage the use of specific L2 features in meaningful contexts, enhancing the learners’ L2 proficiency. Harley (1989)

carried out an experiment of integrating an analytic approach with the experiential approach of content-based teaching. Meaning contrasts between two tenses, i.e. the imparfait and the passé composé in French were taught to Grade 6 immersion classes. Although only immediate post-test results demonstrated benefits for the experimental group, linguistic gains could be retained if some teaching strategies, such as recycling of target language, were adopted. Moreover, the researcher proposes the use of dramatic or miming games for promoting the contextualized use of specific verb vocabulary.

Attending an intensive ESL programme for primary francophone students in Quebec proved to be beneficial for the learners' L2 development (Lightbown & Spada, 1994). The 5 and 6 graders that had received more form-focused instruction were more accurate in their use of some of the forms investigated. Therefore, it is concluded that "at times a focus on form appears to be necessary" (p.577). Although empirical evidence is slim, it does provide support for the positive outcomes of analytic teaching.

Research findings show that placing focus both on content and language in the CLIL classroom could increase students' language benefits. Thus, the pursuit of both acquisition and learning seems to be an essential principle that should be included in the CLIL model developed in this study.

#### ***4.1.2 Providing comprehensible input***

The input hypothesis attempts to explain how acquisition takes place. It is assumed that comprehensible input is the necessary condition for acquisition. According to Krashen (1982) "a good teacher is someone who can make input comprehensible" in order to facilitate acquisition (p.64). In this way, learners can 'move from i', their current level, "to i+1, the next level along the natural order, by understanding input containing i+1" (Krashen, 1985: 2).

Krashen posits that comprehension can be achieved through use of context and simplified input. Being engaged in real and interesting communication is what supplies optimal input. Context is assumed to enable input to become comprehensible. It enables learners to infer meanings when the linguistic resources available are not sufficient for decoding. Information from context can be extra-linguistic, world knowledge and preexisting linguistic knowledge. Learners do not necessarily have to be exposed to contexts involving a particular grammatical element.

Input in CLIL classes contains new concepts to be acquired. Comprehension is succeeded through cues from the situational and verbal contexts which interact with the student's world knowledge. Contextual cues hidden in oral and written texts as well as extralinguistic cues enable learners to understand target language (Markee, 1997). When efforts are made to make input comprehensible, the content is made accessible to learners so language acquisition is facilitated. Background knowledge, i.e. world knowledge and linguistic competence attained so far, enable understanding of messages. Associations of form and meaning develop functional and semantic links.

Students attending CLIL classes need to be provided with opportunities to experience success through comprehensible input and meaningful tasks. Dale and Cuevas in Crandall (1987) aver that if activities are tailored to the language and literacy, i.e. Mathematics proficiencies of the learners, students will carry out successfully the tasks in a non threatening atmosphere.

Providing comprehensible input is an important feature in the CLIL class (Echevarria et al., 2004). When teaching content to students of limited proficiency, then the teacher needs to make 'verbal communication more understandable by consciously attending to students' linguistic needs (p.66). Input should be made comprehensible (Krashen, 1985), namely speech should be adjusted in order to make messages understandable. Conversation can be made understandable when speech is appropriate to learners' level of language proficiency. The teacher can speak more slowly but naturally and use more repetition for beginners.

Various techniques can enhance the transmission of clear messages. Gestures, pictures, and real objects can be used while the teacher talks. Hands-on activities enhance understanding of new information. The SIOP model includes three criteria for achieving comprehensible input. These are appropriate speech, clear explanation of academic tasks and use of techniques to make content concepts clear (Echevarria et al., 2004).

Appropriate speech refers to what the teacher says and how it is said that is, the rate and complexity of the speaking. Echevarria et al. (2004) claim that L2 learners with limited L2 proficiency who are learning content through the L2 "benefit from teachers who slow down their rate of speech and enunciate clearly while speaking" (p.67). This may not be necessary at higher levels of proficiency. Understanding of messages is enhanced when

language is accompanied by visual aids and when techniques such as “paraphrasing and repetition” (ibi: 67) are used. Added to these, a “simple sentence structure like subject-verb-object” (ibid: p.67) and reduction of embedded clauses could enhance transmission of messages. A good explanation of academic tasks can help students perform better. L2 learners should have clear instructions for activities given in a step-by-step manner accompanied by a demonstration of the expected work. The students’ comments collected by Echevarria (1998) refer to the importance of giving clear explanations regarding the teacher’s expectations for tasks. Various L2 learners attending content and language classes said that they did not understand the teacher’s words or that the teacher talked fast. Therefore, articulating clearly what has to be done seems to be vital in a CLIL class. Incorporating techniques in CLIL lessons in order to make content comprehensible for L2 learners seems to be important. Echevarria et al. (2004) reveal that “high-quality sheltered lessons offer students a variety of ways for making the content accessible to them” (p.69). Techniques could include: hands-on activities, the use of scaffolding techniques, emphasis of key vocabulary, and activities which encourage learners to apply content and language knowledge. Various other techniques could be used such as using “sentence strips” (ibid: 69) in Science to allow students to sequence the steps that need to be followed in an experiment. Finally, multimedia and other technologies, such as Powerpoint slides and relevant websites, could also be used in the CLIL class.

Pacing of the CLIL lesson should match the learners’ ability level. Echevarria et al. (2004) advise that, when working with English learners, information should not be presented too quickly, yet it should maintain learners’ interest. The right pace depends on learners’ prior knowledge and the target content. The teacher may read aloud and do a shared reading to help all learners work at roughly the same pace.

In sum, teachers can use a number of strategies similar to those found in motherese (Cameron-Faulkner, Lieven & Tomasello, 2003), such as adjusting speech to learners’ level, using exaggerated intonation, extra-linguistic information, non-linguistic representations, L2 and L1 medium strategies, and emphasizing key concepts, in their effort to promote understanding in the CLIL class.

#### 4.1.2.1 Adjusting speech to learners’ level

Teachers seem to be sensitive to the learners’ levels of proficiency (Ellis, 1990). To begin with, research review on second language classroom behaviour by Chaudron (1985) has

identified that the rate of speaking in the L2 classroom is usually adjusted to the students' level in order to make input comprehensible. Research shows that teachers choose word items according to the level of the learners. For instance, Henzl (1979) documents that teachers simplify their vocabulary when telling a story in the L2 according to their students' level. For instance, word items with narrow semantic fields such as 'woman' were preferred to items with general meanings i.e. 'young gal' when addressing less proficient learners. The researcher shows a high type-token ratio when talking to beginners, showing that fewer different items are used and repeated to a great extent by the teachers working with students of this proficiency level.

Mitchell (1988) conducted a study of the teacher's role in L2 elementary French teaching focusing attention to its importance. The teacher can present topics of interest to the learners, adjust speech to the students' level and solve communication problems, so s/he cannot be substituted by functional syllabuses, authentic materials or microcomputer programmes standing on their own.

Met (1994) found that the use of input modifications such as slower rate of speech is a strategy used by teachers in immersion classes to help learners comprehend new content.

Modified input has been found to be an aid to comprehension (Kelch, 1985). It was demonstrated that beginners who receive speech at a slower rate, i.e. slowing down from 200 words per minute to 130 w.p.m. exhibited enhancement in input processing, improving significantly their dictation scores.

In brief, research outcomes suggest that L2 students in CLIL classes can benefit by adjusting speech to their linguistic level. Comprehension is improved and performance can be enhanced.

#### 4.1.2.2 Exaggerated articulation

The positive impact of intonational enhancement in input on L2 proficiency has been shown by White (1987) and White (1996). Exaggerated articulation was one linguistic adjustment used by teachers in U.S. secondary classrooms in their effort to make input comprehensible, as it had been shown by classroom observations and transcript analysis. Beginning ESL learners were exposed to twice as many modifications as the students in classes with half or more L2 population (Edmondson, 1999).

Xanthou (2006) examined CLIL implementation in primary school classes. The content teacher reported in the interview that “the exaggerated articulation helped students understand new concepts” (p.54).

Empirical evidence discloses that the use of exaggerated articulation in the CLIL class could be used to attract students’ attention to new language items and enhance input comprehensibility.

#### 4.1.2.3 Extra-linguistic information: body language, gestures

Markee (1997) reports that the use of extralinguistic cues enables learners to understand target language. McCafferty (2004) provides evidence from a college student learning L2 English, showing that “representational gestures carry communicative functions” (p.162). Gestures allow space for cognition to operate helping the interlocutor to think. A verbal accompaniment can help a participant in a conversation to get engaged in lexical search. DeGraaff et al. (2007) provide further support for the above. They examined characteristics of effective CLIL teaching performance, showing that the use of gestures enables the CLIL teacher to provide comprehensible input in secondary schools.

Wong-Fillmore (1985) observed that immersion teaching employing extralinguistic cues enabled learners to guess the meaning of new vocabulary without inhibiting the provision of L2 input, which contributed to language learning. The primary school children in Cabrera and Martinez’s (2001) study who had to listen to a story accompanied with gestures by the teacher, exhibited higher levels of comprehension than when listening to a story which was simplified only in terms of linguistic features.

Research results demonstrate that the provision of extra-linguistic information in L2 environments can enhance input processing. It is therefore an essential item of the comprehensible input principle included in the CLELD model.

#### 4.1.2.4 Providing multiple, non-linguistic representations

The dual-coding theory of storing information assumes that information is stored in both a linguistic and an imagery form (Paivio, 1969). Unlike the linguistic aspect of knowledge which is linked to actual statements, the imagery aspect is linked to mental pictures or sensations. This latter system of representation is also called nonlinguistic. When both modes of representation are employed, knowledge is better recalled. If students are

assisted by the teacher to create nonlinguistic representations, then brain activity is stimulated (Gerlic & Jausovec, 1999) and achievement is enhanced.

According to the Common European Framework, the texts used in language learning should be made comprehensible by providing visual support (Council of Europe, 2001). Extralinguistic contexts, such as pictures and diagrams, enable learners to comprehend meanings. Nonlinguistic representations can be created in several ways, such as “creating graphic representations”, “making physical models” (Marzano et al., 2001: 73), “generating mental pictures”, “drawing pictures and pictographs” which present information in symbolic form (ibid: 74).

King et al. in Crandall (1987) present some effective teaching practices suggesting ways of incorporating visuals into Social Studies lessons. First, a learning environment which is enriched with multimedia materials and manipulatives is considered of primary importance. Pictorial representations make descriptions clearer and leave immediate impressions on the viewers. Short (1994) recommends the use of “vocabulary previews, graphic organizers, and so forth” (p.587) in order to provide comprehensible input in Social Studies taught through L2. Teachers need to be sure that important information has reached all learners. Demonstrating real objects strengthens students’ visual experiences. Children can research a topic from various sources.

Research shows that presenting new terms with a bold-faced definition or visuals enables vocabulary acquisition (Kessler and Quinn in Crandall, 1987). Xanthou (2006) used many visual aids in a CLIL 6<sup>th</sup> grade elementary class. A Likert-type five point scale questionnaire was administered to the participants of the experimental group in order to investigate experiences and attitudes towards teaching techniques. The children mentioned that they liked “looking at visual aids such as pictures/graphs and PowerPoint presentations (84.21% very much)” (ibid: 51). The EFL inspector reported in the interview that the visual aids which were used in the CLIL lessons enabled the understanding of the meanings of unknown words, thus eliminating the need to translate in L1. The content teacher reported that visual input is vital for success in the CLIL class while the head confessed that if the lessons were carried out without PowerPoint presentations, different results might have been yielded.

Ramirez and Stromquist (1979) investigated the effect of ESL teaching techniques on student learning in bilingual elementary schools. Student language learning was found to be positively influenced by teaching behaviours such as “commanding with objects” (p.150), that is, asking the learner to manipulate objects or visual aids, checking comprehension, and providing explanations. Similar findings have been showed by Met (1994) who investigated the strategies used by teachers in immersion classes to help learners comprehend content. These included the use of realia, and visuals.

Tellez and Waxman (2006: 245-277) attempted to synthesize the results of 25 qualitative research studies in the area of second language instruction focusing on effective practices for English language learners in US schools. The synthesis revealed that the use of multiple representations enables the provision of comprehensible input. Representations such as films and multi-media have been shown to be useful in the second language class by many researchers, such as Tang (1992), who showcased their usefulness in L2 reading comprehension. Similarly, Chun and Plass (1996) showed that active learning behaviour occurs when multimedia programmes are used involving pictures in order to present definitions. The researchers explain that a hypermnesia effect occurs, according to which static images seem to stick longer in memory in contrast to moving or transient images which are more likely to fade away.

Short (1994) has shown that visual representations such as illustrations, pictures from textbooks, and newspaper photographs were effective means for teaching target vocabulary items to middle school social Science classes.

Techniques such as ‘graphics’ and hands-on experiences can clarify and reinforce meanings in CLIL classes by facilitating the communication of mathematical concepts and processes through the L2 (Mohan, 1986: 85). The researcher argues that constant care needs to be taken for ensuring comprehension due to the cognitive complexity of some tasks. Quality input which is appropriate to the language and content, e.g. level of Mathematics of learners needs to be provided.

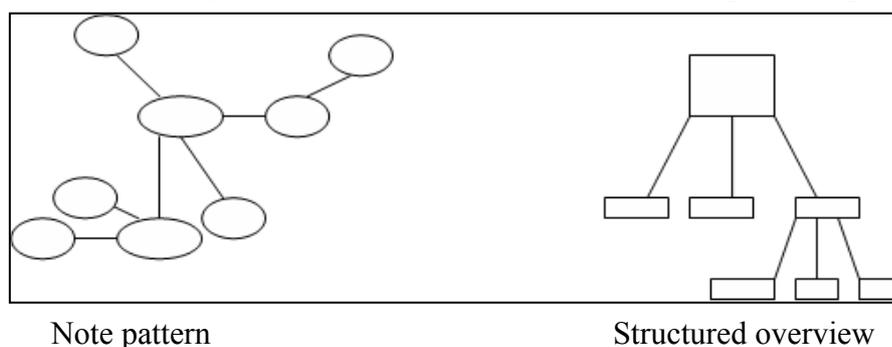
In the document ‘Mathematical Vocabulary’ prepared by the Department for Education and Employment in 2000, the use of “a structured approach to the teaching and learning of vocabulary” (p.2) is considered to be vital for helping children use the correct mathematical terminology. Following this approach, the teacher needs to plan the

introduction of new vocabulary in a suitable context by using real objects, mathematical apparatus, diagrams and pictures. Careful explanations need to be provided and learners need to be encouraged to use the new words through questioning. Further, reading and writing new mathematical words in a variety of circumstances is likely to help spelling them correctly.

The use of electronic media, particularly video and television, has been found by Jones and Plass (2002), to support L2 listening comprehension and vocabulary acquisition. In this study, the English speaking college students had to listen to a historical account in L2 French. The subjects were assigned to one of four listening treatments: listening without annotations, with written annotations, with only pictorial annotations, and with both written and pictorial annotations. The participants remembered word translations better when they had chosen both written and pictorial annotations while listening. Clovis (1997) revealed the positive impact of using electronic media on the development of second language skills.

Coonan's (2007) study with secondary school teachers in Italy showed that teachers used non-verbal strategies such as "diagrams", "organisation of information in flowcharts" and "maps" (p.640) in order to be efficient in CLIL classes. De Graaff et al. (2007) confirms that the use of visuals, such as board drawings, is effective in developing the L2 in secondary school settings.

Tables and line graphs could be used to illustrate content. Mohan (1986) suggests using a structured overview of topics. In this case, the teacher presents target concepts by drawing lines to show their connections. Alternatively, pattern notes can be prepared where the title of a topic is written in the centre of the board and various ideas radiate out from it, producing a map of thoughts related to the topic. These techniques can be used as an orientation to or summary of content or as an aid to understanding text (Figure 9).



**Figure 9:** Line graphs

Graphic organizers combine both a linguistic and a nonlinguistic mode as they use language together with symbols to demonstrate relationships. Crandall (1993) proposes the use of graphic organizers in the CLIL class as they facilitate teaching content through the medium of L2.

Short (1994:110) suggests the use of “semantic webbing” as a technique which could be used in the social studies classes taught through the medium of the L2. While summarizing ideas in traditional ways can be difficult for an L2 student, semantic webbing is an easier way to illustrate information and relationships. This can be done by placing key words in boxes while subheadings are placed under the main idea.

Short (1994), a teacher trainer and material developer for integrated language and content instruction, undertook a research project investigating CLIL in Social Studies. This was one of the projects supported by the National Centre for Research on Cultural Diversity and Second Language Learning seeking to identify successful instructional strategies and techniques in Social Studies classes of U.S. middle schools, grades 6-9. Data were gathered through audiotaped and transcribed classroom observations, interviews, analysis of classroom discourse, textbooks, and samples of student work. As it was observed, the extensive use of graphic organizers enhanced reading comprehension, assisted retention of new vocabulary and content concepts, and thinking development. Venn diagrams were employed to enable learners comprehend comparisons. The findings provided support for the principle that “representing information visually benefits language learners because it highlights important points and reduces dependence on written text” (p.590).

Short (1994) describes the first phase of a research project in U.S. investigating the instructional strategies and techniques used in integrated language and content Social Studies classes leading to student success. As it was shown, the reading process was made “more comprehensible through vocabulary previews, graphic organizers and so forth” (p.587). Retention of both vocabulary and content concepts was assisted through the extensive use of graphic organizers. It seems that visual representation of information helps demonstrating important points to L2 learners, thereby reducing the need to depend on written texts.

The potential positive outcomes of graphic organizers have not yet been showed by qualitative research. However, graphs, maps, tables, Venn diagrams and timelines appear to be useful in content-centered language instruction since they allow knowledge to be

displayed visually. These techniques may allow information from oral or written texts to be clearly organized, pre-reading and pre-listening practice can be provided, reading activities can be developed and ideas can be organized during the prewriting stage (Crandall, 1993).

The positive influence of non-linguistic representations has been verified by research. It is therefore a necessary item which is included in the CLELD model developed in this study which can promote students' comprehension and retaining of new language in the CLIL class.

Mitchell (1988) discriminates between L2-medium strategies and L1-based strategies used by the teacher in order to communicate meanings.

#### 4.1.2.5 L2 medium strategies

Successful CLIL implementation requires careful development of scientific terms in order to expose the learner to comprehensible input. L2 medium strategies include repetition of an item, substitution of an item with an equivalent one, explanation for the item's meaning, contrast of the item with similar ones, exemplification of the item, and clue-giving, i.e. suggesting an associated concept.

The absence of L2 medium strategies in mainstream classes where some students attend classes through their L2 can cause learners frustration. Harklau (1994) contrasted the instructional and linguistic environment of ESL and mainstream classes finding differences in interactional routines or the use of oral and written languages in the class. The study explored the L2 learning experiences of four Chinese immigrant high school students who had entered mainstream classes in the United States. Unlike ESL classes, input in mainstream classrooms was not adjusted in order to be made comprehensible to L2 learners. It did not involve speed reduction, repetitions, pausing, comprehension checks, or contextualization of abstract concepts through visual representations such as maps and graphic organizers. ESL learners were frustrated with fast teacher talking. For instance, an immigrant student reported: "I don't want to spend my time to listen to something I don't understand..." (p.249). Therefore, efforts should be made to make input comprehensible in CLIL classes, while considering the students' need for preparation in the vocabulary of the subject.

De Graaff et al. (2007) investigated characteristics of effective CLIL teaching performance in secondary school classes and related these to SLA theoretical principles. One of the main features which were identified as important was drawing attention to functional communication. This is enhanced by facilitating “exposure to input at a (minimally) challenging level” (p.607). Thus, the CLIL teacher should be expected to select and adapt input material to just beyond the learners’ expected level, making it comprehensible for them. The teacher’s talk needs to be adapted before and during teaching, using “synonyms, descriptions, translations of difficult words”, “simple structured sentences”, “paraphrasing” (ibid: p.613). However, a similar study needs to be conducted in primary school settings in order to validate theoretical assumptions and their effect on learners’ language performance.

Second language acquisition studies have examined whether certain features of the linguistic input that the learner receives influence the rate of acquisition. Chaudron (1982) transcribed and analyzed subject matter lessons taught through L2 English in different school levels. A problem that was found was the overelaboration of vocabulary meanings which endangered the decoding of exact messages. Learners may not comprehend paraphrases, while some phrases used by the teacher may not be exactly synonymous e.g. saying “if you look at pieces of sculpture’ instead of ‘if you look at wire sculpture” (p.176). These observations suggest the careful use of negotiation of meaning strategies by the CLIL teacher in order not to disadvantage the students’ L2 vocabulary learning.

Herman et al. (1987) examined how text features may influence the rate of vocabulary acquisition while reading. It was shown that the key concepts in a text need to be elaborated in order to present “a more complete body of knowledge” (p.281).

Met (1994) refers to some negotiation of meaning strategies used by teachers in immersion classes to help learners comprehend content. L2 medium strategies include the use of redundancy in repetitions, paraphrases, examples, definitions, and synonyms. Ramirez and Stromquist (1979) investigated the effect of ESL teaching techniques on student learning, in bilingual elementary schools. Findings showed that effective teaching involved the use of L2 medium strategies to clarify the meaning of new words. These included synonyms and antonyms.

An L2 medium strategy such as repetition is considered to enable a native speaker addressing second language learners outside the classroom (Hatch et al., 1975). Repetition and restatement in L2 input may serve functions similar to those in L1 input. First language acquisition research shows that language addressed to young children consists of sentences produced at a reduced rate with clearer articulation, frequent repetition and prompting. Snow (1972) supports that repetitions increase a child's processing time, thus enhancing comprehension. Restating and expanding on children's sentences provides new word and syntactic structures which are more likely to be understood. Jensen & Vinther (2003) carried out two experiments involving input enhancement in order to examine its relation to attracting learners' attention to specific linguistic features. The results showed significant effect of exact repetition on comprehension and acquisition of linguistic features. This indicates the positive effect of repetition on L2 students' language development.

Coonan's (2007) examination of secondary school teachers' logs in Italy showed that the teachers often used repetition and reformulation often in the CLIL classes in order to provide more comprehensible input. A relevant study was undertaken by Robinson (2005) aiming to identify and evaluate the practice used in vocabulary teaching and to identify processes involved in learning new words in CLIL classes. The researcher sought to develop an approach to vocabulary teaching providing guidance for subject and language support teachers. Therefore, the subject teachers' practice was examined as they explained, defined, used and tried to help the EAL learners in one multicultural middle school of England (Years 5 and 6) studying alongside non-EAL pupils to use L2 key vocabulary in Geography and Science lessons as well as the outcomes of their practice on children's learning. A number of significant features were revealed in the teaching observed. These included "frequent repetition of the key vocabulary" (Robinson, 2005: 433). Findings demonstrated that the key words of the lesson were repeated many times by the teachers. In this way, students were allowed to notice target words. The researcher states that the teachers used certain "linguistic frameworks" i.e. noun phrase, verb phrase, adjective phrase plus new information and noun phrase (p.441-442) in an effort to explain the meaning of an unknown word. Linguistic frameworks allowed the meaning of a word to develop incrementally, by repeating the initial phrase and gradually adding new information while controlling the grammatical complexity of the text. These outcomes suggest that effective transmission of messages and retention of new vocabulary in CLIL classes could involve repetition of target vocabulary.

Cabrera and Martinez (2001) investigated the listening comprehension of primary school children studying English as a foreign language for a second year. The children listened to two tales that were simplified under two conditions: first with linguistic adjustments only, and second with linguistic with interactional adjustments, i.e. repetitions, comprehension checks and gestures. It was shown that the second condition allowed the children to follow the thread of the story unlike the first condition. Xanthou (2006) revealed that the CLIL teacher used a lot of repetition aiming to help CLIL students understand the content of Geography taught through L2.

Research shows that repeated/recurring and multiple exposures to target L2 vocabulary can enhance L2 acquisition (Herman et al., 1987, Hwang & Nation, 1989, Schmitt & Carter, 2000, Kim, 2006). Nation (2005) showed that 5-16 repetitions are required for learning a new word and Rott (1999) demonstrated that 6 exposures bring better results than 2 or 4 for intermediate language learners. Hence, evidence shows that the use of L2 medium strategies such as repetition of target words can benefit students' in CLIL classes.

Wong-Fillmore (1985) observed that immersion teachers in successful classes did not mix languages but used the target language to communicate. It is more likely that the use of extralinguistic cues enabling learners to guess the meaning of the language contributes to language learning as compared to translations which inhibit the provision of L2 input. Getting the necessary information in the students' native language may not allow the learners to pay attention when they hear a language they do not understand. In one of the effective classes being observed, the teacher used mainly the L2 although sometimes she alternated between languages. The teacher succeeded in communicating the meaning of target words by creating links to already known words. However, it should be noted that in cases where children are at very early stages of language learning, such as in primary schools, a difficulty may occur in putting things together. Linking new with very weak prior linguistic knowledge may be a problem. More use of the mother tongue could prove important for providing clarifications and settling miscommunications. Thus, a combination of both L2 and L1 strategies could be used in CLIL primary school classes.

#### 4.1.2.6 L1 medium strategies

L1-based strategies include pupil interpretation that is pupils are invited to supply an L1 equivalent of an item, teacher interpretation where a translation is provided by the teacher,

language switching when the teacher speaks bilingually repeating meanings in L1 which were first provided in L2, and interpretation in L1 where the problematic area is the only L2 heard.

It has been supported that incorporating students' native language in instruction is likely to increase comprehensibility. Merisuo-Strom (2007) believes that in some cases the contents can only be clarified through the use of the students' home language. Lucas and Katz's (1994) study of 9 exemplary K-12 programmes for language minority students favour the incorporation of students' native language in instruction. Thomas and Collier (1997) conducted a study of school effectiveness and found that although ESL content programmes provide strong L2 support, L1 academic support is the variable providing the most powerful influence on –ELL- students' long-term academic success (p. 64). These findings coincide with those of Ramirez and Stromquist (1979) who found that giving some terms in the students' L1 was one of the preferred techniques of teachers in bilingual elementary schools ensuring effectiveness. Findings point to the academic benefits of incorporating the L1 to a certain extent in order to enhance students' concept formation.

Cummins (1999) describes the successful example of the International High School in New York City in which students were encouraged to use their background knowledge, much of it in their native language, in order to “facilitate learning and demonstrate what they had learned” (p.13). Learners' lifeworld and linguistic knowledge were used to bridge the gap between the L2 and the L1 discourses. Lin (2006) reviewed research literature and reached some conclusions regarding as to how L1 can be used in the L2 classroom. For instance, L1 can be used to highlight what is important, or to arouse learners' interest by establishing a warmer atmosphere. Moreover, a quick L1 translation can be provided for L2 vocabulary to ensure understanding. Providing an example in L1 enables learners to relate unfamiliar L2 concepts to familiar L1 events. L1 can be used to encourage class participation and elicit background knowledge and experiences transforming them into L2. Learners could be assigned to discuss a group task in L1 first and then produce an L2 version with the help of the teacher. Students can also be helped to rephrase questions asked in L1 into the L2. Recent research suggests a judicious use of the learners' L1 in CLIL settings. Similar conclusions have been reached by Behan and Turnbull (1997) who explored how grade 7 French immersion students used their L1 to build knowledge. The talk of students was tape-recorded while preparing for an oral presentation, which was a cognitively demanding task. The researchers observed that the use of L1 to manage the

task, share information and search vocabulary, enhanced L2 development and helped students to deal with the cognitive aspects of the task. These conclusions suggest that L1 could be used effectively in the CLIL class to facilitate and enrich the learning of new concepts.

Students' native language was considered to be important in a CLIL approach developed by Cuevas (1984). The Second Language Approach to Mathematics Skills (SLAMS) which was originally developed for grade K through 12, proposes the use of preventive language strategies to review the Mathematics content in student's home language and work with ESL activities.

The argument that learning a subject such as chemistry can be enhanced when L2 students are allowed to use their first language and when teaching considers students' cultural capital has been supported by Tobin and McRobbie (1996). The research they have conducted involved Chinese L1 high school students trying to understand meanings in Chemistry in English. The students' efforts were constrained in a position of failure when learning was based on linguistic L2 hegemony while learning a subject. Research suggests that the students' native language (L1) may need to be employed in CLIL classrooms as it has demonstrated additive effects in subject learning of bilingual students. For instance, Kearsy and Turner (1999) collected evidence from five schools in the UK and from a British school in Europe which had bilingual students. A comparison was carried out between two similar schools involving 14 to 16 year olds, which showed that being bilingual was an advantage in understanding scientific language when students were encouraged to speak in both their L1 and L2.

Instructional materials that have promoted statistically significant achievement in Science learning through the medium of L2 involved both students' native language and L2 English. Fradd et al. (2002) demonstrated the positive impact of this parameter on the academic knowledge of Hispanic, Haitian Creole, and monolingual English-speaking fourth-grade elementary students of an urban district. Pre- and post-test comparison demonstrated significant academic gains in Science knowledge. This evidence supports the use of L1 strategies in the CLIL classroom, as suggested by the CLELD model.

Echevarria et al. (2004) reviewed practice related to teaching content through English to L2 students and found that clarifying concepts in the students' native language (L1) is beneficial to their academic development. The researchers believe that explaining a

concept or task in L1 is ‘an important support for the academic learning of those students who are not yet fully proficient in English’ (p.107). Although advanced L2 learners may not need to use students’ L1, beginners may need clarification of concepts in their L1.

Coonan (2007) reviews literature on L2-L1 codeswitching reaching the conclusion that alternation helps learners remember L2 words and build up their L1 lexicon in the content area. The teacher uses L1 to draw the students’ attention to “similarities in form or meaning and cultural connotation between words met in L2” (p.627). This observation provides support to the use of L1 in CLIL teaching for strengthening learning and retaining new words

Code-switching was found to be effective in CLIL classes. Leung (2005) observed that code-switching facilitated learning Mathematics through L2 English. It was used by 15 year old Hungarian bilingual students when communicating with peers during group-work. Students finally improved both Mathematics knowledge and foreign language mastering new vocabulary easily in every lesson (Langer, 2007).

Several studies conducted either outside or inside the United States exploring the impact of language policies in CLIL classrooms were reviewed by Lee (2005). The researcher carried out a review analyzing and synthesizing current research on Science education with ESL learners at the elementary and secondary levels. It was shown that the students’ Science achievement is constrained by exclusive instruction and assessment in English because of their limited English proficiency. As Lee notes, L2 learners engaged in subject learning, “confront the demands of academic learning through a yet-unmastered language” (ibid: 492). However, CLIL teachers are often not aware of how to address the complex educational needs of ESL learners (Lee, 2005). Therefore, success and progress in academic achievement is based on knowledge of academic discipline learning, integrated with knowledge of developing L2 English. Lee (ibid) considers L2 students’ Science learning outcomes, and discusses the literature on Science learning and instruction in an L2 context.

Lee’s (2005) research synthesis revealed that “with ELLs the interplay between English and the home language is critical in learning Science” (p.500). Current practices in various countries, such as the USA, do not consider the learners’ L1 oral and written proficiencies as well as students’ personal knowledge in the Science classroom assuming that limited

educational resources exist. However, where language policies allow the use of students' first language, this provides cognitive tools for learning Science. If the L2 students' mother tongue is not considered in academic learning then teaching may ignore the main tool that ELLs have used 'to construct their understandings of their surrounding world' (p.494). New understandings can be constructed on these prior understandings. The researcher concludes that Science instruction needs to be congruent with students' home language and culture (Lee, 2002; 2003). So, learners' prior linguistic and cultural knowledge needs to be incorporated in the CLIL class for effective Science education.

Linguistic code-switching in Science classrooms has been looked at by a few studies which demonstrated its positive effects on Science and L2 learning. The purposeful use of students' home language seems to enhance literacy development in the L2. Code-switching has been found to be beneficial in Kenian elementary grade classroom settings in Africa, where elementary school pupils were provided more accessible content when their teachers incorporated native languages in various ways of code-switching as opposed to the use of L2 English-only medium of instruction (Cleghorn, 1992). Acquiring content knowledge through the L2 was based on maintaining the learners' mother tongue.

Serra (2007) studied CLIL implementation in three Swiss primary schools where L1 German students were studying Maths through L2 Italian. The researcher investigated the role played by the L1 reaching the conclusion that the careful use of language alternation can be used as a metalinguistic device. Serra (2007) posits that target words may "become more learnable by alternating languages" (p.597). Awareness of linguistic forms is raised as the learner finds equivalent meanings in both languages.

Gajo (2007) describes how two teachers in a secondary school CLIL class of Italy work together on a song in L2 French about Resistance in History. Teachers used codeswitching, not as a simplistic act of translation, but as a way of "conceptual enrichment" (p.575), enhancing the understanding of a concept. In this environment learners can move from mere obligatory linguistic knowledge to autonomous linguistic knowledge which is not directly related to the specific task.

Xanthou (2006) found a positive impact of content and foreign language integrated learning on L2 vocabulary and grammar knowledge. Observation of teaching techniques

employed in the CLIL class showed that the sporadic use of L1 when required seemed to help the teacher explain some difficult concepts more clearly.

Research in the effects of the use of L1 into CLIL classes provides illustrates that it can facilitate L2 learning by enhancing comprehension and provide conceptual enrichment of the target vocabulary. Thus, it is a recommended strategy included in the CLELD model.

#### 4.1.2.7 CALL

Computers can be used as a tool to present audio, visual, and written material. A literature and research review related to the relation of technology with learning was carried out by Kern (2006). As it was shown, the use of technology seemed to have a significant effect on L2 student learning. In contrast, Fletcher-Flinn and Gravatt (1995) found that the use of technology was not found to be significantly more effective than traditional instruction. However, in spite of the fact that positive outcomes were shown in Kern's study, the researcher is reluctant to attribute effectiveness to technology per se. Kern (op cit) argues that the way technology is used in the classroom is considered to be very important, highlighting "the central importance of pedagogy and the teacher" (p.200). Therefore, technology can be interwoven by educators into the pedagogical approaches used in the classroom. In this sense it can be used as a "tutor, tool, and medium" (ibid: 191). Computers as a tutor means can instruct, provide feedback, and assess language skills, grammar and vocabulary. As a tool, they can present audio, visual, and written materials related to the target language or allow online research related to a topic. As a medium, technology allows opportunities for interpersonal communication and multimedia publication. In this study, technology is used as a tool to present new content which includes the target language.

Chapelle (1998) claims that L2 input can influence language development if it is apperceived by the learner. Doughty's (1991) experimental research demonstrated that L2 acquisition of middle proficiency learners is positively influenced by highlighting target language structures in context in order to make learners notice specific syntactic forms. Therefore, Sharwood Smith (1991) suggests that CALL activities need to consider input enhancement. Key concepts and target vocabulary can be emphasized through typographical enhancement in written input: boldfacing, colouring, underlining, circling (Kessler and Quinn in Crandall, 1987 – Science through L2). Further, visual input can enhance input comprehensibility. Chun and Plass (1996) showed that active learning

behaviour occurs when multimedia programmes are used, involving pictures and video clips in order to present definitions. The students in their study achieved higher scores in the vocabulary post-test.

Chapelle (1998) suggests that some criteria need to be met for developing CALL pedagogical material. It is suggested that linguistic features need to be made salient in CALL activities and this can be achieved by highlighting them by using a different colour. CALL materials can provide comprehensible input through repetition, simplification using restatements, definitions of words, non verbal-cues and decreased speed. Thus, the CLELD model needs to involve the use of technology to present new material in a comprehensible manner i.e. by attracting attention to new word items.

Technology can be integrated in the L2 class as a research, planning or creative tool in the hands of the learners. Computer was used effectively by L2 students in a CLIL class in Cyprus both as a tool of presenting new content and as a medium to prepare projects (Xanthou, 2006). When the students were asked to assess the effectiveness of some teaching and learning strategies they seemed to favour computer projects when researching new knowledge.

Both theory and research provide support for the use of comprehensible input in L2 medium classes. Therefore, it should be one of the principles included in the CLELD model developed in this study, which could help CLIL students develop their L2 proficiency.

The comprehensible input hypothesis posits that L2 proficiency can be promoted through comprehensible input. Krashen (1985: 17) explains that “it is the comprehensible input factor that is responsible for the success of immersion” and that this success is the evidence in support of the input hypothesis. The theorist posits that acquisition is the outcome of comprehensible input and not the result of production (Ellis, 1990). However, the role of language production should not be downplayed as it appears to be important for language development. This challenges the efficacy or at least the adequacy of the theory as to whether it can alone lead the learner to successful L2 acquisition. Interaction and production are two issues which are also taken into account in this section as complementary processes for effective L2 acquisition.

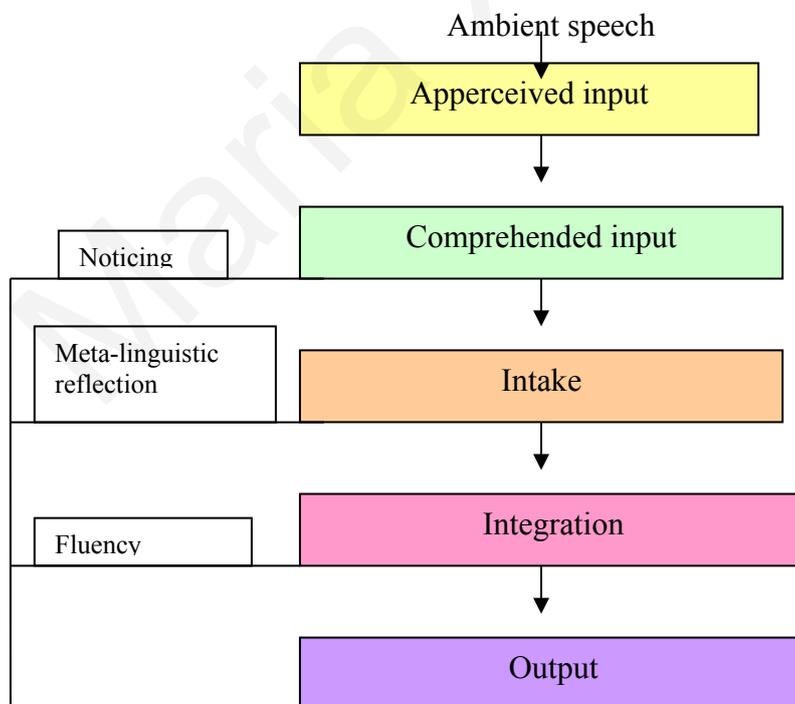
Although the input hypothesis seems to be valuable to a certain extent for language pedagogy, output production and classroom interaction are also considered in the development of the CLELD model, as factors contributing to language acquisition.

Next, the role of producing output will be examined.

#### 4.1.3 Promoting output production

Swain (1985) has proposed the comprehensible output hypothesis as complementary to Krashen's input and Long's interaction hypotheses rather than an alternative. This hypothesis holds that learners need an opportunity for pushed output which is coherent and precise in order to develop grammatical competence. Swain explains that by relying exclusively on input permits learners to engage in a small amount of language production. It is assumed that L2 learners benefit more from being pushed to produce L2 forms than from just listening to them in the input, as retrieval and production create connections in memory (De Bot, 1996). Learners need both comprehensible input and comprehensible output to reach language fluency.

Izumi (2003) proposes a learning model which illustrates output as an active component in the SLA process (Figure 10) based on Gass's (1988) earlier model.



**Figure 10:** Output as an active component in the SLA process (Adapted by Izumi, 2003: 188).

This model presents the interrelated and dynamic processes of language acquisition. Five stages are proposed whereby the learner converts input to output: apperceived input, comprehended input, intake, integration, and output. First, learners perceive ambient input in light of their past experiences. This input is either used for instant communication and then discarded or it may become intake which will facilitate the integration of new knowledge into the developing system. If input information is a part of a person's existing knowledge then the intake data is used for rule strengthening; otherwise it is stored as partially analysed or unanalyzed data. Output is considered to be the last and necessary component in these interrelated language acquisition processes. Bygate (1999) believes that output can be successful for lower proficiency learners if monitoring is engaged during production.

Swain (1995) has identified four functions of output. The primary function is fluency. Output opportunities enable the development of quick access to extant L2 knowledge, thereby raising the learner's fluency. The second function is hypothesis-testing. The learner's hypothesis about the target language is tested through output where one can test linguistic ability. Language production forces the students to concentrate on the means of expression required to convey meaning. Output opportunities stimulate language acquisition by forcing the learner to process language syntactically. Meaningful use of linguistic resources is assumed to push the learner to higher levels of language proficiency. Research by Pica (1988, 1992) and Nobuyoshi and Ellis (1993) on the hypothesis-testing function of output has accumulated evidence showing that guiding learners to increase the comprehensibility of their product, i.e. through requests for clarification, contributes to language acquisition and can have long lasting effect. Izumi (2003) explains that "output triggers chains of psycholinguistic processes that are conducive to language learning" (p.187). It engages internal procedures, such as monitoring, which pushes the learners to interact with the external environment, i.e. teacher or peer intervention, in order to reach a solution. The third possible function of output is the metalinguistic one. While students reflect upon their use of target language, their output may cause internalization of linguistic knowledge. Production forces the student to pay attention to the forms with which specific messages are expressed. The fourth function that the output may serve is noticing. According to the noticing hypothesis, while producing language, learners realize their linguistic weaknesses (Schmidt, 1993; Schmidt and Frota, 1986). They notice the gap between what they want to say and what they can say. Therefore, they understand what they need to find out about the target language.

Nassaji and Fotos (2004) reviewed research related to effective conditions for the acquisition of grammatical forms, over the past few decades. The results showed that learners need to be given opportunities to produce output. Swain's (1985) SLA studies call for the importance of comprehensible output "providing support for CLIL education" (Dalton-Puffer & Nikula, 2006: 242), which can offer the pupils numerous opportunities to produce output. Teacher and student discourse, and in particular the performance of directives in CLIL classrooms, has recently been examined by Dalton-Puffer and Nikula (ibid). The researchers examined 9 Austrian and 8 Finnish CLIL lessons involving students from 5<sup>th</sup> to 10<sup>th</sup> grade. Findings showed that the teachers promoted students' output through requests for information in instructional register which were carried out directly with 'how', 'which', and 'what' questions, whose everyday nature made them socially appropriate and 'in accordance with the pragmatic principles of CLIL classrooms' (p.254).

Swain & Lapkin (1995) used think-aloud protocols to derive information about internal-cognitive processes employed by learners. It was shown that students realized specific production problems relevant to grammatical form. The researchers concluded that output leads to noticing the gaps in target language knowledge. However, it was not examined whether problem identification by learners forces searching for subsequent input. Bigelow (2000) added empirical weight to Swain's claim, showing that extended opportunities for output production were crucial in "improving learners' use of the grammatical structure" (p.239). However, it is suggested that output did not always succeed in drawing the learners' attention to the target form. So, more research is required to examine the noticing function of output and specify effective processes of producing output in L2 teaching.

Swain (1985) claims that modified output produced by the learner is important for second language development. Output can result from various opportunities for production but can also be stimulated from feedback obtained from teachers and peers. The researcher examined the results of a Bilingual Proficiency Project. The language proficiency of 175 Grade 6 immersion students learning subjects through L2 French in Canada was examined. The findings showed that the students achieved a discourse competence level similar to that of native speakers of French. However, the same improvement was not observed in grammar and sociolinguistic domains. Swain attributes this phenomenon to the limited opportunities for producing speech in the classroom. Unfortunately, as Swain (1985) notes, comprehensible output is missing in language and immersion classrooms. Data

collected from Canadian immersion classrooms show little extended speech from learners, although it could be expected that these classrooms present increased opportunities for output which is characterized by appropriateness (Allen, Swain, Harley, & Cummins, 1990).

De Graaff et al. (2007) investigated the characteristics of effective CLIL performance in secondary schools linking them to theoretical principles in SLA. One of the five effective key behaviours was facilitating “opportunities for output production” (p.609), as it has been shown to stimulate learning. Teachers could encourage students to practise in oral and written form. The teacher should stimulate learners to use the L2 to express themselves. Students could be allowed to report answers orally. Output production draws learners’ attention to their language deficits, raising their motivation to learn. However, the findings of De Graaff et al. (2007) need to be explored in primary schools revealing the potential positive effects of the observation tool.

Output may need to involve access to meaning in order to be more effective. Word items may need to be activated only to express certain meanings. Otherwise, language production can take the form of forced output i.e. meaningless repetition of words (Van Patten, 2003). Barcroft (2006) examined the effects of copying target L2 vocabulary, which does not require access to meaning. It was revealed that forced output without access to meaning produces less vocabulary learning than the no writing condition, which indicates that forced output does not necessarily promote language learning.

The necessity of producing modified output in the L2 context has been questioned. For instance, Schachter (1983) cautioned against the effects of negative feedback which may not necessarily help learners advance their interlanguage. Corrective feedback may monitor linguistic performance without causing lasting effects on the learner’s current L2 linguistic level. However, total absence of negative feedback by the teacher may not allow the learner to see the gap between the target language and his current linguistic level, thereby causing fossilization of errors (Gass, 1988).

The findings of the aforementioned studies add some weight to the output hypothesis. Although more direct evidence is required to validate the position that output promotes language acquisition, a CLIL teaching model needs to consider the possible gains of allowing students to produce and use language through a variety of activities.

Output production in the CLIL classroom may possibly be stimulated by using various types of questions and providing guided practice.

#### 4.1.3.1 Stimulating production of target language

Output production in the CLIL classroom can be pushed when the teacher stimulates “the use of the target language” (De Graaff et al., 2007: 609). Seeking explanations, reports, answers to questions and responses to oral and written tasks can stimulate output production (Dee Graaff et al., 2007).

Questions can increase students’ output production in the CLIL class. These may include both lower-order questions requiring the recall of facts, and have no alternative answers and higher-order questions requiring analysis, synthesis, problem-solving, creating, and judging (Borich, 2007).

CLIL students were provided with opportunities for practising or applying new knowledge (Gagné and Briggs, 1979, Swain, 1985) via handouts, questions, verbal or written exercises.

Prompting, namely giving hints, can stimulate CLIL students to produce correct responses. Verbal prompts remind learners how to perform correctly. The teacher can use modeling in order to demonstrate what the learners are required to do, helping them to comprehend complex explanations.

Feedback and correctives can provide guidance when students carry out a task. CLIL students can then be allowed independent practice while rapid checking of work allows pupils to find out about their performance.

In sum, theory and research supports the promotion of students’ output production for noticing and using linguistic features. Therefore, output production is an important principle that could help CLIL learners achieve their goals.

#### **4.1.4 Promoting linguistic interaction**

The interaction hypothesis questions the importance of input and output, focusing on the impact of social mediation (Swain, 2000). In this view, language learners are not considered to be input processors or output producers but interactants “in developmental processes” (Ohta, 2000: 51).

Long (1983) has advanced the interaction hypothesis, by assuming that input is made comprehensible from attempts to negotiate communication difficulties. Interactional adjustments are supposed to facilitate acquisition as they help to make salient grammatical features which are problematic to learners. More recently, Long (1996) has explained that negotiation of meaning taking place between interlocutors who finally understand each other “facilitates acquisition because it connects input, internal learner capacities, particularly selective attention, and output in productive ways” (pp. 451-452).

The importance of interactional input has been demonstrated by Gass and Varonis (1994) who investigated dyadic interaction noticing that interaction helps learners to see gaps. Modifications of the existing L2 knowledge are brought about with possible sustained results. Learners can acquire language forms in the area of vocabulary by noticing the gap between their current language repertoire, and that of the target language. Ellis et al. (1994) demonstrated that interaction enhanced comprehension and increased vocabulary acquisition of Japanese learners learning English as a second language. Mackey (1999) investigated the effect of various types of conversational interaction on second language acquisition. Overall, findings suggest that active participation in “conversational interaction has a positive effect on the production of developmentally more advanced structures” (p.576). The results of Mackey’s study point to the need for active participation in interaction when learning an L2. Interaction may enable learners to notice target language features. Gass (1991) claims that if language features are “consciously noticed” (p.136) then they are made available for intake in the learner’s interlanguage system. While trying to communicate, attention can be drawn to both meaning and form (Long, 1996).

A smaller number of studies have reached different results. For instance, Pica (1992) and Ellis et al. (1994) did not find any significant differences between L2 learners participating in interaction and those observing it. So, she concluded that it may not be necessary to participate in interaction in order to accept its benefits. Similar findings have been reached by Loschky (1994) who investigated the impact of interaction on comprehension and retention of vocabulary, finding that the groups that were not exposed to interaction did not exhibit the same levels of comprehension as their counterparts who had opportunities to negotiate input.

Regarding the success of specific interaction strategies and techniques, the results of various studies need to be considered. Wong-Fillmore (1985) carried out a 3-year longitudinal investigation of the effects of instructional practices used by teachers of immersion classes. Classes having successful outcomes for L2 learning provided opportunities to learners to engage in interactions in various social situations. Most likely, in this way students can see how language is structured and how it is used for communication.

The interaction hypothesis advanced by Long (1996) claims that the linguistic modifications which accompany communication breakdowns between L2 learners and their interlocutors most likely facilitate L2 development, providing negative feedback and positive input at a time when the learner is aware of the gap between the L2 and his/her current interlanguage system. Lyster (2002a) draws on examples from immersion classrooms where the subject matter is delivered in L2, showing the positive impact of corrective feedback. Lyster's examples challenge claims supported by Krashen (1994) that corrective feedback breaks the communicative flow and that it is not easy for the students to notice oral feedback. The role of noticing language features in the input has been praised by several researchers such as Swain (1988). Spada & Lightbown (1993) showed that form-focused instruction and corrective feedback provided in communicative classrooms can promote second language development in both the short and long term. Whether noticing language features should be done on an implicit or explicit basis has not yet been resolved.

How meaning is negotiated in interactions has been investigated by Nakahama, Tyler, and Van Lier (2001). Two types of interactions between native speakers (NS) and nonnative speakers (NNS) were examined. As it was shown, conversational interactions seem to provide learners with more challenging language practice than highly structured information gap tasks. The conversational activity involved "the creation of shared schema and frame...the building of rapport, and the exchange of information" (p.388) as the interlocutors aimed at textual coherence. By contrast, in the information gap activity, the interlocutors aimed to find the differences between the pictures and so they concentrated on comprehending word items. Thus, meaning was negotiated only at the ideational level. Regarding the length of turns, in the conversation activity, the interlocutors produced significantly longer utterances, which indicates that this type of activity creates favourable context for production pushed output. CLIL lessons seem to

provide the ideal context for exposing students to cognitive challenges, through conversational interactions, thereby encouraging learners to produce output in order to communicate meanings.

Verbal exchanges are vital for effective learning in CLIL classes. Echevarria et al. (2004) acknowledge the need for the CLIL teacher to provide verbal scaffolding to learners in order to help them accomplish what they cannot accomplish on their own, reaching the Zone of Proximal Development (Vygotsky, 1978). Coonan's (2007) three year study with secondary school CLIL teachers in Italy uncovers the teachers' view that the interactive T – SS mode “seems to guarantee the epistemological nature of the subject being learnt” (p.634). It is concluded that the interaction between the teacher and the students is vital in the CLIL class. It may be the main path leading learners to grasp key concepts and accomplish the lesson's goals. When using verbal scaffolding, the teachers prompt, question, and elaborate in order to push learners to higher levels of L2 proficiency. Verbal scaffolding can be given through ‘paraphrasing’, i.e. restating a learner's answer using correct language, “using think-alouds” and “reinforcing contextual definitions” (p.86), i.e. placing a word's definition in the context of a sentence. The approaches which can be used to provide procedural scaffolding include the use of an instructional framework based on explicit teaching, small group instruction, working with partners, practice opportunities with more experienced peers, and independent work. “Instructional scaffolding” (ibid: 87) can be used by teachers to promote learning, e.g. using a graphic organizer to illustrate content.

The use of process questions and probes promote constructivist thinking. Process questions such as indirect, higher-order, divergent, open, and concept questions encourage students to use personal experiences and knowledge to build or construct their own interpretations and meanings. Probing helps learners to elaborate on answers. Borich (2007) explains that probing may serve to “elicit clarification of an answer, solicit additional information about a response, or redirect a student's response in a more fruitful direction” (p.24). Probing aims to lead discussion to some higher thought level by seeking problem solutions and generalizations. The ultimate aim is to promote the learning of the new content.

The CLIL teacher should encourage student participation and engagement by asking questions, waiting for students' responses and restating on them. Echevarria et al. (2004)

claim that when teaching content through the L2, teachers should consider “opportunities for interaction” (ibid: 102) and clarification of key concepts in L1. Learners develop their L2 proficiency when using English to answer and express ideas. Thus, teachers should provide opportunities for linguistic exchanges between themselves and their students, and among students.

The CLIL teacher can use a number of conversational moves in interaction. These are grouped by Long (1996) into specific types of interactional features. These include input modifications (e.g. partial self-repetition and stress on key words), semantically contingent responses (e.g. recasts, repetition, expansions), and conversational modifications (e.g. confirmations, confirmation checks, comprehension checks, clarification requests).

#### 4.1.4.1 Conversational modifications: confirmations, confirmation checks, comprehension checks, clarification requests

The interaction process includes the efforts of both the teacher and the learner in an interpersonal communication. Interactional features signal the occurrence of meaning negotiation. Two types of negotiation are identified by Long (1983). The first serves to avoid conversational problems. The modifications of this type are described as strategies i.e. treating topics briefly. The second serves to repair discourse after a problem occurs. Such modifications are called tactics i.e. requesting clarification and confirming comprehension.

Pica and Doughty (1985) identified a number of interactional features of this kind: clarification requests, i.e. expressions eliciting clarification of preceding utterances (e.g. ‘What do you mean by ...’), confirmation checks or expressions following the previous speaker’s utterance to ensure understanding, and comprehension checks, i.e. expressions serving to confirm whether the speaker’s own preceding utterance is understood by the message receiver/s (i.e., ‘Do you understand?’).

Long and Porter (1985) reached the conclusion that interacting in order to clarify meaning enhances second language learning even when it takes place between non-native speakers of English. Allowing students opportunities to interact helps their conceptual learning as they can use one another as resources regardless of their linguistic level.

There is no clear evidence linking interactional adjustments to L2 language acquisition. However, there is some indication of interactional modification moves, involving clarification requests, confirmation and comprehension checks, which caused 73 per cent of the repetitions which occurred in a two-way lecture. These repetitions appeared to promote comprehension of 16 low-intermediate ESL adult learners (Pica et al., 1987).

Lyster (2002b) presented classroom interaction extracts from immersion classes which show that meaning negotiation is an effective way of promoting production of accurate target language. For instance, a confirmation check was used to elicit a target word which the learner failed to produce in the initial stage of a conversation in a Science lesson.

Peñate and Bazo (2001) showcased that the use of comprehension checks during interaction allows L2 gains for primary school pupils. Similar findings have been reached by Cabrera and Martinez (2001) who examined L2 listening comprehension of primary school children. The children who listened to a story with linguistic and interactional adjustments, involving comprehension checks, were able to follow the story. In contrast, listening to a tale only with linguistic adjustments was not as effective.

More recently, De Graaff et al. (2007) analysed nine CLIL lessons and found that the provision of feedback on incorrect language production can promote learning. Prompting students to produce correct language utterances could be done through repetition, elicitation, and clarification request. In the first case, the teacher repeats the mistake adjusting intonation in a way to prompt the learner to repeat correctly. In the elicitation technique, the teacher omits the mistake, thus asking the learner to find the missing element. In the case of clarification request, the student is invited to provide the meaning of the incorrect utterance, thus forcing reformulation.

#### 4.1.4.2 Semantically contingent responses: elicitation of reformulations, recasts, repetition, expansions

A positive relationship has been found between modified oral input and the acquisition of word meanings. Ellis R (1995) showed that interactionally modified input promoted vocabulary learning of Japanese high school students to a greater degree than premodified input. However, in the second case, the rate of acquisition was faster indicating that a combination of the two strategies could be used to raise academic outcomes.

Gibbons (1998) examined the role of student-teacher interactions in the development of L2 English in a primary school CLIL class. Participants were taught Science through L2 English. Analysis of the nature of interactions illustrated how ‘everyday’ language can be used to express the children’s understandings of curriculum topics. Familiar language forms a shared contextual basis for the development of unfamiliar registers. Activities are sequenced from more context-dependent to less context-dependent. Initially, in the context-embedded language, exophoric reference is used (i.e. this, that, these) due to exposure to rich visual environment which limits the need to name the referent and therefore minimizes the number of content words. When the original experience is distanced, the interlocutors reconstruct the experience through language, ensuring that the processes are made explicit. This is done through verbs, nouns and pronouns.

Gibbons (2003) uses the construct of a mode continuum in order to describe the discourse which occurs in a classroom while the learners are “moving from registers expressing their firsthand experiences in oral language to those expressing academic knowledge in writing” (p.250). Initially, here-and-now language is used which is directly linked to the immediate situational context where a small group is experimenting with objects attracted by a magnet. Next, the learner reports to the teacher what she has found out. Then, the student prepares a written report using “field-specific lexis” (p.251). This process illustrates the movement from everyday ways of meaning making toward formal discourse of a particular discipline which involves technical language.

Gibbons (2003) demonstrates the importance of the teachers’ mediating language in building linguistic bridges in order to span the difference between everyday discourse and scientific language. Teacher-student interactions seem to promote the use of scientific register. Language learning can be mediated by teachers through recasting, that is reformulating the students’ expressed meanings in a registrally appropriate manner “signaling to learners how to reformulate” correctly, “indicating the need for reformulation”, and “recontextualising” students’ personal understanding by presenting new language and moving towards academic Science language (p.257). The teachers used equivalent words in the place of everyday words in a sentence. They built on students’ contributions but extended them by presenting new language which could be later used by the learners. The discourse produced by the teacher was semantically contingent upon what the learner had contributed. In this context, teachers and learners were seen as active co-constructors of meaning. Gibbons’s (1998; 2003) findings illustrate that CLIL learning

presents language-in-context emphasizing the relationship between context, language and meaning. Teacher-student interactions can enhance learners' understanding and exposure to academic language. Interacting with the teacher seems to provide opportunities to negotiate meaning, as opposed to a lecturing approach which may not help students enhance foreign language proficiency. Thus, the learners' achievements are affected positively.

It is hard to demonstrate that learners' uptake or response to feedback leads to L2 learning or that no occurrence of uptake entails the opposite. Lyster (1998b) admits that "it is unwarranted to equate learner uptake with L2 learning" (p.74). The researcher examined transcripts of interaction in immersion classrooms at the primary level. As it was shown, the functional properties of the recasts detract attention from corrective reformulations. An immediate response to corrective feedback does not constitute a proof for L2 learning for high intermediate level students (Gass & Varonis, 1994).

Several linguistic devices can be used to enable the logical development of ideas in oral and written discourse. These include paraphrasing, using semantically similar terms, and repeating key words. Activities need to provide opportunities to the learners to interact with peers and be actively engaged in discussions. In their effort to continue discussions, learners ask questions, form hypotheses, predict, and evaluate evidence data as supporting or rejecting the hypotheses. The linguistic elements required for hypothesis-testing and discussion are gradually internalized by the learners (Mackey, 1999).

Conversational interaction may develop L2 knowledge. Mackey (1999) has examined the impact of conversational interaction on L2 development. Repeating and extending a phrase is one way of negotiating interaction in order to enhance L2 development. Findings indicate that interaction enhances comprehension of vocabulary items. The interactor group finally showed L2 development as compared to groups which were not involved in interaction.

Mackey (1999)'s study showed that interaction was beneficial to L2 development of adult ESL learners. Those who did not participate in the interaction did not manage to reach the level of their counterparts who were able to produce more developmentally advanced structures. This difference was demonstrated in delayed post-tests implying that interaction may help learners to notice the areas they need to improve. When the learner

rephrases a sentence in order to clarify the meaning, this pushes the learner to produce more comprehensible output. Mackey (1999) illustrates how a NNS restructures output in order to enhance comprehensibility while talking with a NS. Clearly, certain time may be required before change can occur. The positive impact of interaction raises the role of attention in L2 acquisition which is activated while negotiating meaning. Focusing attention on a certain amount of data may help the learner to process input more successfully. Schmidt (1993) affirms that attention is vital for learning.

Recasts could also enhance L2 development. A recast is a ‘target-like reformulation of a learner’s utterance’ at the level of morphology or syntax (Lyster, 2002a: 240) with the original meaning intact. According to Skehan (1998: 275), they are “utterances which re-express an intended meaning of an interlocutor, but more correctly and precisely”. Empirical research suggests that recasts may enhance short-term L2 learning (Han, 2002). Iwashita (2003) found that recasts have a larger impact than other conversational moves on short term L2 grammatical development of L2 learners of Japanese at a beginning level of proficiency attending an Australian university. Ellis N (1995) conducted a survey of studies finding that implicit negative feedback involving recasts enhances L2 proficiency on the syntactic level. Leeman (2003) explains that since recasts are expressed right after an error, the positive evidence is made noticeable. Philp (2003) also investigated learners’ perceptions on recasts. A high rate of noticing recasts was observed. Han (2002) reports the results of a small-scale laboratory study, suggesting that by increasing the salience and frequency of linguistic features in recasts, development in morphosyntax is enhanced. Mackey (1999) found that interaction involving the use of recasts facilitates L2 development. The researcher presents an example showing how a NS modifies a problematic utterance which had previously been produced by a NNS interlocutor. The NNS managed to reproduce correctly the target language item. Similar observations have been reported by Xanthou (2006) in primary school CLIL settings.

Research carried out by Mackey and Philp (1998) has shown a positive effect of recasts on second language development. Recasts were found to be beneficial for promoting the use of complex linguistic forms, despite the fact that they did not help less advanced learners. Positive outcomes of recasts have also been reported by Iwashita (2003) who found that recasts may be more noticeable than interactional moves containing only positive feedback.

Learners' perceptions about feedback provided through task-based dyadic interaction recasts were examined by Mackey et al. (2000). The results showed that feedback on lexis and phonology provided to ESL learners was correctly perceived by them as opposed to morphosyntactic feedback. The findings provide evidence in support of claims that vocabulary learning may benefit from negotiated interaction unlike certain aspects of L2 morphosyntax because interactional feedback usually focuses on lexis. Pica (1994) reviewed research on classroom interaction and negotiation of meaning, finding that it facilitates access to lexical form. As the researcher reports, "many of the speech modifications used to make input comprehensible can be considered lexical ones, in that words unfamiliar to the learner are repeated, replaced or defined in isolation from the longer segments in which they were initially uttered" (p.510). Findings need to be treated with caution as far as their applicability in primary school settings is concerned as the subjects involved were adult L2 learners. However, they radiate optimism related to the importance of feedback on the acquisition of L2 lexical forms.

Carpenter et al. (2006) investigated learners' interpretations of recasts in interaction. Results showed that the utterance-response group could identify recasts at a higher rate than the response-only group. This suggests that learners were able to identify the corrective nature of recasts due to the contrast indicated between a nontarget-like utterance and a recast. Interestingly, lexical and phonological recasts were more accurately recognized than morphosyntactic recasts perhaps because these are usually shorter in length and they possibly have a higher communicative value. This result accords well with the earlier finding of Mackey et al. (2000).

The effectiveness of recasts has been questioned by several researchers who claim that recasts may be ambiguous. For example, this conclusion has been reached by Lyster (1998a) who examined the results of a French immersion programme on fourth and fifth graders' L2 language development. The researcher reports that in content-based ESL settings there is a high risk of perceiving recasts as forms serving "discourse functions other than corrective ones" (p.207). In content-based classrooms "the most pressing need is for ...the expression of meaning in context". Therefore, "less salient morphosyntactic features of the target system...may fail to become intake" (Harley, 1993: 62). In another study, Lyster's (1998b) findings suggest that recasts do not draw primary school learners' attention to form and they do not cause learner-generated repair although they are the most common type of feedback in content-based ESL classrooms. The observational study

revealed that “the majority of recasts as used naturalistically by teachers in such contexts are unlikely to be either negotiated or noticed by young L2 learners as negative evidence” (1998b: 52). In this study as well as in Lyster and Ranta’s (1997) study, in four immersion classrooms at primary level, recasts were not followed by student repairs. Student-generated forms of repair were not observed most probably because recasts already presented the correct forms to students. The functional properties of recasts seem to override their corrective reformulations in meaning-oriented classes. This is likely due to the emphasis being placed on messages rather than on the correctness of language forms in content-based ESL settings. Learners’ attention is focused on meaning and the teacher is expected to confirm the truthfulness of their answers.

Lyster (2004) has more recently compared the results of recasts and prompts in French immersion classrooms finding that the latter are more effective in leading to improvements since learners are prompted to use target-like form rather than just hearing them.

Pica et al. (1989) found that clarification requests were more effective in encouraging learners to produce modified output than recasts requiring confirmation. Similarly, the recast group in Carroll and Swain’s (1993) study did not benefit as much as the group that received explicit metalinguistic feedback when dealing with the dative alternation rule in English. Although, the applicability of these findings in elementary classroom settings is yet to be explored, the possible ambiguous nature of recasts in settings such as content-based ESL classes should not undervalue their role in L2 development. Mackey (1999) holds that the positive effects of recasts should not be discounted because of the absence of overt oral responses in many cases, as delayed positive outcomes in L2 may occur.

Lyster and Ranta (1997) analyzed interaction in four primary immersion classrooms identifying some types of corrective feedback used by teachers as reactions to students’ errors. Their findings led them to suggest that a wider range of feedback techniques may need to be implemented which are able to initiate negotiation of form. These involve explicit correction, recasts, direct elicitation of correct forms from the learners, metalinguistic clues related to the well-formedness of the learner’s utterance, clarification request, and repetition of the learner’s erroneous utterance.

The ambiguous nature of corrective feedback could be made clearer if explicit techniques were used. For instance, Lightbown (1991) analyzed classroom interaction finding that corrective feedback was effective when it was provided together with explicit

paralinguistic signals. Spada (1997) carried out a review of more than 30 studies examining the impact of corrective feedback on second language learning and finding that it promotes second language development. The results reveal that explicit form focused instruction, i.e. drawing learners' attention to language form either implicitly or explicitly (p.73), can be effective in CLIL classes. Lyster (1998a) suggests that learners in these learning environments may need to be provided with "signals that facilitate peer- and self-repair *drawing* their attention to target – nontarget mismatches" (p.185) rather than be merely given the target forms in the interactional input. Self repair may follow a metalinguistic clue or elicitation move provided by the teacher, a fact which encourages noticing the target – non-target mismatches unlike repeating a teacher's recast or being exposed to explicit correction. Lyster (1998a) found that the negotiation of form involving elicitation, metalinguistic clues, clarification requests or repetition of error was more effective for lexical and grammatical errors than recasts, thus leading to "higher rates of uptake *and* eliciting peer- and self-repair" (p.190). Teachers responded with recasts to grammatical and phonological errors, whereas they tended to respond with negotiation of form to lexical errors. This finding suggests that meaningful content-based contexts are suitable environments for developing L2 vocabulary knowledge in a natural, implicit way. This is supported by the finding that most of the lexical repairs (80%) were peer- and self-repairs following negotiation of form whereas most of the phonological repairs were learner repetitions following recasts.

Pica et al. (1996) examined whether learners' responses to each other during interaction enhance input, feedback, and production. Learners were Japanese L1 speakers attending preacademic, low-intermediate-level English classes. A series of communication tasks were carried out by subject dyads, showing that meaning negotiation between learners enabled the production of modified output. Findings suggest that classroom tasks may need to be created which can encourage learners to interact in order to negotiate meaning and "ensure the comprehensibility of their message meaning" (p.80).

Developing linguistic competence out of meaning negotiation is an issue which warrants greater consideration. Getting interactional help during conversation may enhance communicative performance on one hand but on the other the learner may not feel the need to learn the target features. However, in the worst of cases, the interactant may not develop language proficiency but enhance strategic competence, namely the ability to overcome communication problems.

Using language seems to be the most important way to learn it. Interaction is therefore one of the most important tools in the hands of the teacher. Protracted language events refer to their expansiveness by the teacher as a way of negotiating and enriching language expressed by the learner. The teacher, for example, repeats the meaning of the speech act pronounced by the child but expands using target structure, adds information or corrects if required. A question may then be introduced by the teacher to expand further, while the pupil's answer, although incorrect may focus on meaning. So the same pattern is repeated as in the child's first speech act. Tellez and Waxman (2006) have accumulated research evidence demonstrating that protracted language events increase language proficiency of English language learners in the U.S. schools. CLIL students' achievement was found to be promoted both in the content subject and in L2 English especially when the pupils were encouraged to use the new terms in context and also break the task or problem into small grammatical phrases in order to enable comprehension and conversation. This procedure of keeping the conversation going has been found by Bridges et al. (1981) as contributing to the development of language comprehension.

Short (1994) describes a research project investigating successful practices in middle school CLIL classes in the U.S. Observations of the first phase of the project showed that teachers helped all learners get involved in activities by trying hard to "repeat, rephrase, and extend student responses" (p.596). Interaction which employs interactive adjustments such as negotiation of input with recasting and repetitions may allow the primary school EFL learner to reap more L2 benefits than mere meaning-oriented interaction (Peñate and Bazo, 2001).

It is worth considering how interaction can best be organized in the classroom in order to enhance L2 proficiency. Communication needs to reach optimal conditions in order for students to reap linguistic benefits. Ellis (1990) reviews several studies on this topic, reaching the conclusion that in this environment "the students are involved and interested in what is being talked about" (p.126). Interesting topics are likely to attract interest and promote the need to talk. Effective interactional strategies need to be employed in order to facilitate comprehension in the CLIL class. The repeated use of patterns by the teacher and meaning negotiation could be useful. Further, clarification requests could encourage students to reformulate their utterances in order to overcome comprehension problems. Requests for clarification may result in increasingly more explicit information from the students which can promote language learning.

The role of conversation interaction has been praised by theorists and its benefits have been showcased by research. Therefore, the potential beneficial effects of interaction should be considered in the CLIL class.

#### ***4.1.5 Keeping the affective filter down***

Social and psychological factors need to be considered when learning a language. Krashen (1982) holds that the affective filter is responsible for the ultimate level of language acquisition. The affective filter involves the attitudes towards the language taught and the learners' motivation as well as psychological readiness. When language learners are tense or anxious, the affective filter is up so not many possibilities for language acquisition exist. They cannot succeed in learning the target language. In the opposite case, optimal attitudes cause a low affective filter. Learners are more receptive, seeking to get even more input. According to the affective filter hypothesis the teacher needs to ensure that learners do not feel anxious but relaxed and confident. In this way, the filter is down allowing comprehensible input to enter.

The recent Pilot Curriculum for EFL in Cyprus State primary schools outlines young learners' characteristics, matching these to appropriate language teaching methodology. It is mentioned that the children's instinct for play and fun needs to be considered. Participating in games provides a reason to use the foreign language (Ministry of Education and Culture, 2006). "Affective factors" need to be taken into consideration for successful task accomplishment (Council of Europe, 2001: 161). Learner involvement in task performance and a high level of intrinsic motivation caused either by the interest found in the task itself, its relevance to real world or its importance in completing another linked task lead to successful task performance. Extrinsic motivation such as earning praise or participating in a competition may also enable successful task completion (Council of Europe, 2001).

Seikkula-Leino's (2007) study has revealed that the 5<sup>th</sup> and 6<sup>th</sup> graders participating in CLIL learning had a weak self-concept in L2 knowledge. Therefore it is suggested that teachers need to provide positive feedback regarding students' L2 knowledge. Pupils need to be motivated in this learning environment.

#### 4.1.5.1 Language and content games

Although learners differ in prior knowledge and abilities, they share an important similarity: they all value pleasure (Prodromou, 1995). Games and quizzes are likely to bring pleasure in EFL learning as “students find them enjoyable” (Larsen, 2000: 136). A relaxing learning atmosphere is created where even learners with poor linguistic background have the opportunity to report whatever they know or the teacher has taught them in a non-stressful way. Anxiety was found to cause tenseness and other psychophysiological symptoms in beginning foreign language classes at tertiary education (Horwitz et al., 1986). According to Horwitz et al. (ibid), the fear of negative evaluation makes language learners avoid using the target language in public. However, it is eliminated while playing most probably because attention is focused on the message instead of the correctness of linguistic forms.

Research related to the use of games in the CLIL elementary level class is still at a preliminary stage. However, there is emerging evidence of their place in CLIL classes. For instance, Xanthou (2006: 75-76) used quizzes and language games in a CLIL 6<sup>th</sup> grade elementary class of Cyprus, and found that they turned out to be a necessary content and language learning tool by creating a non-stressful learning atmosphere encouraging learners’ participation. Classroom observation revealed that students responded positively to various memory games. Competitions created meaningful contexts for children to participate, using the target language in a vivid context increasing fluency. A Likert-type five point scale questionnaire was administered to the subjects of the experimental group in order to conduct an affective evaluation of CLIL and the procedures by which it was delivered. Participants felt that using the new knowledge in games was very important.

The benefits of keeping a low affective filter have been demonstrated by research. It therefore renders it an essential principle that could benefit CLIL students. As a result, it was included in the CLELD model that could benefit CLIL students.

#### **4.1.6 Summary**

This section has discussed several language learning theories. The acquisition/learning hypothesis stresses the importance of exposing learners’ to meaningful input. Learning can be enhanced by focusing attention on language features. The input hypothesis holds that acquisition is mainly the outcome of reception of L2. It focuses on the importance of comprehensible input through meaning-focused communication. The interaction

hypothesis emphasizes conversational adjustments while negotiating meaning. The input and interaction hypotheses deserve a certain level of consideration in the L2 classroom as they call attention to L2 input which is of prime importance in L2 acquisition.

Output production hypothesis is complementary to the input and interaction theories. The output hypothesis claims that pushing the learner to produce appropriate utterances encourages the individual to make linguistic choices which are near the L2 norms and therefore promotes the acquisition of linguistic features. In general, learner output seems to be considered important in the context of interaction. Production is valued not as a means to an end but as contributing to the communication of meanings. Affective filter hypothesis stresses the importance of eliminating stress in the class as this raises learners' involvement and makes them more receptive to knowledge.

To sum up, research which employs both quantitative and qualitative methodology has accumulated evidence which appears to demonstrate overwhelmingly that a number of teaching strategies can be employed for the successful application of the five key principles in the CLIL class which contribute to L2 development.

- Acquisition and Learning principle requires the use of both experiential and analytic teaching. Language should be acquired in meaningful settings. However, explicit language instruction enhances L2 development.
- Comprehensible input principle requires the avoidance of structurally complex sentences, the use of exaggerated articulation, extra-linguistic information, multiple representations, L2 and L1 medium strategies, and technology in order to present new material in a comprehensible manner in the classroom.
- Output production can be promoted through a variety of questions, as retrieval and production creates connections in memory which enhance retention of new vocabulary.
- Linguistic interaction can be achieved through confirmation - comprehension checks and clarification requests which facilitate comprehension, as well as semantically contingent responses which have been found to promote the use of scientific register.
- Keeping the affective filter down can be achieved through educational games which can promote learners' participation.

Taking into consideration the aforementioned strategies in subject matter teaching through the medium of the L2, may increase the possibilities for maximization of L2 development in CLIL classes.

## **4.2 Effective subject matter teaching**

In order to provide effective CLIL instruction, research in related areas such as subject teaching should be considered (Coyle, 2007).

The current climate of education within Greek Cypriot State schools emphasizes the acquisition of key competences in many areas, focusing on foreign languages, Mathematics, Science and ICT (Kazamias et al., 2005). The curriculum objectives related to Social Studies, Science and Mathematics are presented below.

### ***4.2.1 Curriculum objectives***

#### ***4.2.1.1 Social studies – Geography***

According to the curriculum, learners should be able to use basic geographical symbols in reading maps and in finding orientation, develop and apply geographical cognitive skills related to charts and graphical presentations in order to solve geographical problems, demonstrate the interdependence between human and natural environments, familiarize themselves with constant changes in the world, understand the effect of climate and ground morphology in people's lives, get to know other countries and people and develop positive attitudes towards them, state economic, political and cultural relationships between Cyprus and other countries, and get to know contemporary human problems and how these can be tackled.

#### ***4.2.1.2 Science***

The curriculum (1994) sets several objectives related to the subject of Science in the primary school. Pupils need to make observations using all their senses, ask questions and seek answers, write down observations, cooperate with other pupils when carrying out a task, classify material bodies and organisms, use scientific processes in carrying out a research study: make predictions, carry out experiments, write down measurements and observations using various ways, interpret data, hypothesize and modify hypotheses under the light of new data, make conclusions, apply simple scientific knowledge to life and show consideration for the protection of natural environment.

#### 4.1.2.3 Mathematics

According to the primary school curriculum of Cyprus (Ministry of Education and Culture of Cyprus, 1994), children need to develop a positive attitude towards Mathematics, discover mathematical relationships of quantity, size and distance in the natural and technical environment, elucidate basic mathematical notions (height etc) through real life experiences through carrying out free or guided activities, use mathematical terminology to communicate and discover new relationships, use concrete examples to reach generalizations and formulate rules, use various strategies in solving mathematical problems, find practical applications of Mathematics in the environment and generally in everyday life and access technology to develop mathematical skills.

Research paints an optimistic picture about the teacher's role in the teaching scene, bearing witness to the view that student achievement is affected by the teacher (Wright et al., 1997). Thus, CLIL teachers need to be familiar with content pedagogy. They need to be informed of current effective approaches and instructional practices (Met in Cenoz & Genesee, 1998, Kyriakides et al., 2006).

This section includes five key behaviours for effective teaching which have been identified by research studies over the past three decades to be essential for effective teaching as they enhance student performance: lesson clarity, instructional variety, task orientation, engagement in the learning process, and moderate-to-high success rate (Borich, 2007). Key behaviours involve a number of instructional practices. This study makes reference to the effective instructional practices revealed by Marzano et al. (2001).

The results of the meta-analysis of studies carried out by Marzano et al. (2001) are also considered in the construction of the CLELD model. The meta-analysis yielded nine of the most effective instructional methods for K-12 classrooms, as suggested in over forty years of educational research. The methods include: comparing, summarizing and note-taking, reinforcing effort, nonlinguistic representations, cooperative learning, setting objectives and providing feedback, generating and testing hypotheses, using cues, questions and advance organizers. Jochum (2005) assessed and confirmed the applicability of the strategies in the area of foreign language teaching. Therefore, despite the fact that the generalizability of the study is limited to secondary schools, when teaching a subject through the medium of the L2 in the primary school, consideration of this study's results may increase students' achievement.

The CLIL lesson delivery model developed in this study includes the following key behaviours related to effective subject matter teaching.

#### **4.2.2. Lesson clarity**

Lesson clarity refers to how understandable and clear a presentation is to the class. It involves communicating messages clearly to students and directing talking to the students' level of comprehension. In order to achieve this, directions need to be clear and not overly complicated.

Clarity is related to cognitive behaviours i.e. content needs to be organized in a logical and step-by-step order, and delivery strategies i.e. audible delivery free of distracting mannerisms which could include a discussion, question-and-answer format etc.

Borich (2007) provides some indicators of lesson clarity. As it is outlined, the teacher

“Informs learners of the lesson objective..., provides learners with an advance organizer (e.g. places lesson in perspective of past and/or future lessons), checks for task-relevant prior learning at beginning of the lesson (e.g. determines level of understanding of prerequisite facts or concepts and reteaches, if necessary), gives directives slowly and distinctly (e.g. repeats directives when needed or divides them into smaller pieces), knows ability levels and teaches at or slightly above learners' current level or understanding..., uses examples, illustrations and demonstrations to explain and clarify ...provides review or summary at end of each lesson.” (Borich, 2007: 11).

Students need to be informed of the objectives. New material should be built on previous knowledge. The teacher is responsible to re-teach elements which seem to be vague to the students. Instructions need to be given clearly, while complex instructions should be given in a step-by-step manner.

When the lesson is delivered in L2 the situation of facing different ability levels may become obvious. One of the reasons is that some students take private lessons for more years than others.

Content can be explained through the use of illustrations, visual aids, examples, and by linking content to students' personal experiences. A multisensory approach is likely to enable lesson consolidation. Revisions can help clarifying misconceptions. Hence, students are helped to store and at a later stage recall this knowledge. Clear communication is positively related to effective teaching. So, the teacher needs to explain

concepts clearly in order to help students comprehend messages and enter them into their long-term memory.

Clarity can be achieved when the lesson is well prepared. A good ‘lesson preparation’ is one of the eight factors contributing to an effective CLIL lesson as illustrated in the SIOP model (Echevarria et al., 2004). Lesson preparation involves setting content and language objectives, using supplementary materials, adaptation of texts, and designing meaningful activities.

Lesson planning should include content objectives. This brings focus to planning. Echevarria & Graves (2002) state that content objectives should be related to specific grade-level content standards. The products and learning therefore need to be tied to the content objectives. A CLIL lesson should also consider language objectives in the preparation phase. These should be stated clearly, and the teacher should let the students know about these objectives. Language objectives may refer to students’ vocabulary, listening, speaking, reading comprehension or writing skills. Language objectives could also focus on functional language use i.e. requesting information, negotiating meaning etc. Forming hypotheses, conclusions, and making comparisons refer to developing higher-order skills but they also link to language objectives. When teaching and assessing objectives then multilevel responses should be taken into account, depending on the students’ L2 proficiency. For example, beginners could be assigned to respond in groups i.e. thumbs-up/thumbs-down. More proficient students could work in pairs or small groups. Planning should take content concepts into consideration. These concepts need to follow the curriculum. This implies that the teacher adapts materials to make content comprehensible but does not diminish content. It is the teacher’s responsibility to scaffold students in order to help them meet their grade-level standards. Lesson planning as regards the content concepts should consider learners’ proficiency in L2 and the appropriateness of materials. Echevarria et al. (2004) refer to reflecting “on the amount of background experience needed to learn and apply the content concepts”(p.23). For this to be achieved the teacher needs to design activities which activate the learners’ prior knowledge.

Teaching content to EFL learners of limited proficiency requires the use of “supplementary materials that support the core curriculum and contextualize learning” (Echevarria et al., 2004: 24). Supplementary materials help to enhance meaning and clarify concepts which seem to be ambiguous. In addition, they present new information in different ways thereby

supporting different learning styles, e.g. meaning construction takes place through seeing, feeling, hearing, creating etc.

Clarity is a key behaviour included in the CLELD model that can be achieved mainly by informing learners of the objectives, activating prior knowledge and providing differentiated instruction.

#### 4.2.2.1 Inform learners of the objectives

Borich (2007) highlights the importance of informing learners of the lesson objectives. This enables the activation of “the internal processes of learning” (Borich, 1992: 159, Gagné and Briggs, 1979). Learners are allowed to focus their search and retention processes on target aspects of knowledge or processes of the lesson. So, students may need to be told how they are expected to demonstrate competence in the new content. Borich (2007) claims that “the most effective way to focus your learners’ receptivity is to inform them of the behavioural outcome they will be expected to attain by the end of the lesson” (139). When learners are aware of what they are expected to attain during the lesson they can select the relevant information which leads to the desired behaviour. Other aspects of the lesson may serve as tools for acquiring the highest level outcome expected. Furthermore, they know when the expected level of behaviour has been attained. Thinking is allowed to be organized at the beginning of the lesson while key points are later hooked on this advance organizer.

Effective task-oriented lesson delivery in CLIL classes depends on supporting both content and language objectives (Echevarria et al., 2004). The teacher needs to state clearly content objectives in order to help students focus and structure classroom procedures. Activities need to support the content objectives. Similarly, students need to hear a simple language objective which should be recognizable throughout the lesson delivery i.e. listen, read, speak, write about a topic.

Lesson planning should involve the design of meaningful activities which consider linking prior to new learning and relate learning with students’ lives.

#### 4.2.2.2. Activating prior knowledge-Linking new information with pre- existing knowledge

A lesson’s clarity is related to linking new information to learners’ background and experiences. Stimulating recall of task-relevant prior learning is a preliminary instructional event required at the beginning of the lesson (Gagne & Briggs, 1979). Students are

enabled to combine old with new concepts and skills. The key concepts which have been accessed and acquired in previous lessons need to be reviewed, summarized or restated. Revision does not need to involve all the material that has been taught. Only task-relevant information needs to be retrieved on which links with new information will be created. Key aspects need to be condensed into a brief form. Questions need to enable students to recall important parts of previous lessons and tap mental images which involve details that can help further recall (Borich, 2007).

The SIOP instructional model which was developed to be used by teachers teaching content through the medium of L2, regards building on students' background knowledge as an important feature which characterizes effective content and language instruction of EFL learners of limited proficiency (Echevarria et al., 2004). 'Schema' world knowledge, namely an individual's past experiences enables understanding and remembering concepts (ibid: 45). When students lack sufficient prior knowledge the teacher could teach vocabulary, enrich students' experiences, and help them build background via a conceptual framework. Blachowicz and Fisher (2000) point out that when students of limited English proficiency are taught content through English, key words should be taught in order to help learners comprehend target material. Various activities should be designed to help learners learn and use these words. Providing experiences can be done through presentation of background information related to the target content. Students can be helped to build background by being presented with graphic organizers. In this way, they can build a conceptual framework and construct meanings. Students in a class may possess considerable, fair, or little prior knowledge. Thus, the teacher can differentiate instruction to accommodate all levels. Definitions and analogies can be used for learners having some prior knowledge and first-hand experiences can be provided to learners having little prior knowledge.

According to the findings revealed by the meta-synthesis of qualitative research studies conducted by Tellez and Waxman (2006), activating prior linguistic or/and cultural knowledge needs to be considered for effective lesson planning. Teachers should build on what the students already know or have experienced. This could involve cultural knowledge, well-known stories or other forms of prior knowledge.

The prior experience can be used as the context for interpreting the new experience. Ellis (1990) investigated the characteristics of immersion classes which were successful for language learning and discovered that prior experiences serve as the contexts within which

the language being used is to be understood. Students are enabled to put new knowledge into a coherent mental framework where prior knowledge serves as the context within which target language features are to be understood.

Background knowledge facilitating comprehension has been studied under the rubric of schema theory. The reader's pre-existing linguistic and world knowledge as well as knowledge of the rhetorical structure of the text (opening, developmental structure, closing) exists in the form of 'content schemata' and 'formal schemata' respectively. A massive body of evidence apart from the aforementioned research synthesis, validates the importance of schema theory. Several researchers have investigated the value of schema theory for second language reading (e.g. Carrell & Eisterhold, 1983; Carrell, 1984; Carrell, 1987; Floyd & Carell, 1987). Carrell and Eisterhold (1983) conclude that the teacher in the L2 classroom should "strive for an optimum balance between the background knowledge presupposed by the texts and the background knowledge our students possess" (p.589). Carrell (1984) found that primary school children had more difficulties recalling stories when the expected story schema was violated. Carrell (1987) revealed that culturally familiar content in a text affects reading comprehension of high-intermediate ESL students to a greater extent than formal schemata related to the rhetorical organizational structures of texts. Similar findings have been reached by Floyed and Carrell (1989) who showed that the intermediate-level ESL learners which were given cultural background knowledge, improved reading comprehension. Prior knowledge has been found to be very useful in increasing elementary-level students' familiarity with the learning context (Palmberg, 1987). Palmberg's findings provide converging evidence to a main principle of learning outlined by Dupuis and Snyder (1983, p.298) that "the more we know about the whole subject, the easier it is to remember specific words related to it". Therefore, connecting the target words to already existing words in the students' mental lexicon enables new vocabulary learning.

Activating background knowledge was found to be a successful instructional practice used by teachers in middle school Social Studies classrooms in U.S. in order to facilitate the learners' comprehensibility of content and development of language skills (Short, 1994).

Leung's (2005) exploration of some discourse interaction data led him to conclude that when teachers and learners deal with mathematical concepts, the use of informal and everyday language facilitates the process of learning. The boundaries of a word's meaning can be explored through thinking and negotiating processes. This can be done more

successfully through informal everyday language. Leung (ibid) concluded that technical vocabulary should be considered as “a pedagogic point of departure for exploring concepts, meaning-making and meaning exchanging, not an end point of learning” (p.134).

Moje et al. (2001) concluded that students can be assisted in constructing new knowledge when their everyday knowledge and discourse are brought into the classroom. Extensive Science knowledge is not enough when teaching Science. Lee (2004) bears witness to this conclusion describing how six Hispanic teachers of elementary students managed to promote the students’ L2 and academic knowledge by employing their linguistic and cultural knowledge in the L2 class.

Lee (2005) carried out a research synthesis of studies employing discourse analysis of learners’ oral and written communication while interacting with teacher and peers. It was shown that Science instruction is effective when it is cognitively based on students’ experiences. Lee’s (2005) research synthesis concludes that Science instruction should be cognitively based. Students’ everyday experiences and language experiences involve forms of reasoning and argumentation serving as intellectual tools when learning Science in the L2. Learners from different language and cultural backgrounds have been shown to make use of sense-making practices such as “deep questions, vigorous argumentation, situated guesswork, embedded imagining, multiple perspectives, and innovative uses of everyday words to construct new meanings” (p.504) and thus interacting productively with scientific practices. Pupils’ queries should grow out of their own observations and questions, while the teacher guides and assists with the process of learning.

Effective CLIL teaching has used the current language resources of students and later focused on new language. In this way, learners were allowed to build on their existing knowledge and language, and to connect prior with new learning (Gibbons, 1998).

Coonan (2007) has found that the secondary school CLIL teachers in Italy participating in a three year study used the strategy of retrieving the students’ existing knowledge quite often in their effort to be efficient. Observation in primary school CLIL classes in Cyprus revealed that the retrieval of the students’ prior knowledge facilitated learning (Xanthou, 2006).

It could be assumed that CLIL lessons have the advantage of offering rich word associations through the interesting content of the subject matter presented. So, the

semantic representation of new words or lexemes is made stronger diminishing the possibility of word attrition, namely forgetting the meaning of the target words with time.

An effective strategy proposed by Short (1994) is the Directed Reading Thinking Activity which allows building new knowledge on pre-existing world experiences. Predicting, reading and proving are the three basic steps of a DRTA. The process guides students to move to higher-level thinking. Eliciting how much students already know on the topic can be done through brainstorming. Predictions are based on prior knowledge and guesses are heard. Corrections of predictions are made while reading. This results in cognitive growth as old information is assimilated into new.

Advance organizers could be used to help students build new information on prior knowledge. Advance organizers are materials used at the introductory stage of a lesson aiming to enable the retention of material that will follow. Short (1994) claims that graphic organizers and vocabulary previews are important in the CLIL class in order to make input comprehensible.

Research synthesis on advance organizers suggests a number of generalizations. First, they need to focus on important information. Second, deeper learning is produced by higher level advance organizers. Third, they can have a more powerful effect with information which is not well organized. Finally, different results are produced by different types of advance organizers such as expository, skimming, narrative and illustrated advance organizers with the first two producing better results (Marzano et al., 2001).

Marzano et al. (2001) conclude that students need to be provided with opportunities to “think about new knowledge before experiencing it” (p.120). This is likely to promote student achievement. Thus, building new learning on prior knowledge can be a powerful tool in the CLIL class which can enhance academic benefits.

#### 4.2.2.3 Differentiated instruction

Experts’ reports on teachers’ abilities stress the importance of ‘supporting learning for all the students, following differentiation processes in mixed ability classes’ (Koutselini-Ioannidou, 2006: 39). Hess (1999, p.1) states that differentiated instruction can raise the bar for all learners in the classroom. This kind of instruction aims to direct all students toward learning by using a variety of processes and products to get there.

A multiple intelligence orientation needs to be considered when designing tasks. Activities could address the Visual Auditory Kinesthetic (VAK) neurolinguistic programme. Visual learners like “to obtain a great deal of visual stimulation” (Rao, 2002: 7). Therefore, information should be presented visually and many objects should be shown to them (Reid, 1987). Auditory learners benefit from exposure to a rich auditory input. Kinesthetic games can help learners who learn best when they move (Marzano et al., 2001).

Learners differ in their experiences and learning style. The teacher needs to recognize learners’ differences helping them to build on their experiences. It is suggested that various forms of learning may need to intrude in the traditional classroom (Campbell et al., 1996). Gardner (1983) states that several more intelligences exist. These include linguistic intelligence related to sensitivity to word meanings, logical-mathematical intelligence handling chains of reasoning and recognizing patterns and therefore responding to graphic organizers, musical intelligence showing sensitivity to pitch and tone and responding well to rhythmic patterns, spatial intelligence exhibiting accurate perception of the visual environment and to respond to patterns and pictures, bodily-kinesthetic intelligence showing ability to use the body responding to gestures and games, interpersonal intelligence possessing collaboration skills and responding to person-to-person communication, intrapersonal intelligence developing thinking strategies and inventing, and naturalistic intelligence good at observing and organizing patterns, existing in the natural environment. In this framework, a thematic unit (e.g. consisting of 2-6 lessons) could include activities such as individual projects for intrapersonal intelligence, solving problems, answering questions, and brainstorming ideas collaboratively for interpersonal intelligence, composing and singing songs and learning in rhythmical ways for music intelligence, using puzzles, charts, and pictures for spatial intelligence, dramatizing events for kinesthetic intelligence, reading and writing for verbal/linguistic intelligence and working with math games, deductive thought, Science experiments, and problem solving for mathematical intelligence.

Differentiated instruction refers to the efforts of teachers to respond to variance among learners in the classroom. Teachers therefore need to vary teaching for creating the best learning experience for a learner or a small group. Activities such as role play, reading, creative writing and note taking help individuals to digest information each in his/her own way. Many researchers have reached the conclusion that “addressing an individual’s learning styles through flexible and compatible teaching results in increased academic

achievement” (Tomlinson & Allan, 2000: 27). Christian (2006) examined how differentiated instruction had been implemented in three suburban elementary schools noting that varied instructional strategies need to be incorporated in the lesson in order to attain differentiated instruction such as "journal writing, student presentations, creating tiered lessons, peer coaching... questioning activities, problem-based learning, anchor activities, flexible grouping, pre-assessment..." (Christian, 2006: 13) etc. The researcher finally discovered a positive relationship between the use of differentiated instruction and student achievement.

Assigning the same exercises for all learners may not enable differentiation. Differentiated teaching may include activities ranging from simple to complex in order to address all linguistic levels of the Mixed Ability Class. Linguistically advanced students are likely to benefit from tasks that are more complex in research, resources, problems or goals than less advanced peers. Asking advanced students to do extra assignments i.e. book reports after completing their regular work may also not be appropriate. This could be seen as punitive to them (Tomlinson, 1995). Instead, various other strategies could help to achieve differentiation of work. Providing children with a number of options instead of loading additional work to the more advanced students seems to be a key issue. For example, the teacher could use multiple texts-reading materials to suit varying readability levels to present the new structure. The children could be given the right to choose from a number of exercises. A variety of computer programmes could also be used to address the various levels of proficiency in the class.

Differentiating teaching needs to consider how students gain access to knowledge. Differentiation may occur at the level of content, learning process and products. Regarding content differentiation, the teacher may use texts at more than one reading level and present content through ‘both whole-to-part and part-to-whole approaches’ (ibid: p.8), Process differentiation refers to how the learner understands the target concepts, generalizations and subject specific skills. Product differentiation refers to how a learner can demonstrate knowledge. This can take the form of a portfolio, an end-of-unit project etc.

Differentiation refers to responding to the learner’s needs. According to Tomlinson and Allan (2000) “every learner must have tasks that are equally interesting and equally

engaging, and which provide equal access to essential understanding and skills” (p.7). All children should constantly feel challenged.

Interest differentiation is based on the premise that interesting tasks are also stimulating and engaging. Research uncovers the importance of fostering the students’ interest for promoting achievement (Torrance, 1995). The teacher can provide learning choices at various levels of difficulty in order to respond to differences in student readiness. Students’ interests can be accommodated when access to several materials and technologies is provided. A choice of tasks should be given and investigation of target concepts in student interest areas could be encouraged. In response to students’ different learning styles the teacher needs to address the various learning styles. So, information needs to be presented and explored through auditory, visual, and kinesthetic modes. Students need to be allowed to work alone or with peers.

Lesson clarity can help the student focus on new content, make connections between prior and new learning and find interest in appropriately designed tasks. Therefore, it is an important principle of the CLELD model that can help the CLIL learner to reach high standards of understanding and remembering new content.

#### ***4.2.2.4 Instructional variety***

Instructional variety is another key behaviour contributing to effective teaching. It refers to the use of various instructional methods and techniques in lesson delivery i.e. using direct and indirect instruction, cooperative learning etc. Research revealed that the use of various instructional materials, techniques, reinforcements and types of feedback raises student achievement (Brophy & Good, 1986).

The use of different learning materials, displays, and visual variety, can help the teachers to enhance student involvement. Instructional variety could involve the use of audiovisual devices and demonstration materials, direct and indirect instruction and cooperative learning. Instructional variety has been shown to enhance student engagement in the learning process and performance (Walqui, 2000). The following indicators for effective use of variety in class are presented by Borich. The teacher:

“uses attention-gaining devices..., shows enthusiasm and animation through variation in eye contact, voice, and gestures (e.g. changes pitch and volume, moves about during transitions to new activity), varies modes of presentation e.g. presents, asks questions, then provides for independent practice [daily], uses a mix of rewards and reinforcers e.g. extra

credit, verbal praise, independent study, etc. [weekly, monthly], incorporates student ideas or participation in some aspects of the instruction e.g. uses indirect instruction or divergent questioning [weekly, monthly], varies types of questions e.g. divergent, convergent, [weekly] and probes e.g. to clarify, to solicit, to redirect [daily]”. (Borich, 2007: 12).

A teacher can use variety in many ways i.e. starting the lesson in a way which attracts students’ interest such as using an audio or visual tape, promoting all four language skills (listening, speaking, reading, writing) during the lesson and by moving from one task to another as quickly as possible e.g. dealing with problem solving, games etc. Distributing activities which involve students’ five senses, one or two each time, may attract students’ interest and is likely to assist effective learning. Teachers may also need to vary the way they speak throughout the lesson. An enthusiasm from the teacher’s part about the lesson is transmitted through variation of voice and eye or body movement (gestures).

In sum, variety is a key behaviour included in the CLELD model that can be accomplished mainly through instructional variety, variety of questions and the creation of various classroom climates.

#### 4.2.3.1. Vary modes of presentation

Instructional variety is another important element which is necessary for keeping students’ attention throughout the lesson. Lesson delivery should include some combination of teaching techniques such as lecture, question and answer, discussion, and guided practice. Relying on a single technique may be monotonous for the learners and lead to boredom. Student interest is stimulated by variety of instructional techniques: visual, oral etc, and activities: “large group lecture, question and answer, small group discussion” (Borich, 2007: 142) which helps learners to encounter material and use knowledge in various ways. In this way the different learning styles can be accommodated.

A variety of “grouping configurations” (Echevarria et al. , 2004: 105) need to be applied in a CLIL class designed to support the lesson’s language and content objectives. Learners may work individually, with partners, in triads, small groups of four or five, or they may form cooperative learning groups, and whole-groups (Echevarria et al., 2004, Cuevas, 1984, DfEE, 1999, Porter, 1986, Coonan, 2007). A shared experience for all learners can be provided when working in whole-class groups. Collaboration is developed in small group work, while success is promoted in partnering settings where L2 learners practice scaffolding and help one another (Nagel, 2001). Echevarria et al. (2004) state that teaching

content via the L2 to students of limited L2 proficiency is effective when it uses “a variety of grouping structures, including individual work, partners, triads, small groups of four or five, cooperative learning groups, and whole-groups” (p.105). Variety may also exist in terms of group homogeneity or heterogeneity regarding learners’ gender or language proficiency. The constant creation of homogeneous groups may not be an effective practice. Learners are actively involved in the learning process when changing from whole group to cooperative groups or pair work. This change has also more possibilities of satisfying a student’s learning style.

#### 4.2.3.2. Use various types of questions

A variety of questions is necessary for effective teaching, e.g. questions asking for information, seeking clarification and asking for opinions. Students can interact directly with the content presented to them through a variety of content questions which aim to check recall and understanding of subject material. Content questions could include ‘direct’ questions requiring no interpretation (e.g. ‘What is the meaning of...’), ‘lower-order’ questions requiring the recall of facts (e.g. ‘What was the ...’), ‘convergent questions’ considering various data sources that lead to the same answer (e.g. ‘What is one of the chemical elements in the air we breathe?’), ‘closed questions’ having no alternative answers (e.g. ‘What is the function of a CPU in a computer?’), ‘fact’ questions requiring the recall of certain pieces of knowledge (e.g. ‘What is the result of the number 47 divided by 6?’) (Borich, 2007: 21).

The flexible use of questions may determine the degree of variety provided in the lesson. Process questions guide learners to use content in order to achieve higher-order goals: analyze, synthesize, problem-solve, create, and judge. Various types of process questions could be used. ‘Indirect’ questions are those having several possible interpretations (e.g. ‘What are some of the ways you have used the word *ancient*?’), ‘higher-order’ questions require complex mental processes such as drawing inferences and forming generalizations (e.g. ‘What were the effects of the invention of ...’), ‘divergent’ questions allowing various correct answers (e.g. ‘What...*do*...we have to do to clean the air we breath?’), ‘open’ questions expecting more than one correct answer (e.g. ‘How have recent advances in computer technology influenced your life?’), and ‘concept’ questions requiring abstraction, generalization, and inference) e.g. ‘Using examples of your own choosing, can you tell us some of the ways division and subtraction are similar?’ (Borich, 2007: 22).

Borich (2007) notes that students' ideas and contributions can be used to create instructional variety. For example, when "modifying ...a student's idea by rephrasing it or conceptualizing it in *the teacher's* words" (p.18) can be used to promote variety in the lesson.

#### 4.2.3.3. Create various classroom climates

Borich (2007) points out that the effective teacher "creates a variety of classroom climates" (p.168). Climate could be changed according to the objectives and the situation. Depending on how authority is relinquished, the climate can be: authoritarian in which the teacher is the instructor and the primary provider of information, laissez-faire where the students lead in providing information and instruction, and an in between state where teacher and students undertake and share responsibilities. Depending on the level of control which is relinquished over the learning process, climate can be competitive, cooperative, or individualistic. In the first case, students compete for right answers while practising. In the second case, learners engage in dialogue while the teacher intervenes to scaffold discussion. In the third case, students work independently to complete assignments. The classroom's physical environment or organizational environment should change from time to time in order to increase variety.

Research has shown that the incorporation of instructional variety can raise students' interest and involvement. Therefore, it is an important key behaviour included in the CLELD model which can promote learning outcomes in CLIL classes.

#### **4.2.4 Task orientation**

Borich (2007) reports that the opportunities for learning increase when more time is dedicated to the task of teaching an academic subject. Therefore, the teacher could focus on the amount of time devoted to lecturing, asking questions or probing learners to inquire. Research evidence shows that when teachers dedicate most of their time on teaching content, achievement is higher than when focusing on the process required to learn the content. It is concluded that when teacher-student interactions concentrate on the acquisition of subject-specific content, rather than on process issues, there are more possibilities to raise the level of students' achievement.

Moreover, task-oriented teachers match the instructional goals with both classroom instruction and test construction. The teaching which is task-oriented also tends to be goal-

oriented. Clear instructional goals are set for a specific amount of time. Instruction is organized around goals and it is not negatively influenced by classroom management tasks or students' misbehaviour. Organizing subject content and preparing well-structured lesson plans and activities are necessary elements of task-oriented teaching.

Some indicators for considering task orientation in class are provided by Borich (2007).

The teacher:

“develops unit and lesson plans that reflect the most relevant features of the curriculum guide or adopted text *in accordance with text and curriculum guide...*, handles administrative and clerical interruptions efficiently (e.g. visitors, announcements, collection of money, dispensing of materials and supplies) by anticipating and preorganizing some tasks and deferring others to noninstructional time, stops or prevents misbehaviour with a minimum of class disruption (e.g. has preestablished academic and work rules to ‘protect’ intrusions into instructional time) selects the most appropriate instructional model for the objectives being taught (e.g. primarily uses direct instruction for knowledge and comprehension objectives and indirect instruction for inquiry and problem-solving objectives), builds to unit outcomes with clearly definable events (e.g. weekly and monthly review, feedback, and testing sessions)”(p.14).

In short, task orientation can be achieved by developing lesson plans which reflect curriculum features, matching goals with instruction, setting objectives which consider various levels of cognitive complexity, selecting an appropriate instructional model and assigning meaningful tasks.

#### 4.2.4.1 Lesson plans reflect curriculum features

Lessons should be developed following curriculum objectives in order to cover the subject matter related material.

#### 4.2.4.2 Match goals with instruction

Activities need to match the lesson's objectives in order to promote learning in the suggested by the ministry of education cognitive domains.

#### 4.2.4.3 Objectives consider various levels of cognitive complexity

Objectives state the particular behaviour to be attained, how this will be demonstrated, and the level of proficiency that will be reached. Objectives serve to move goals which identify what will be learned to accomplishment and also to allow measuring the effects of teaching strategies on students. The term behavioural objectives is used to refer to the description of behaviour which needs to be both observable and measurable e.g. with an observational checklist or a work sample (Gronlund, 2003).

Objectives need to take into account the cognitive, affective, and psychomotor domains (Borich, 2007: 92). The first domain refers to development of intellectual abilities, the second to building attitudes, while the third refers to development of neuromuscular skills. To begin with, objectives which relate to the cognitive domain need to address different levels of cognitive complexity. Bloom et al. (1984) developed a taxonomy of objectives related to the cognitive domain beginning from lower-level cognitive skills and moving on higher-level ones: knowledge, comprehension, application, analysis, synthesis, and evaluation. Objectives related to the affective domain may range from lower i.e. listen, notice, to higher-level objectives i.e. decide, select (Krathwohl et al., 1999). Objectives related to the psychomotor domain range from least to most authentic. Harrow (1972) identifies the following five levels: imitation, manipulation, precision, articulation, and naturalization.

#### 4.2.4.4 Select appropriate instructional model

Direct instruction strategies can be used to teach facts, rules, or action sequences mainly by full-class instruction as opposed to small-group. The teacher's presentation involves explanations and examples along with opportunities for practice and feedback. Teacher-student interactions are based on questions and answers and error correction. Direct instruction involves clear presentation of goals, sequential presentation of content in steps, and checking students' understanding. Outcomes can be tested with multiple-choice, matching, fill-in and questions requiring short-answers.

Direct instruction strategies include guided student practice which involves a number of questions providing opportunities to all learners to respond and get feedback. Feedback is provided to students when they give correct answers or when they are hesitant while errors are treated with reteaching. Gentile & Lalley (2003) note that direct instruction strategies are effective for learning content and especially facts, action sequences, and rules which are important for moving to higher-order thinking. Review and practice lead to retention.

Indirect strategies could also be used to meet the lesson's objectives in a task-oriented environment. Constructivist assumptions place importance on constructing reality upon one's experiences. Learning is based on hypothesis formation, rule creation, and providing explanations about observations. The use of "classroom dialogue, problem-solving exercises, and individual projects and assignments that create discrepancies - or an imbalance - between old knowledge and new observations" stimulate the need for rule creation and formulating hypotheses (Borich, 2007: 262).

Kyriakides et al. (2006) investigated teachers' perceptions of the appropriateness of forty two criteria classified into six categories belonging to specific models of teacher effectiveness research for performance evaluation. A questionnaire was completed by 237 Greek Cypriot primary school teachers. The results showed that the criteria related to the 'working process model' were regarded as the most appropriate for evaluating lesson delivery. According to this model, effective teaching and learning processes enable teachers to reach their objectives. Therefore, when teachers can ensure high quality of teaching, they are considered effective. One of the basic criteria included in the 'working process model' is the use of discovery learning approaches.

Constructivist approaches to Mathematics and Science allow students to explore and predict in order to integrate facts which can be used for real life problems into mathematical reasoning. The constructivist view of teaching Social Studies supports the use of activities which present problems to be solved as well as the interaction of the teacher with the students and among students.

Teaching higher-order skills require indirect instructional strategies. Indirect strategies may involve questions (e.g. 'Who would like to tell us what the word...means?'), probes of deeper understanding (e.g. 'Not only...but...'), concept learning through deduction (e.g. 'The word capital means tangible goods or possessions. Is a house tangible?') (Borich, 2007: 270), examples such as 'name which of the things included in a list refer to a particular concept', concept learning through induction, i.e. asking learners to form a rule after a definition for a concept has been provided, learner experience, i.e. asking students to report examples from their personal experience and knowledge, content organization, i.e. through the use of advance organizers which provide a conceptual framework of what will follow. For instance, the teacher could draw some right, equilateral, and isosceles triangles before presenting the target concept of a right triangle. By this, students can integrate related concepts into larger patterns.

Some types of indirect instruction are: concept learning, inquiry learning and problem solving. Concept learning can be done through demonstration of examples and nonexamples of the target object or event in order to spot their special characteristics.

Inquiry learning could be used to move the lesson to a higher level. This allows students to see how they reach knowledge. Inquiry-based learning allows learners to identify

problems, brainstorm possible solutions, investigate, analyze, discuss, and form conclusions (Bruner, 2004). The use of scientific inquiry in CLIL classes was found to be effective for content learning. The Hispanic, Haitian Creole elementary school learners involved, exhibited statistically significant achievement in Science learning (Fradd et al., 2002).

English language proficiency and Science learning have been shown to develop through “inquiry-based Science instruction” (Lee, 2005: 505). The positive impact of inquiry approach on Science and language learning has been demonstrated by Kelly and Breton (2001) who showed how two teachers at elementary grades developed the students’ engagement in scientific inquiry through problem identification, observation, questioning, using both L1 and L2, and talking about different classroom experiences. Similar findings have been showcased by Rodriguez and Bethel (1983) who reported the effectiveness of the approach which was based on object manipulation, exploration, and interaction with teacher and peers. The bilingual Mexican American elementary grade students in the experimental group exhibited statistically significant improvements in classification and L2 oral communication skills as compared to students in the control group who were taught in the traditional way. The positive outcomes of inquiry-based Science have also been demonstrated on English proficient elementary ELLs by Amaral et al. (2002) as compared to students with limited English proficiency.

Higher-order outcomes can also be pursued through problem-centered learning which presents particular steps to follow in order to solve a problem. A problem-solving lesson could make use of an advance organizer involving the following stages: ‘identifying a problem, stating the research objectives, collecting data, interpreting the data, making conclusions’ (Borich, 2007: 278).

Observation of CLIL lessons in primary schools shows that students can practise problem solving skills effectively (Xanthou, 2006). For instance, learners found and presented diagrammatically information about animals of South Africa and about various places of the target country. Moreover, many children provided explanations to their classmates for some problems, for example why it is colder in central China as compared to Greece.

Children managed to deal with problem solving tasks (e.g. they studied graphs illustrating temperature and rainfall in Cape Town and Nicosia, discovering the characteristics of the Mediterranean climate). They also read texts and studied graphs finding the answer to a question set e.g. the most important products of South Africa.

Another teaching strategy is inductive and deductive learning. Induction is used when learners study specific instances and then they are called to make a generalization. Deductive teaching presents students generalizations and requires them to apply some principles in specific instances. The steps used in deductive learning include: the presentation of a theory or generalization, hypothesis formation, i.e. prediction, data collection for hypothesis testing, data analysis, and concluding the truthfulness or not of the generalization (Borich, 2007).

Using questions to guide concept learning, inquiry, and problem-solving is another indirect instruction strategy. Unlike direct instruction, which includes specific questions requiring a single right answer, indirect instruction involves questions that guide the inquiry process, which encourage discovering the various sides of a problem. Questions could include ‘What else?’ and so on.

Using student ideas, experiences, feelings, and points of view in the teacher-student dialogue may promote higher-order thinking. Students can use examples from their experiences on which they construct meanings. Understanding of ideas is encouraged by linking them to the learners’ interests and concerns.

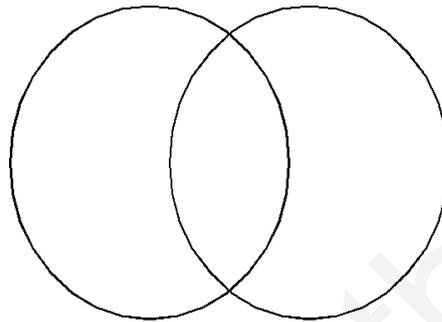
To conclude, research shows that the selection of an appropriate instructional model contributes to effective learning, i.e. inquiry-based instruction for learning Science. Therefore, this is considered to be an important item in the CLELD model which can enhance task orientation and student achievement of CLIL students.

#### 4.2.4.5 Assign meaningful activities – Task-based learning

Several types of meaningful tasks can be assigned in the CLIL class. These include: identifying similarities and differences and generating and testing hypotheses.

Research review has shown that when students are provided with explicit guidance in ‘identifying similarities and differences’ (Marzano et al., 2001: 15), their understanding as well as their ability to use new knowledge is increases. It has been demonstrated that identifying similarities and differences between topics is beneficial for learning (Solomon, 1995). Learners’ understanding and ability to use knowledge is enhanced when similarities and differences are represented in graphic or symbolic form.

Research reports the existence of various ways of identifying similarities and differences. This can be achieved through the process of comparing between things, classifying or grouping similar things into categories, creating a metaphor, i.e. tracing a general pattern in two seemingly different topics, and creating analogies or finding relationships between pairs of elements. The “Venn diagram” (Marzano et al., 2001: 18) could be used for comparisons (Figure: 11).



**Figure 11:** Venn diagram

Venn diagrams allow a visual display of the similarities and differences between two topics. The similarities between two items are placed in the intersection between the two circles whereas the differences are placed outside. Elements can be organized into groups through the process of classification, i.e. the students are provided with the categories into which some elements need to be classified (Figure 12).

Categories

**Figure 12:** Classification graphic organizers (Marzano et al., 2001: 22)

In metaphor construction, two items are linked by an abstract relationship. Similarly, analogies enhance understanding of how dissimilar items are similar by taking the form ‘A:B::C:D’ (read as, ‘A is to B as C is to D’) (Marzano et al., *ibid*: 26). In a teacher-directed analogy task, the teacher could provide students with one part missing within the

four elements of the analogy i.e. “circumference is to circle as perimeter is to .....”(ibid: 27). In a student-directed analogy task, students provide more parts of an analogy than in the previous case.

Generating and testing hypotheses is a powerful cognitive operation. Research shows that learners can approach the particular process in either an inductive or a deductive manner (Marzano et al., 2001). In the first case, one draws new conclusions based on available information. For instance, the learner can first observe how a particular insect behaves and then induce that all insects of this type behave likewise. In the second, someone makes use of a general rule to predict a future event or action (Johnson-Laird, 1983). For instance, when hearing about a particular animal, one can access the generalizations about it from memory, anticipating specific actions and behaviours.

A learning context based on inquiry encourages learners to get engaged in a hands-on investigation or problem, thus promoting observation and information gathering which extend understanding (Borich, 2007).

Inquiry based learning seems to develop both cognitive and linguistic domains emphasizing a number of cognitive processes, such as observing, predicting, hypothesizing, and experimenting. Coonan (2007) investigated 288 log books of secondary school CLIL teachers in Italy and found that problem-solving is preferred as a strategy for learning in CLIL classes.

In sum, research reveals that task-oriented teaching gives rise to better academic results. Task-orientation includes lesson planning which reflects curriculum features, goals which match with instruction, objectives which consider various levels of cognitive complexity, and appropriate instructional models to facilitate achievement of goals and meaningful activities which employ various cognitive processes such, e.g. the identification of similarities and differences and generating-testing hypotheses). Task-orientation is an important key behaviour that can benefit CLIL learners.

#### ***4.2.5 Engagement in the learning process***

The amount of time spent on the learning process indicates the degree of engagement in the learning process. Engagement is closely connected to task orientation as well as to content coverage.

The task-oriented teaching style does not guarantee task engagement. Research in elementary school context shows that real engagement takes place when learners are actively thinking about the activities while they are working on them or when they are using what is presented (Weinstein & Mignano, 1996).

Echevarria et al. (2004) acknowledge the importance of engaging students who are learning content through the medium of L2 in the learning process. Off-task behaviours should be eliminated. Student engagement involves three aspects: allocated time, engaged time, and academic learning time. Allocated time refers to the teachers' decisions concerning the time that should be spent on a task. Engaged time is the time learners are actively engaged in a task during allocated time. When instruction is clear, opportunities are provided to learners to talk about new concepts. Moreover, hands-on activities attract students' attention, keeping them engaged in the learning process. Engagement is maximized when students are involved throughout the allocated time e.g. by using maps, interacting, applying concepts etc. Academic learning time relates to the learners' time-on-task. Fun and creative activities cannot be included in the academic learning time when they are not directly related to the lesson's content and language objectives. Effective CLIL teaching should plan to use the whole teaching period efficiently, providing for activities relating to the target objectives in which children will be engaged.

Student engagement can increase when the teacher monitors the students' work by providing feedback for their progress. Moreover, activities need to be both interesting and manageable. Active participation can be promoted through direct and indirect strategies, various questioning strategies and collaborative learning (Borich, 2007).

Borich (2007) outlines the following indicators of effectiveness regarding student engagement in the learning process. The teacher:

“elicits the desired behavior immediately after the instructional stimuli (e.g. provides exercise or workbook problems with which the desired behavior can be practiced), provides opportunities for feedback in a nonevaluative atmosphere (e.g. asks students to respond as a group or covertly the first time through), uses individual and group activities (e.g. performance contracts, CD-ROMs, games and simulations, and learning centres as motivational aids) when needed, uses meaningful verbal praise to get and keep students actively participating in the learning process (*explains why an answer is correct*), monitors seatwork and frequently checks progress during independent practice (*circulates*)” (p.16).

Both the content itself and the teaching processes need to motivate students. So, activities need to be both meaningful and stimulating (Laar et al., 1989). Opportunities for

distraction should be limited and students need to get to work on, think through, and inquire about the target content.

Student engagement in the learning process can be achieved by promoting interest, e.g. through games, encouraging the use of learning strategies, assigning cooperative work, providing guided practice, reinforcing effort and providing recognition, assessing progress and providing feedback and reviewing new content and language knowledge-summarizing-notetaking. Next, research finding regarding these items is presented.

#### 4.2.5.2 Promote interest – Games

Pupils' engagement in the learning process is positively affected by the use of comprehension games involving new language. This has been showcased in the CLIL classroom (Xanthou, 2006). Content comprehension games could include memory games such as word tennis and football, where students gain points for each correct answer they provide, true-false quizzes, etc.

#### 4.2.5.3 Encourage the use of learning strategies

The EFL objectives should be taken into consideration when teaching content to EFL learners. According to the EFL curriculum of Cyprus, students should be helped to 'communicate effectively..(and) become sensitive to language appropriacy...' (Ministry of Education & Culture of Cyprus, 1994: 175). Therefore, students should use learning strategies to promote their communicative competence as well as construct and use academic knowledge.

Mental strategies are behaviours used by individuals to learn something new. Successful learners use learning strategies to process new information. Echevarria et al. (2004) have carried out a research review where they found that when students use self-regulating strategies learning is improved. Learners can use metacognitive, cognitive and social/affective strategies (O'Malley & Chamot, 1990). Metacognitive strategies refer to monitoring one's thinking, being aware of the learning process, reflecting, and interacting. Garofalo and Lester (1985) hold that metacognition in subjects such as Maths needs to develop by choosing and planning what to do while monitoring the process. Cognitive strategies allow students to organize new information. They relate to how students approach the learning tasks and manipulate target material, e.g. previewing a topic through brainstorming, prior reading, using a graphic organizer or a semantic map, connecting

personal experiences to new information, and discovery learning. When students use strategies to make connections between prior and new knowledge, get involved in problem-solving, and remember information, the learning process is facilitated in a CLIL setting (Echevarria et al., 2004). Activating an individual's existing schemata is likely to enhance learning and retention of new knowledge as new information is connected in the brain through links with prior knowledge (Barnhardt, 1997). Social/affective strategies are used when learners interact, e.g. through cooperative learning tasks.

#### 4.2.5.4 Assign cooperative work

Proponents of the cognitive developmental theory of learning stress that cognitive development occurs in social environments. Piaget (1990) claims that peer discussions promote socio-cognitive conflict, causing a disequilibrium which stimulates the clarification of misconceptions. Vygotsky (1978) holds that learners internalize what is jointly constructed with more competent peers. Understanding is enhanced by mutual exploration of concepts. Knowledge gained in a constructivist environment is based on direct experience and classroom dialogue, so it is more personal, allowing students to transfer it to situations beyond the classroom. In this learning environment teachers are not the information transmitters but facilitators that help learners acquire knowledge by extending their experiences and developing understandings. In this view, collaborative groups may serve to test one's understanding and expand the understanding of certain issues. Thus, the teachers need to know about collaboration, i.e. structuring interactions among learners for more powerful shared learning in order to prepare today's students (Darling-Hammond, 1998).

Assigning group work is considered to be an advantageous teaching strategy of primary school teachers (Kyriakides et al., 2006). The Department for Education and Employment (DfEE) in the UK recommended a format for a typical Mathematics lesson as part of a National Numeracy Strategy. This format suggests that a Mathematics lesson needs to consist of three parts. The first part involves 10 minutes of 'warm-up' activities dealing with mental arithmetic. The next which is the main body of the lesson, introduces learners to the topic. This is done by the teacher who works with the class as a whole. Then, students work in small groups while the teacher provides intensive support to one group a day. The lesson's last part involves a plenary discussion, in which several aspects of the group work can be discussed (DfEE, 1999: Sections 5-6).

Cooperative learning should be carefully designed for maximizing academic gains.

Cooperative activities need to involve teacher-student interaction, student-student interaction, task specialization, materials, role expectations, and responsibilities.

Cooperative learning aims at 'engaging students in the learning process and promoting higher patterns of behaviour' (Borich, 2007: 393). Research outcomes reveal that cooperative learning creates conditions conducive to learning and promotes academic achievement. Research studies revealed the positive outcomes of cooperative learning over individualistic and competitive learning. Comparison of the three types of learning has shown that learners retain more information when they are involved in cooperative learning. Johnson et al. (1981) reviewed 122 studies on cooperative learning structures, and reported that cooperation is more effective than individualistic goal structures and interpersonal competition. The ninth grade students attending Science classes in Humphrey et al.'s (1982) study exhibited greater retention of the new material than their counterparts involved in competitive and individualistic learning experiences. Sherman and Thomas (1986) examined cooperation in high school classrooms, reaching the same conclusion. These findings coincide with the outcomes of the research review of ninety-nine studies examining the effectiveness of cooperative learning, conducted by Slavin (1995). Traditional, teacher-mediated teaching was not as effective as cooperative learning.

Research by Greenwood and Delquadri (1995) has accumulated evidence demonstrating that peer tutoring to weak learners led to faster, more effective student learning outcomes than teacher-mediated instruction. The at-risk first-graders being involved in peer tutoring exhibited long term benefits, compared to low achievement students in control groups, indicating that cooperative learning is an effective approach.

There is converging evidence suggesting that cooperative learning promotes academic achievement. Students exhibit higher achievement in cooperative learning structures. Research synthesis of pertinent studies demonstrated that cooperative learning promotes the learners' productivity and affects positively the students' academic achievement (Johnson, et al. 1998 – in college; Johnson & Johnson, 1999). The positive effect on students' achievement was revealed by the meta-analysis carried out by Johnson et al. (2000). Research synthesis of studies related to effective teaching methods by Marzano et al. (2001) revealed the effectiveness of cooperative grouping strategies in promoting learning. These strategies allow peer interaction. So, children help each other to achieve

goals. The smaller the size of cooperative groups the more effective they are. The researchers note that systematic application of cooperative learning is likely to promote its effects. However, the overuse of this strategy may inhibit the individual development of certain skills. Besides, some children may need time to work quietly on their own.

Research review carried out by Koutselini & Theophilides (1998) revealed that cooperative learning affects positively students' academic development. This happens because students' involvement is raised. Students' engagement with the task is maximized allowing opportunities for repeatedly checking concept learning, thereby achieving higher levels of performance (Singhanayok and Hooper, 1998).

Tellez and Waxman's research synthesis of qualitative studies (2006) revealed that communitarian teaching which extend beyond cooperative learning are effective in promoting language learning. The broader view of cooperative learning addresses the importance of social interactions while performing group tasks in language learning. The term communitarian learning has been chosen first by Kahne in 1996 to emphasize the social aspects of language learning (Tellez and Waxman, 2006). In order to achieve communitarian knowledge-building, a shared goal needs to be pursued through conditions promoting genuine dialogue.

Learners' language development is also enhanced as they have more opportunities to talk in the group than in a lecture-based lesson. They can form hypotheses, state disagreements, ask for and provide explanations, and summarize. Discussion allows clarification of one's own and others' ideas, reorganizing information and correcting misconceptions thereby fostering academic achievement for students of all ability levels (Norman 1986; Chi et al., 1994; Calderon et al., 1998; Lyle, 1999; Hirvela, 1999). Moreover, students have the opportunity to get involved in discussions in order to carry out a task, thereby using language meaningfully. Their output production increases while negotiating input through paraphrasing and repeating (Pica, 1994; DiCamilla & Anton, 1997; Rydland & Aukrust, 2005 ).

The benefits of cooperative learning seem to hold for all proficiency levels and for all subject areas (Johnson et al. 1983; Bossert, 1988). Children use one another as resources for enriching content and correcting mistakes (Pica & Doughty, 1985; Porter, 1986; Urzua, 1987; Meyer et al., 1994; Vine, 2003). Cooperative activities require the participation of

all group or pair members to carry out a task, allowing each member to do something according to one's abilities.

Learning content and language in CLIL classrooms can be enhanced when cooperative learning is employed. A research project undertaken by the U.S. National Centre for Research on Cultural Diversity and Second Language Learning identified cooperative learning as an effective instructional strategy used by CLIL teachers in middle school Social Studies classrooms (Short, 1994). This strategy enhanced content comprehension. Cuevas (1984) has developed the Second Language Approach to Mathematics Skills (SLAMS). The approach proposes the use of activities which address Mathematics content knowledge and language development. Instructional activities need to be based on various approaches, such as small-group work and individual tasks.

Group work in CLIL classes has been found to provide opportunities for promoting both content and language learning (Gibbons, 1998; 2003). The children in Gibbons's studies participated first in small-group learning experiences in CLIL Science classes. A teacher-guided reporting session followed and the lessons ended up with a writing activity. Group work promoted language and content learning by providing opportunities to exchange and extend knowledge. Peer interaction provided opportunities to request and provide information, make observations, seek clarifications and draw conclusions.

Crandall (1993) presents cooperative learning as a sound instructional strategy that fits into the CLIL paradigm as it 'promotes authentic language use' (p.117). Cooperative learning has been found to be an effective instructional strategy used by CLIL teachers in middle school Social Studies classrooms, as it 'encourages students to interact; in the process, they share their insights, test hypotheses, and jointly construct knowledge' (p.117). Coonan's (2007) three year study with secondary school CLIL teachers in Italy revealed the teachers' tendency to prefer pair and group work rather than individual work. Teachers reported in the interviews that pair/group work occupy 30 – 70% of the time. Teachers' logs confirmed the use of pair-group work and less so cooperative learning.

Cooperative reading in primary school content-based learning can promote both concept understanding and L2 vocabulary learning. Klingner and Vaughn (2000) investigated the frequency by which bilingual students helped each other and their limited proficient peers in a fifth-grade elementary school Science class while reading collaboratively. Learners

assisted one another in understanding word meanings and getting the main idea. Their score on English vocabulary tests improved significantly from pre- to post-testing indicating that the social interaction that took place, enabled cognitive development. Similar findings have been reported by Xanthou (2006) who showed the benefits of collaborative strategic reading in CLIL primary school classes.

To sum up, research verifies that cooperative learning can be a valuable instructional tool in the CLIL class that could benefit learners. Hence, it is an important item of the CLELD model that can promote students' engagement in the learning process and enhance learning.

#### 4.2.5.5 Provide guided practice

Practicing has been found to be an effective instructional strategy (Marzano et al.: 2001). Eliciting the desired behaviour by engaging learners personally in the learning process at the appropriate level of difficulty is another important instructional event. The teacher needs to stimulate attempts of producing the desired behaviour. Learners need to get involved in “summarizing, paraphrasing, applying, or solving a problem involving the lesson content” (Borich, 2007: 143). Students can be encouraged to apply what has been learned through questions, verbal or written exercises etc. Responses at this stage do not need to be accurate. The importance is managing to elicit responses. Eliciting activities need to be simple and nonevaluative in order to avoid the anxiety of being tested. For instance, students could write the answers while the teacher circulates or check them with a peer, learners who do not raise hands could be prompted to answer etc.

Research synthesis in cognitive psychology related to practice reveals that a certain amount of practice is necessary in order to master a skill. Noteworthy, while students need some practice to reach a fair level of competence in a skill, the increase in competence is less each time. Marzano et al. (2001) report that “the first four practice sessions result in a level of competence that is 47.9 percent of complete mastery. The next four practice sessions, however, account for about a 14-percent increase only (pp. 67-68). Thus, learning does not happen automatically. Practice seems to be required in order to perform with accuracy. Practising at initial stages does not need to be carried out fast in order to allow learners to focus on the reasoning process. Premature engagement with lots of examples may not bring positive results. Moreover, practice assignments need to focus on certain aspects of a skill or process which learners need to develop.

The instructional events suggested by Gagné and Briggs (1979) bear resemblance to the phases of a CLIL lesson designed for limited English proficient students prepared for mainstream instruction, as proposed by Chamot and O'Malley (1987). According to Chamot and O'Malley (1987), lessons could be divided into the following phases: "Preparation, Presentation, Practice, Evaluation, and Follow-Up Expansion" (p.245). During the first phase, students have a chance to look at advance organizers about the lesson and report prior knowledge of the topic. Presentation follows where teachers use techniques in order to provide new information in a comprehensible way. During the practice phase, students apply learning strategies. Next, learners evaluate their individual learning, while in the follow-up expansion phase they apply new information to their lives.

Practising should reflect task-orientation. Mastery of content knowledge can be attained via hands-on materials for practising new knowledge, applying content and language knowledge, and integrating all language skills (Echevarria et al., 2004). Hands-on materials including manipulatives enhance practice sessions in a CLIL class. When planning lessons considering hands-on practice the teacher should divide material into meaningful parts. New knowledge should be practised through several activities carried out close together and children should be given feedback, e.g. paper-and-pencil practice. Connections between abstract and concrete concepts are more effectively made when students use all language skills. Integration of language skills is important because the language skills are processes that are found in an integrated manner in our daily lives, e.g. talking about something we have written.

Research findings suggest that practice is a necessary component for academic achievement. Thus, CLIL teachers need to create opportunities for EFL learners to practise all four language skills in an integrated way. Practising and applying new knowledge 'through multiple language processes' (ibid: 121) meets the needs of students for different learning styles.

#### 4.2.5.6 Reinforce effort and provide recognition

This instructional strategy does not seem to directly engage students' cognitive skills. To be more precise, reinforcing students' efforts has to do with learners' "attitudes and beliefs" (Marzano et al., 2001: 50). Rewarding may raise their level of motivation. Laar et al. (1989) are convinced that "the most effective teachers tend to be constantly encouraging the learner, and finding ways to reward effort" (p.27). This has been confirmed by the

research of Mortimore (1991) who investigated the factors contributing to school effectiveness in the primary sector. One of these factors is positive reinforcement which has been found to enhance achievement.

Harter (1980) has demonstrated the positive impact of believing in effort on student achievement. When students believe they are not able to carry out a task successfully, they are likely to self-fulfil their predictions (Covington, 1983). The opposite conviction arms the learner with a great motivational tool. Research synthesis by Marzano et al. (2001) has shown that many students do not realize that effort raises achievement levels. Therefore, teachers may need to tell their students about the impact of the effort belief.

Research uncovers an optimistic note related to the effort belief. Learners can easily learn to change their beliefs about the importance of effort. Student achievement has been found to be enhanced when more effort is employed. This implies that teachers may need to explain the link between added effort and increased achievement.

A number of research studies on providing recognition using praise demonstrate that it decreases intrinsic motivation of elementary school students (Brophy, 1981, Morine-Dersheimer, 1982). However a careful research review uncovers that intrinsic motivation is not necessarily decreased by rewards. Interestingly, it has been shown that the researchers' conclusions were affected by the way intrinsic motivation was measured. For instance, Cameron and Pierce (1994) carried out a meta-analysis of 96 experimental studies in this area, and concluded that when the level of intrinsic motivation is measured by examining the learners' free-time activity (namely being engaged in the activity without being told to do so), a negative effect of  $-.04$  is shown. That is, when praise is provided, learners are not likely to spend much time on the activity during their free time. On the contrary, when it is measured by investigating students' attitudes, rewards are shown to promote intrinsic motivation having an average  $.14$  effect size. This means that the average student exposed to reward scored  $0.14$  standard deviations above the scores of the average student who was not exposed to this treatment. Wiersma's meta-analysis (1992) suggests that students' performance ability on the activity being rewarded shows a positive impact of reward, indicating that praise can provide encouragement and support, especially when it is made contingent on effort (Brophy, 1981).

Research has shown that reward works much better if it is provided when some standard of performance has been attained (Marzano et al., 2001). This implies that when a teacher promises rewards simply for carrying out an activity it may not be as effective as when providing rewards for successful task completion.

Another conclusive remark coming from research synthesis is that “abstract symbolic recognition is more effective than tangible rewards” (Marzano et al., 2001). A great number of studies showing negative outcomes for rewarding dealt with tangible rewards such as candy and money. On the contrary, research shows that abstract and symbolic rewards produce better results. More specifically, verbal rewards on students’ attitudes have an effect size of .42 on intrinsic motivation. In contrast, tangible rewards have an effect size of .04 (Cameron and Pierce, 1994). It appears then that the provision of abstract rewards for successful performance can motivate students.

Marzano et al. (2001) provide some suggestions regarding the provision of recognition. First, recognition needs to be made personal. Public personal recognition is found to promote learning. Second, providing recognition can follow some steps. When students face a difficulty with a task, the teacher can ask them to stop for a while. A suggestion can be provided on how to improve and then praise can be given if the student has improved performance having considered the suggestion. Last, offering specific symbols of recognition such as stickers, coupons, treats and awards does not necessarily lower the level of intrinsic motivation as long as these are given for having achieved performance goals.

Research suggests that effort reinforcement could enhance the efforts of the students. Thus, it should be taken into consideration in the CLIL class in order to improve the students’ involvement in the lesson.

#### 4.2.5.7 Assess progress and provide feedback

Provision of feedback in a straightforward manner is likely to promote learning by enhancing students’ metacognitive skills and direct students’ attention on specific aspects of what is being studied (Marzano et al., 2001). It is thus considered by primary school teachers to be an effective teaching practice (Kyriakides et al., 2006).

Research synthesis has shown that feedback enhances achievement. Hattie (1992) has analyzed nearly 8000 studies reaching the conclusion that feedback improves educational outcomes. Marzano et al. (2001) have drawn four generalizations regarding how feedback could be used. First, feedback needs to be “corrective” (p.96) in nature. Learners need to be given an explanation about why what they are doing is correct or why it is not. It has been shown that students need to be informed about what is correct in their answer or what is inaccurate. Second, feedback needs to be timely. It should be given right after a test. Third, feedback should reference a specific criterion. Unlike norm-referenced feedback which informs learners about their achievement as compared to other learners, criterion-referenced feedback informs learners where they stand regarding a goal. The latter type of feedback has been shown to have more positive impact on student learning. Finally, ‘student-led feedback’ (ibid: 101) may need to be part of a student’s feedback process. Research suggests that students are able to provide feedback on their progress. This can take the form of self-evaluation. Countryman and Schroeder (1996) have attested the usefulness of feedback in the classroom.

Scheerens (1992) avers that “frequent assessment of progress is effective in the attainment of learning results in the basic school subjects” (p.45). Students’ progress needs to be assessed in order to examine whether to re-teach or to move on. This is an informal type of assessment. It involves opportunities for finding out whether students have learnt content. These may involve “teacher observations, anecdotal reports, teacher-to-student and student-to-student conversations, quick-writes and brainstorming” (Echevarria et al., 2004: 148) and, in general, tasks during lesson delivery which are not evaluated.

Providing feedback is connected to the eliciting event in terms of the time that should be given. Responses to wrong answers need to be provided in an encouraging manner. Students should not be penalized for wrong responses. Comments such as “That’s a good try” (Borich, 2007: 144) may stimulate more accurate responses. Feedback can be given to individual students, small groups and to the whole class. A learner’s correct response could be anonymously reported to the class. Correct answers in written form could be read aloud. The correctness of the individual performance could be acknowledged with simple nods or smiles. The teacher could sit with a group and discuss answers. Alternatively, the groups could be given the answer keys after they have finished. Several students could also read their answers aloud. Answer keys could be shown on a handout, a transparency or on the board. Elicitation activities and feedback do not always have to be provided in a

single teaching period. Research papers and other products such as projects could be returned some days later.

Assessing students' progress is vital for their progress. Thus, it should be considered in the development of the CLELD model in order to promote CLIL students' achievement.

#### 4.2.5.8 Reviewing new content and language knowledge, Summarizing, Notetaking

Learners need to review target content and language knowledge in order to retain it in long-term memory. This can be done through drawing up semantic maps, showing pictures for concepts, completing sentences and taking notes of what they have learned.

Research review in cognitive psychology shows that when students summarize, they omit certain information, while some other information is kept or substituted (Marzano et al., 2001). It is concluded that the processes of selecting important information and deleting unimportant details require a deep level analysis of information.

Reviewing new content and vocabulary can contribute to student engagement in the learning process. CLIL teachers need to determine whether learners have learned key vocabulary and content concepts. Students with limited English proficiency may not easily distinguish which information is most important to retain. So, the teacher needs to review and summarize important concepts during and at the end of a lesson. Feedback needs to be provided through clarification. Echevarria et al. (2004) stress that effective review in a content class where learners are taught through L2 can be achieved when key vocabulary and key content concepts are reviewed and feedback is provided on learners' output.

Reviewing key vocabulary can be done through paraphrasing. Multiple exposures to new words are required to help students retain them. Techniques such as drawing up semantic maps of the new words may be beneficial. Reviewing vocabulary can be done through drawing a picture for a concept, and playing pictorial (where someone draws a concept and the others find it), or demonstrating the meaning through gestures or/and acting out.

Reviewing key content concepts is equally important in a CLIL class. The teacher can scaffold understandings when summarizing the key content and which has been covered up to a point. Students can complete outcome sentences either orally or in journals. Listing key points on the board forms another type of review. These should better focus on main

content concepts. Final review guides the teacher's decisions about future steps, e.g. re-teaching, assessing etc. Reviewing vocabulary and content helps teachers provide feedback on learners' output, clarifying and correcting misunderstandings. Supportive feedback may enhance learners' L2 proficiency. In response to a student's grammatically or lexically wrong response, the teacher can restate the answer correcting the mistake. Feedback can be provided "orally", "in writing" or "through facial expressions and body language" (ibid: 148), e.g. nod, smile or encouraging expression. Students can also provide feedback to each other.

Reciprocal teaching proposed by Palinscar and Brown (1984) is an effective strategy for summarizing (Rosenshine & Meister, 1994). Four components are involved in this strategy: "summarizing, questioning, clarifying, and predicting" (Marzano et al., 2001: 42). During summarizing, one learner summarizes what has silently or orally been read. Questioning follows, during which the student asks questions in order to elicit important information. Confusing points are then clarified by asking classmates to clarify parts of the passage, e.g. by rereading. Finally, the learner requires predictions about what will follow in the text.

Learner needs to decide on which elements are important. Research has shown that verbatim note taking is the least effective way to take notes (Marzano et al., 2001: 43). When learners try to record everything, they are not likely to get involved in synthesizing information. Learners' working memory is devoted to information recording, leaving no space for analyzing new information. Students need to be encouraged to continue adding to the notes as their understanding increases. These notes can be used for test preparation, providing a strong review for advanced learners (Carrier & Titus, 1981).

Assigning homework could help children enhance their understanding of the content which was presented to them in the classroom. However, research in this field is not yet conclusive. For instance, Cooper (1989) carried out a meta-analysis of studies finding a small effect of homework for elementary school pupils. However, more recent work by Cooper et al. (1999) reveals beneficial outcomes for elementary school students as low as second grade. Unfortunately, the amount of homework which needs to be assigned has not yet been answered by research.

Research shows that reviewing new content and language, summarizing and notetaking can promote students' engagement in the learning process. Thus, they are very important for CLIL learners in order to enhance academic learning.

#### ***4.2.6 Moderate-to-high success rate***

Success rate is another effective teaching behaviour. It relates to the rate at which learners comprehend and finish their assignments. The levels of difficulty which can be discerned in a lesson are those of high success, moderate success and low success. In the first case, the student makes only careless errors because s/he comprehends the material presented, in the second case the learner has partial understanding, while in the third, little or no understanding exists. Research review by Borich (2007) reveals that "instruction that produces a moderate-to-high success rate results in increased performance" (p.16). This happens because content coverage takes place at the students' level of understanding. It has been shown that when learners deal with high success activities which allow understanding the task and having low error rates, higher achievement scores are reached and more positive attitudes are developed. Therefore, it is suggested that learners should spend 60-70% of their time on activities which allow moderate-to-high levels of success. Moderate-to-high success rates create a constructivist classroom environment conducive to learning the target content as the learners are given opportunities to experience knowledge by applying what has been learned, comparing, problem-solving and thinking critically about new content.

Borich (2007) has set the following indicators of teacher effectiveness related to the key behaviour moderate-to-high success rates:

"establishes unit and lesson content that reflects prior learning..., administers correctives immediately after initial response (e.g. shows model of correct answer and how to attain it after first crude response is given), divides instructional stimuli into small chunks..., plans transitions to new material in easy to grasp steps..., varies the pace at which stimuli are presented and continually builds toward a climax or key event" (p.18).

The moderate-to-high success key behaviour included in the CLELD model involves three items: sequencing lessons based on prior learning, planning transition to new material in manageable steps, and providing instruction which produces moderate-to-high success rate.

#### 4.2.6.1 Sequence lessons based on prior learning

A moderate-to-high success rate can be achieved only when there is a good unit planning and a logical sequence of lessons, thereby taking into consideration earlier learning on which new knowledge will be built. Each lesson should be designed and delivered as a logical extension of the previous lesson. Lessons need to be arranged in a logical order that helps achieving unit objectives. Borich (2007) adds that the teacher can apply a student's idea to teach an inference or move to the next step in a problem analysis.

The CLIL model proposed by Echevarria et al. (2004) identifies the importance of linking concepts to students' background knowledge. Explicit links are provided which preview a topic that will be presented (e.g. 'Have you ever seen ...?'). Direct links to the target content may follow (e.g. 'Today we're going to read about...', 'Does the ...that you know look like the one in your textbook?'). Gibbons (2002) stresses the importance of accessing prior knowledge about a topic in order to build new knowledge. She suggests the use of questions, pictures, photographs, interviewing, picture and sentence matching, semantic webs and a word wall.

#### 4.2.6.2 Plan transition to new material in manageable steps

Lesson should be divided into small and manageable pieces. This may enable learners to comprehend new content.

#### 4.2.6.3 Instruction produces moderate-to-high-success rate

Students should spend more than the average time in high-success activities. According to Borich (2007) learners need to 'spend about 60% to 70% of their time on tasks that allow almost complete understanding of the material being taught' (p.16). Errors need to be only occasional. If a moderate-to-high success rate is reached, mastery of the content can be achieved.

To sum, research uncovers that the success rate can influence students' performance. A moderate-to-high success rate influences comprehension and successful task accomplishment. It is a vital key behaviour included in the CLELD model which can help CLIL students to promote their academic achievement.

#### 4.2.7 Summary

Research review which included synthesis and meta-analysis of research studies in the area of subject matter teaching has demonstrated the effectiveness of five key behaviours: lesson clarity, instructional variety, task orientation, engagement in the learning process and moderate-to-high success rate. A number of strategies can be employed in the CLIL class in order to follow successfully these key behaviours and promote learning.

- Lesson clarity can be achieved by informing learners of the objectives in order to allow them to activate retention processes on target aspects of knowledge, building new learning on prior knowledge, thereby creating strong connections in memory and providing differentiated instruction in order to address the learning styles of all learners.
- Instructional variety requires the use of various modes of presentation, i.e. individual, pair and group work, various types of questions, i.e. both lower and higher-order questions and various classroom climates, i.e. competitive, cooperative, individualistic.
- Task orientation can be achieved when the teacher develops lesson plans following curriculum features, matches goals with instruction, considers objectives at various levels of cognitive complexity in order to achieve deep learning, selects appropriate instructional model, i.e. direct and indirect, and assigns meaningful activities, i.e. identifying similarities - differences and generating - testing hypotheses.
- Engagement in the learning process can be achieved by promoting students' interest, i.e. through memory - comprehension games, encouraging the use of learning strategies, i.e. cognitive and comprehension strategies, assigning cooperative work which allows learners to jointly construct knowledge with peers, providing guided practice in order to facilitate students to master the new skills, reinforcing effort and providing recognition in order to positively affect attitudes, assessing progress and providing feedback for directing learners' attention to target aspects of learning and reviewing new material - summarizing - notetaking in order to enable retention of new knowledge.
- Medium-to-high success rate can be achieved when the teacher sequences lessons based on prior learning, plans transition to new material in manageable steps to enable learners comprehend new content, and provides instruction which produces moderate-to-high success rate in order to allow students to exhibit comprehension and experience success.

Research evidence shows that by taking into account the above key behaviours in subject matter delivery, the possibilities for raising students' academic achievement increase. Therefore, the teachers need to employ these key behaviours in CLIL teaching for promoting learning outcomes.

### **4.3 Purpose of the study**

Crandall (1993) calls for research investigating 'the effectiveness of integrated instruction, specifying optimal conditions for various programmatic effects ... the relative effectiveness of different programme models, and the use of various instructional strategies, ... and assessment measures' (p.119). The design and implementation of CLIL programmes needs to be guided by research. However, gaps exist in the research base of this area (Freeman, 1998). In response to this call, the present study aims to develop and investigate the effectiveness of a CLIL lesson delivery model for elementary school classes (CLELD) which could enable teachers to help students learn content and simultaneously develop their L2 proficiency.

The model provides an approach to lesson delivery which is designed to accommodate the learning styles and affective needs of the pupils of primary school age as well as their cognitive stage of development. Moreover, it will investigate whether or not educators who use this model for lesson planning have a positive outlook on their lesson delivery.

### **4.4 Statement of the problem**

Primary school teachers are confronted with the challenge of implementing CLIL type teaching for potential content and language benefits (European Commission, 2005 a,b). Van de Craen et al. (2007) assert that CLIL can be beneficial for learners, the prerequisite being that the programmes should be carefully conceptualized. Meeting this aim requires the development of a CLIL lesson delivery model which is likely to facilitate the effective implementation of CLIL. Such a model should draw from effective methods and practices for subject matter teaching as well as theory and practice of EFL learning. As Short (2002) advocates, CLIL instruction is effective when it 'draws from and complements effective methods advocated for regular classrooms but adds specific strategies for developing English language skills' (p.18).

However, a guiding model illustrating successful processes in CLIL implementation in elementary school settings is absent (Met, 1998). The development of such a model is needed to ensure positive outcomes of CLIL type provision such as development of L2 vocabulary knowledge while accessing the curriculum in subject matter areas (Mehisto & Asser, 2007). The next section presents the research questions.

#### **4.5 Research questions**

The questions framing the study are the following:

1. Does the use of the Content and Language Integrated Learning (CLIL) for Elementary classes Lesson Delivery Model (CLELD) contribute to English language learners' (ELLs) vocabulary development?
2. Does the use of the CLELD Model promote subject matter learning of English language learners (ELLs) in the content areas of Social Studies, Science and Mathematics?
3. Does CLIL lead to better language proficiency in the area of L2 vocabulary knowledge as compared to traditional learning through L1? Are there significant differences in L2 vocabulary acquisition for pupils attending CLIL classes following the CLELD model with Language Enhancement Activities (LEA) versus pupils in CLELD without LEA classes?
4. Does CLIL lead to better subject matter knowledge as compared to traditional learning through L1? Are there significant differences in subject matter learning for pupils attending CLIL classes following the CLELD model with LEA versus pupils in CLELD without LEA classes? (Geography, Science, Maths)
5. Do ELLs receiving CLIL instruction with the CLELD model have positive attitudes towards this approach?
6. Do the elementary school teachers who use the CLELD model for lesson planning consider their teaching more effective than when not using it?
7. How can CLIL contribute to linguistic theory?

## 4.6 Hypotheses

The following hypotheses are explored in this study:

1. There is a significant relationship between the use of CLELD as a planning instrument in the primary school CLIL classroom and pupil L2 vocabulary development.
2. There is a significant relationship between the use of the CLELD model as a planning instrument in the primary school CLIL classroom and student academic achievement in content subjects (Social Studies, Science, Mathematics).
3. CLIL leads to better language proficiency in the area of L2 vocabulary knowledge as compared to traditional learning through L1. However, the use of the CLELD model with LEA in CLIL instruction leads to better language proficiency as compared to CLELD without LEA.
4. CLIL leads to better subject matter knowledge as compared to traditional learning through L1. However, the use of the CLELD model with LEA in CLIL instruction leads to better subject matter knowledge as compared to CLELD without LEA.
5. Teachers who use the CLELD model with LEA for lesson planning will consider their teaching more effective than when they use the CLELD model without LEA.
6. English language learners receiving CLIL instruction with the CLELD model have more positive attitudes towards this approach than when instructed with the CLELD model without LEA.
7. CLIL can illuminate linguistic theory by providing information about the interactive nature of language learning. This development is highly influenced by prior and later learning associations as well as motivation and reinforcement.

## 4.7 The importance of the study

Vocabulary development is perhaps the most vital aspect in foreign language acquisition for the reason that ‘without grammar little can be conveyed, without vocabulary nothing can be conveyed’ (Wilkins, 1972: 111). Therefore, an effective approach in promoting L2 vocabulary proficiency to the greatest extent may prove extremely useful for education systems which place emphasis on students’ plurilingual development.

This study seeks to investigate whether the use of a specific content and language integrated lesson delivery model for elementary classes (CLELD), developed by the researcher, can be used as a lesson planning tool providing English language learners (ELLs) with vocabulary enrichment to the fullest possible extent as well as opportunities for developing subject matter knowledge effectively. This research is the first attempt to test the model's efficacy in promoting content and L2 vocabulary knowledge in CLIL classes.

A very small percentage of teachers in Cyprus use CLIL on a voluntary basis. The absence of a specific approach offering guidelines for CLIL implementation especially designed for primary school children may inhibit students' L2 development while attention to content delivery is heightened. If the CLELD model is found to be an effective lesson planning tool for L2 vocabulary enhancement it may prove to be a useful guide for teachers demonstrating successful strategies for delivering content and simultaneously developing L2 vocabulary knowledge. High quality lessons could then be implemented addressing both content and language needs of the learners and hence maximizing students' learning time in the CLIL class. The model could provide information for Curriculum development regarding sequencing of lessons, time allocation for each unit, theoretical background for lesson design and practical suggestions for lesson planning.

In the following chapter the investigative framework of this study is described.

## CHAPTER 5: METHODOLOGY- RESEARCH DESIGN

The current study attempts to answer the following research questions:

1. Does the use of the Content and Language Integrated Learning (CLIL) for Elementary classes Lesson Delivery Model (CLELD) contribute to English language learners' (ELLs) vocabulary development?
2. Does the use of the CLELD Model promote subject matter learning of English language learners (ELLs) in the content areas of Social Studies, Science and Mathematics?
3. Does CLIL lead to better language proficiency in the area of L2 vocabulary knowledge as compared to traditional learning through L1? Are there significant differences in L2 vocabulary acquisition for pupils attending CLIL classes following the CLELD model with Language Enhancement Activities (LEA) versus pupils in CLELD without LEA classes?
4. Does CLIL lead to better subject matter knowledge as compared to traditional learning through L1? Are there significant differences in subject matter learning for pupils attending CLIL classes following the CLELD model with LEA versus pupils in CLELD without LEA classes? (Geography, Science, Maths)
5. Do ELLs receiving CLIL instruction with the CLELD model have positive attitudes towards this approach?
6. Do the elementary school teachers who use the CLELD model for lesson planning consider their teaching more effective than when not using it?
7. How can CLIL contribute to linguistic theory?

The study employs both a qualitative and a quantitative methodology in order to ensure triangulation of data provided by the various sources, namely presenting data from more than one source (Sanger, 1996).

### **5.1 Instrumentation: (a) Quantitative Measurements**

#### ***5.1.1 Quasi-experiments***

Quasi-experiments were set up, in which data were collected from genuine classrooms which were formed for teaching purposes, not for the research (Singleton and Straits, 1999). Although intervention and control groups were used, assignment of students to

groups was not randomized. Intact groups of sixth grade classes of subjects were involved in the experiment as it was not practicable to rearrange students into different groups. This would have raised objections on the part of the students and their parents as the former would be separated from their friends for an entire school year. Therefore, a quasi-experiment was carried out. Cook and Campbell (1979) hold that a quasi-experiment is valuable in developing and analyzing a study in field setting. Classes were randomly assigned into control and experimental groups.

The aim was to examine the relationship between the independent variable, i.e. teaching method and the dependent variable, i.e. test scores on vocabulary and content knowledge. The independent variable was expected to influence the dependent variable.

#### 5.1.1.1 The setting

CLIL was implemented in five urban state primary school sixth grade classes of two towns of the Greek Cypriot community of Cyprus during the school year 2007-2008, after having obtained permission from the Ministry of Education and Culture (Appendix I).

Six experiments were conducted in order to examine the effectiveness of learning content and language through CLIL following the CLELD model at three different subjects. Three of the experiments were carried out by the researcher who implemented CLIL in Geography, Science and Maths. The other three experiments were carried out by three teachers each one of whom repeated one of the experiments carried out by the researcher in order to enhance external validity of outcomes; the first teacher repeated the Geography experiment, the second one the Science experiment while the third teacher carried out the Maths experiment (Figure 13). All the teachers strictly adhered to the written lesson plans in order to control for any potential effect of teacher bias for a particular method.

<b>A: L1</b>	<b>CLIL+CLELD without LEA</b>	<b>CLIL+CLELD+LEA (Geography)</b>
<b>B: L1</b>	<b>CLIL+CLELD –LEA</b>	<b>CLIL+CLELD+LEA (Science)</b>
<b>C: L1</b>	<b>CLIL+CLELD –LEA</b>	<b>CLIL+CLELD+LEA (Maths)</b>
<b>D: L1</b>	<b>CLIL+CLELD –LEA</b>	<b>CLIL+CLELD+LEA (Geography)</b>
<b>E: L1</b>	<b>CLIL+CLELD –LEA</b>	<b>CLIL+CLELD+LEA (Science)</b>
<b>F: L1</b>	<b>CLIL+CLELD –LEA</b>	<b>CLIL+CLELD+LEA (Maths)</b>

**Figure 13:** The six quasi-experiments of the study

Each experiment aimed to compare teaching content through three different approaches. Therefore, each teacher had to teach the same content to three different classes. The Geography and Maths experiments included five 40 minute lessons each, while the Science experiment included three 80 minute lessons.

Since the teacher was considered to be an important factor that would influence the outcomes, the same teacher was selected to teach through the three different approaches. Moreover, the students of each experiment belonged to the same socioeconomic background. Thus, all the teachers who carried out the experiments worked in big urban schools housing more than two 6<sup>th</sup> grade classes. There was a limited number of such schools, out of which some have already been involved in a pilot CLIL implementation project (Pavlou & Ioannou-Georgiou, 2007), and hence they were excluded. In the remaining candidate schools, either the subject matter teachers were not willing to participate in the research or the head did not grant permission for the experiment. This situation left only five urban state primary schools available for the study in the two towns for which permission was granted.

Effort was made to find subject matter teachers to provide CLIL instruction. Since subject matter teachers of the schools were not offered an EFL course during their pre or in-service training, they did not feel confident or willing to participate. Added to this, teachers in state primary schools do not teach a subject such as Maths to more than one class, Science teachers do not feel confident or fluent to teach through English and none of the schools involved in the study had a teacher who taught Geography in all three classes of each big school. Therefore, the teachers participating in the study were EFL teachers of big urban schools having access to three different classes in order to control for the potential effect of having different teachers. Each teacher undertook the task of teaching the CLIL lessons to three different 6<sup>th</sup> grade classes.

The researcher carried out a Geography, a Science and a Maths experiment. For each experiment, content was taught to three different classes of the same school in order to compare three different methods: teaching through L1, CLIL with CLELD without Language Enhancement Activities (LEA) and CLIL with CLELD with LEA. The second Maths experiment was taught by another teacher to three different classes of an urban school. The three target groups for the second Geography experiment were taught by the same teacher. However, one of the groups attended a nearby school as access to the third

6<sup>th</sup> grade class of the first school was not possible; they had a different EFL teacher. A different teacher carried out the second Science experiment. The three target groups of the second Science experiment attended the same school. The two CLIL groups were taught by the same teacher, while the group taught through L1 was assigned by another teacher as the school head did not allow more changes in the timetable and the school Science teacher was not willing to undertake CLIL instruction. The five 40-minute Maths lessons and five 40-minute Geography lessons were carried out twice a week while the three 80-minute Science lessons were carried out once a week. The lessons for each subject lasted three weeks.

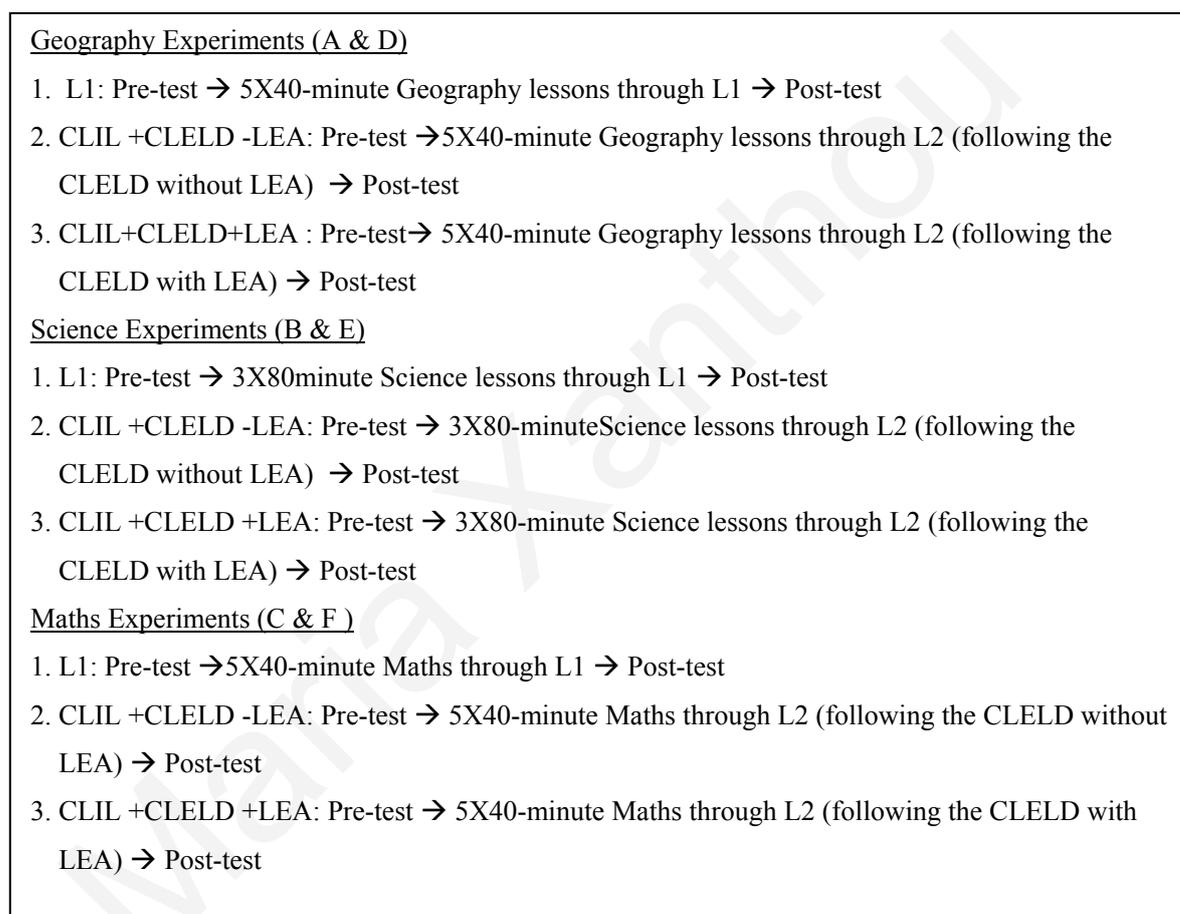
#### 5.1.1.2 The experimental and control groups

The experimental study involved two hundred and seventy three 11 year old pupils – 6<sup>th</sup> graders - attending five urban state schools in Cyprus. Children had been studying English in the public school for three years. Each experiment involved the comparison of three intact 6<sup>th</sup> grade classes being randomly assigned into one control and two experimental groups. Three of the six experiments were carried out by the researcher while the other three experiments were carried out by three other teachers. The children involved in each experiment were distributed in the three groups as follows:

- Experiments A, B, and C: involved the same 70 pupils  
Control group: 21 pupils  
CLIL+CLELD without LEA group: 25 pupils  
CLIL+CLELD with LEA group: 24 pupils
- Experiment D: involved 66 pupils  
Control group: 20 pupils  
CLIL+CLELD without LEA group: 26 pupils  
CLIL+CLELD with LEA group: 20 pupils
- Experiment E: involved 56 pupils  
Control group: 18 pupils  
CLIL+CLELD without LEA group: 18 pupils  
CLIL+CLELD with LEA group: 20 pupils
- Experiment F: involved 72 pupils  
Control group: 24 pupils  
CLIL+CLELD without LEA group: 25 pupils  
CLIL+CLELD with LEA group: 23 pupils

The small numbers of subjects involved in the control and experimental groups could not guarantee that they were equivalent. Likewise, “individual differences between subjects could ‘mask treatment effects’” (Robson, 1999: 96). For this reason, an experimental pre-test – post-test control group design was employed in order to control initial differences between the experimental and control groups (Nunan, 1992; Bell, 1999).

Pre-tests were used as a covariate in data analysis to adjust for the pre-test effect and produce a corrected measure of the effects of the two CLIL methods. The following figure illustrates the procedure followed:



**Figure 14:** The experimental design of the study

The L1 groups are the control groups which were taught content through L1. The CLIL +CLELD without LEA groups are the experimental groups which were taught content through L2 following the CLELD model without LEA. The CLIL+CLELD with LEA groups are the experimental groups which were exposed to CLIL instruction following the CLELD model with Language Enhancement. Prior to treatments, the children were administered L2 vocabulary and subject matter knowledge pre-tests and on completion of the units they were administered post-tests. These were exactly the same as the pre-tests

aiming to determine the growth of the learners' vocabulary knowledge as well as their content knowledge. The results of the pre-tests and post-tests were calculated and compared in order to examine which approach enables the children to show more growth in L2 vocabulary development as well as in content knowledge. Delayed vocabulary tests were administered three months after treatment in order to examine whether knowledge was retained (Nunan, 1992; Robson, 1999).

The teaching procedures included in the CLELD instrument were used in both experimental groups in order not to disadvantage the CLELD without LEA group from comprehending and learning content, as the majority of these procedures could be considered to be essential practices that should be used in the L2 class. It could be argued that an EFL lesson could not be carried out successfully without the use of most of these procedures. Therefore, in the experimental part of this study, the elements which are vital for comprehension have been retained for both experimental groups. However, the CLELD+LEA lessons included language enhancement activities through a multiple treatment i.e. CALL- a powerpoint presentation in order to present new material in visual form, language games, and analytic teaching. These items are considered to be an important unit of the CLELD model as they allow the learner to notice and use the target language (Xanthou, 2006; Coonan, 2007). In contrast, in the CLELD without LEA classes, the teacher did not use language enhancement activities.

The study's research design aimed to elicit information for answering the research questions. Test scores would show the potential benefits of the CLELD model on students' L2 vocabulary and content knowledge. Comparisons between CLIL classes would show the benefits of using the CLELD model with language enhancement activities as compared to using the CLELD model without language enhancement activities. Potential gains for both content and language would point to the simultaneous development of language along content learning in CLIL classes.

#### 5.1.1.3 Description of the teachers: Level of teacher education/ Years of teaching experience

Teachers were all native speakers of the Cypriot Greek dialect. Dalton-Puffer and Nikula (2006) note that European CLIL instruction is usually "conducted by native speakers of the language in the surrounding culture rather than by native speakers of English" (p.246). The teachers who participated in the study were selected for their enthusiasm in teaching

and excellent teaching performance, having followed the school inspectors' advice. They were all certified elementary school teachers for all subjects and have a good command of English (level C1 at the CEFR scale), all having pursued studies in the UK. Three of the four teachers hold an MA in Applied Linguistics or TESOL while the fourth has an MA in Education from a British University. They all have a long experience in EFL teaching ranging from 10 to 17 years. However, three of the four teachers did not have experience in CLIL teaching. The teacher researcher taught using CLIL approach for the second year.

Teacher bias towards a particular method was controlled by requesting teachers to strictly adhere to the lesson plans.

#### 5.1.1.4 Description of the subjects (participants)

All the children participating in the study were attending State urban schools housing grades first to sixth. Participants were also attending private English classes. The vast majority of the students participating in the study came from families monolingual in Cypriot Greek while some students had the Greek-Cypriot dialect as a second language. In the first case, the subjects had English as L2 while in the second, as L3. All participants were learning English as a foreign language. Students who were native speakers of English were excluded from the data. The first three experiments (Geography, Science, Maths) were carried out by the researcher with the same 70 subjects out of which 8 children were learning English as L3. The fourth experiment involved 66 subjects of which 4 were learning English as L3 while the fifth experiment involved 62 subjects out of which 7 were learning English as L3. The sixth experiment involved 75 subjects, of which 1 child was learning English as L3.

Variance of the students was controlled with the pre-post experimental research design. Repeated measures analysis controlled initial differences between the groups. The teachers kept the same level of enthusiasm in all three classes where the lessons were taught in order not to affect the students' bias towards a particular method.

#### 5.1.1.5 Apparatus

Vocabulary and content knowledge tests measured the students' achievement. Tests required a single answer as objectivity was pursued (Read, 2000). A 40-minute period was used for each test completion. Tests aimed to provide answers to the research questions which related to the impact of CLIL on students' L2 vocabulary and content knowledge.

A Likert type five point scale questionnaire was administered to the pupils involved in the two types of CLIL teaching. A 40-minute period was used for questionnaire completion. Student questionnaires aimed to measure students' attitudes towards the type of CLIL provision and the impact of the CLELD strategies. The data obtained from the tests and the questionnaires were analysed by means of the SPSS statistical package.

Interviews from teachers yielded more information on their views about the importance of the performance guidelines included in the CLELD. The research questions of the study were translated into questions. Thus the teachers had to report about the impact of the model on students' L2 vocabulary and content knowledge. The interviews were transcribed and the teachers' statements were placed under the appropriate CLELD item. Ernst (1994) supports that the ethnographic techniques of observation and interviewing adopt "a holistic behaviour in settings, so they can be very useful in teacher supervision and feedback". By being involved in "in-depth exploration techniques, practitioners can gain new awareness of classroom organization, interactional patterns, and teaching and learning strategies in their own classrooms" (ibid: 316-317).

A video recorder was used by the researcher to collect oral and nonverbal interactions from the CLELD+LEA lessons. The data pool consists of a total of ten 40-minute and three 80-minute CLELD+LEA lessons. These were the lessons carried out by the first teacher (researcher); the rest of the teachers did not want to be videotaped. Data from classroom interaction aimed to provide information for answering those research questions which refer to the impact of CLIL+CLELD on students L2 vocabulary development and content knowledge and the contribution of CLIL to language learning theory. Classroom interaction provided more information on the impact of the CLELD items on content and vocabulary learning. Extracts from classroom interaction were classified under the appropriate CLELD item. The researcher and another teacher classified the extracts.

#### 5.1.1.6 Permissions obtained for the study

Permission for the study was obtained by the Ministry of Education and Culture of Cyprus (See Appendix Ia). Likewise, all children received parental permission to participate in the study (See Appendix Ib), following the principles for conducting research with human participants of the British Psychological Society, which states in paragraph 3.3 that "where research involves all persons under sixteen years of age, consent should be obtained from parents or from those in loco parentis" (Robson, 1999: 471).

#### 5.1.1.7 Preparation for the study

##### 5.1.1.7.1 Material required

Lesson plans, students' handouts, PowerPoint presentations and test instruments for the five Geography, the five Maths and the three Science lessons were developed by the researcher specifically for the experiment (See Appendices VIII, X, VI, VII ). The purpose was to develop CLIL material which followed the curriculum aims. The CLIL lessons included the same activities as the lessons which were taught through the medium of L1. Testing materials were piloted in 6<sup>th</sup> grade classes of other schools. This eliminated some easy items from the vocabulary tests and gave opportunities to the researcher to correct some questions on the subject matter tests which had predictable answers.

##### 5.1.1.7.2 Teacher training

Short teacher training was provided in order to follow exactly what the model suggests. Four meetings were held on an individual basis, prior to the CLIL implementation, where the researcher outlined the CLELD principles, explained the aims of the lessons and analyzed the activities which would be presented in the classes. Informal communication and ongoing monitoring also took place. All the teachers who were participating in the study were subject matter teachers with a long experience in EFL teaching. Three of the four teachers had professional qualifications in foreign language teaching while they had all attended seminars and in service training for effective subject matter teaching and EFL teaching for more than ten years. Therefore, they had a very good knowledge of principles for effective subject matter teaching and EFL learning. This compensated for the short training which was provided.

##### 5.1.1.8 Pre-post L2 vocabulary tests

Vocabulary pre-post tests (Appendix VII) assessed vocabulary breadth, namely how many words the learner knows, and not depth (Read, 2004). The vocabulary tests required students to give in L1 the equivalent word items given in L2. This aimed to test the students' receptive knowledge. Ellis and Beaton (1993) refer to the difference between translating into or out of the learner's L1. They note that it is easier to give the L1 meaning in response to the L2 word rather than to give the L2 word for an L1 meaning. The first is considered to demonstrate receptive knowledge whereas the second, productive knowledge.

Target items were not presented in context, because the aim was to reach objective results.

Read (2000: 75) defines objective tests as those “in which the learning material is divided into small units, each of which can be assessed by means of a test item with a single correct answer that can be specified in advance”. Objectivity is ensured by the way scoring can be done without doubting the correctness of the judgement. In this vein, Spolsky (1995: 165) quotes Carroll, an American scholar, as having remarked that vocabulary test items are only those involving single target words.

Pre-tests were administered one week before treatment in order to eliminate the test effect that could influence the learners’ attention during the lessons (Hatch & Farhady, 1982; Shu, Anderson and Zhang, 1995; Ellis, 1995). Post-tests were not administered on the day of attending the last lesson, following Read (2000) who remarks that when a test is administered immediately after the completion of a task, it measures understanding of word items, whereas a delayed test gives indication of the retention of learning over a longer term basis. Similarly, in Ellis’s (1995) study, understanding was measured by the immediate responses of learners when they were involved in the listening task, whereas acquisition was assessed in three tests administered two days, one month, and two and a half months after the task.

The items were related to content words of the units of Geography, Science and Maths and the maximum score was 100. The Geography vocabulary test includes 100 words while the Science and Maths vocabulary tests include 50 words each because the lessons involved much less new vocabulary. Longer lists with vocabulary items based on the subject matter units were initially prepared. These were piloted with children attending 6<sup>th</sup> grade classes of other schools. The items with which children were acquainted were removed and a final list of vocabulary items was selected.

The tests were scored by the investigator, and another highly proficient teacher who rescored all vocabulary pre- and post-tests. Independently of each other, they judged the correctness of the L1 equivalents provided by the students. There was a  $r = 0.99$  level of agreement in pre-tests and  $r = 1.00$  in post-tests indicating high inter-rater reliability. Differences were resolved by discussion. For instance, the second scorer considered the L1 equivalent to be incorrect in the following cases: ‘outside line’ given by some test takers to the word ‘outline’, the L1 ‘long’ with the L2 ‘length’, and the L1 ‘perimeter’ for the L2 ‘circumference’, in the Maths test. It was decided that the scientific L1 word should be considered as correct. Similarly, the L1 equivalent of ‘inflate’ for the L2 ‘blow’ was

considered to be incorrect. The translation ‘transform’ given for the word ‘deform’ was considered to be incorrect in the vocabulary Science test. ‘Rain’ was not accepted as the L1 equivalent for ‘rainfall’. Correct answers in Geography tests were assigned 1 point as the total number of words were 100. In Science and Maths tests they were given 2 points as the total number of words were 50. Incorrect answers were assigned 0 points.

#### 5.1.1.9 Pre-post subject matter tests

Content tests were based only on cognitive objectives using the taxonomy developed by Bloom et al. (1984). This is subdivided into two major categories: lower and higher order skills, the latter corresponding to more complex and abstract mental levels.

The subject matter pre- and post-tests (Appendix VI) which examined the subjects’ content knowledge include “true-false, matching, multiple-choice, and completion (short answer)” (Borich, 2007: 403). These types of tests were chosen because each test item would require “a single correct answer” (Read, 2000). In this way, objectivity was pursued. True-false items ran the risk of 50% guessing the item correctly without knowing the answer. So, the effects of guessing were equalized by encouraging all students to guess in order to prevent that only a number of them does so. In this way, test-wise students were prevented from having an advantage over their peers. The test scores demonstrated a more or less equal guessing factor added on each learner’s knowledge. Borich’s (2007) suggestion that true and false items should be kept at the same length was followed. Added to this, test items were not placed in a systematic pattern e.g. true-true-false, true-true-false. Matching items were prepared considering the following: homogeneity, order of the two lists, number of options, directions, and multiple correct answers. To begin with, the lists are homogeneous. In other words, the items of the matching activity belong to the same content category. Regarding the order of the lists, the first column involves longer descriptions (statements or phrases) looking for a short related item. The opposite would have been more time-consuming for students to complete. Moreover, the number of options is larger than the descriptions in order to decrease the chances of correct guessing through elimination. Ambiguities were avoided in order to eliminate the possibility of encountering multiple correct responses. Finally, descriptions are numbered e.g., 1, 2 etc. whereas options are lettered e.g., a, b etc.

Multiple-choice items allow the assessor to “measure some types of higher-level cognitive objectives” (Borich, 2007: 407). Thus, they were used for this purpose. Care was taken so

as not to provide students with clues. The stem, namely the statement portion of a multiple-choice item did not contain a clue pointing at the correct answer. Grammatical clues included in the stems were also avoided, e.g. a phrase ended with the article ‘a’ would not be followed by an object beginning with a vowel. Redundant words included in the options were avoided and included in the stem instead. Including more information in the correct option as compared to the incorrect options was also avoided. Finally, the option ‘none of the above’ was not offered when there were no clearly correct options as students could guess the correct option.

Completion items ask for a single-word answer. Only one or two keywords were omitted so as not to impair the sense of the content. The blanks were left either at the beginning or near the end of the sentences for preventing awkward statements.

True/false items were chosen because they are short, covering much content and easier to construct, allowing easy scoring. Matching items are also easy to construct as they reduce the effects of guessing of the previous format. However, both formats emphasize memorization. Multiple-choice tests can measure objectives related to different levels while sampling much material. Similarly, completion tests reduce guessing as a specific response is required, while covering much content.

Essay items were not included in the pre-post content tests because they are “difficult to score consistently across individuals” (Borich, 2007: 416). Further, they are usually administered to middle and high school students as the students of elementary grades may not have acquired sufficient written language competence.

The content taught originated from the state curriculum. The CLIL lessons of the two experimental groups strictly adhered to the material that should be covered, as described in the school syllabus. The students’ worksheets and reading material prepared by the researcher follow the students’ textbook which is written in L1 Greek.

The content tests involve multiple choice answers, true/false statements, and completion tasks. The marks of the Geography test were allocated as follows: physical environment (26), climate (6), products (12), habits (6), problems of the country (14), explaining why the country is developing (14), justify decisions – climate (10), forest destruction consequences (6), and finding solutions for forest destruction (6). The maximum possible

score was 100. The marks of the Science test are allocated as follows: Air properties – weight (16,25), exercising pressure (32,50), exercising pressure to all directions (12,50), lower atmospheric pressure in higher places (12,50), interpreting real life applications (20), measuring atmospheric pressure (6,25). The marks of the Maths test are distributed as follows: identifying diameter (5), circumference (5), centre (5), radius (5), finding the relation between the radius and the diameter (10), measuring the radius (5) and the diameter (5), problem solving – measuring the diameter (5), calculating the circumference of circles (20), calculating the periphery of a shape part of which is a circle (5), calculating the area of a circle (20), calculating the area of a shape part of which is a circle (10). The objectives of the units taught are shown in Appendix VIII.

Attention was drawn to the preparation of valid and reliable content tests. In order to produce a valid test, it should be made to measure what it is supposed to. The tests' content validity was established by assigning test questions which corresponded to what was outlined in the test blueprints (Borich, 2007). Blueprints included the lessons' content objectives linked to different cognitive processes (Appendix IX). A committee of four both subject matter and ELT teachers determined that the tests possessed content validity.

Scoring was done by the author and a highly proficient teacher who rescored the pre- and post-tests. There was a .998 level of agreement in pre-tests and a .999 in post-tests, indicating high inter-rater reliability. Reliability coefficients are acceptable when ranging from .80 to .90 or higher. A maximum coefficient is 1.0.

For the second exercise of the Science test, the answer would be considered to be correct only when the test taker would answer that the lack of air does not allow the liquid to move up the straw. Moreover, students had to mention the word 'deform' to describe what happens to the tin when it is warmed; description of the concept was not accepted.

### ***5.1.2 Questionnaires***

Questionnaires are means of data collection allowing quantification. A Likert-type questionnaire was given to the students of the experimental groups (CLIL with CLELD without LEA and CLIL with CLELD+LEA classes) (Appendix III). Question item II is linked to a number of items included in the CLELD observation checklist. The rest of the items are based on the findings of a pilot study in the form of semi-structured interviews conducted among about one fourth of the participants in the experiment (Bell, 1997).

Participants were asked to report their experiences with CLIL learning in L1. Questions were presented in a simple and clear manner. Sophisticated vocabulary was avoided. The young age of learners threatened the validity of results thus the children were given oral clarifications about the questions before responding to the questionnaire in order to answer more precisely and therefore increase the validity of the answers.

### **5.1.3 Validity**

Steinback and Steinback (1984) define validity as “data that are representative of a true and full picture of what the researcher is attempting to investigate” (p.144). Both internal and external validity were sought.

#### **5.1.3.1 Internal validity**

The study’s internal validity is safeguarded by ensuring that “the outcome is a function of the factor ...selected rather than other factors which you haven’t controlled” (Hatch & Farhady, 1982: 7).

The validity of the outcomes was safeguarded from the Hawthorn effect which refers to the tendency of the participants to perform better when they are aware that they are participants in an experiment and they are therefore being studied. Thus, the individuals’ behaviour may change due to the attention they are receiving from the researchers rather than the manipulation of the independent variable (Olson et al., 1994). To eliminate the negative effect of this situation, the children of the two groups were not informed that they were involved in a particular CLIL approach as this could cause the learners of the CLELD +LEA group to exhibit more enthusiasm or even reflect this on a potentially improved performance. Participants of both CLIL experimental groups were told that they would be involved in CLIL and that they would be taught content through the medium of L2.

“Triangulation of sources of data” was employed in order to enhance validity by presenting data from more than one source (Sanger, 1996: 45, Adelman et al., 1980). Mortimore in Cohen and Manion (2000: 239) also suggests the use of “triangular techniques if a more holistic view of educational outcomes is sought”. The triangle used consists of classroom interaction data, interviews, questionnaires and test scores derived from experimental treatment effects. Qualitative data from experimental classrooms enabled the interpretation of quantitative data. Qualitative data are strong in reality as they allow the

observer to pay attention to the details surrounding facts. Analysis of classroom discourse was carried out illuminating discourse processes in the CLIL class. Classroom conversational interaction extracts were classified by the researcher and another teacher under the items of the CLELD model. The purpose was to examine the students' reactions to the CLELD items, through opening, answering and follow-up moves (Dalton-Puffer, 2007).

Interviews with teachers were conducted. Individual 20-minute meetings were held during the teachers' and the researcher's non-teaching time. These facilitated eliciting more information on the participants' views. Likert-type student questionnaires and test scores provided more information on the impact of CLIL with the CLELD model on the students' language and subject matter learning. Content and vocabulary tests were administered to the control and experimental classes. The control groups of the experimental study did not receive the experimental treatment. It was therefore ensured that the students' performance after the treatment was related to the variable and not to other extraneous factors.

The subjects in the control and experimental groups were administered "pre- and post-treatment tests" (Nunan, 1992: 41) in order to strengthen the internal validity of the study. Care was taken in order to eliminate "test effect" which "can influence the internal validity of research" (Hatch & Farhady, 1982: p.7). In order to avoid the possibility of having students learn something from the pre-test, or focus their attention on certain concepts and words, pre-tests had been administered at least one week before the treatment started.

Classes were intact, a fact which could have threatened the internal validity of the study, as preexisting differences in the groups could influence the results. However, classes were randomly assigned into control and experimental groups. The subjects were pre- and post-tested and analysis of covariance was used to balance possible initial differences.

Internal validity was improved by adding more experimental and control groups (Nunan, 1992). Each experiment was repeated with different subjects. The five schools involved were matched in terms of size and location. They were all big urban schools.

The vocabulary and content (Science, Maths, Geography) tests were piloted on Grade 6 pupils attending state primary schools. Results provided information for improving the

structure of the tests. For example, in the Science test question 3 (a) the question stem provided information for answering item 1 (d). The stem was initially formulated as ‘The higher we go, the atmospheric pressure decreases because...’ thereby providing information for answering item 1 (d): Atmospheric pressure is greater on the top of Troodos than on Limassol. Therefore the 3 (a) stem was substituted with: ‘There is low atmospheric pressure in places where...’. Some matching test items were turned into completion ones as they were found to be easy to guess. Piloting also aimed to show whether students were familiar with the target vocabulary, ensuring that the majority of the words were new for the students. Initial vocabulary tests contained more words than the final tests as the familiar words were removed.

#### 5.1.3.2 External validity

External validity refers to the extent that “the outcome of any research study would apply to other similar situations in the real world” (Hatch and Farhady, 1982: 8). By carrying out the same experiment in other schools, generalization of findings is pursued by the current research. Different groups were involved in CLELD approach attending urban schools. The classes in the present experiment were randomly assigned to either experimental or control groups. Moreover, the experiment was carried out in natural settings so the researcher was more likely to be measuring what it was supposed to be measured. In this way, the external validity of the outcomes was safeguarded.

#### **5.1.4 Reliability**

The study’s reliability is also considered, allowing other researchers to repeat the study by yielding similar outcomes.

##### 5.1.4.1 Internal reliability

Internal reliability can be established when outsiders can easily analyze the primary data themselves reaching the same conclusions. This study allows outsiders to do this task finding “a causal relationship between variables” (Nunan, 1992: 59). Statistical comparison of test scores and findings from student questionnaires are presented in this study. Extracts from teacher interviews and classroom interaction data are also displayed. Further, the reliability of the study’s findings is based on scoring agreement. Peer examination of the vocabulary and content tests took place by the investigator and another highly proficient primary school teacher with specialization in EFL teaching who rescored

the tests. Data was mechanically recorded in the form of audio and video recordings in order to safeguard the internal reliability of the results.

The analysis of quantitative data enhanced the internal reliability of the study by allowing outsiders to analyze the data themselves (Nunan, 1992: 58). Repeated measures analysis was used to compare the means of the groups prior and after treatment. Repeated measures multivariate analyses of variance (MANOVA) of treatment (Using L1, CLIL+CLELD without LEA or CLIL+CLELD with LEA) X Time (Before-Pre/End-Post) with student achievement in vocabulary and subject matter tests as dependent variables were carried out. Unlike between-subjects comparisons, such as the independent samples t-test, which do not control differences among subjects but compare the means of two independent groups, in within-subject comparisons such as repeated measures analyses, the same subjects are tested in a number of conditions. In this way, individual differences are controlled. However, further analyses comparing the performance of high achievers among the three different approaches (L1, CLIL+CLELD-LEA, CLIL+CLELD+LEA) were carried out. The difference between the means of the groups was considered to be significant at the 0.05 level of confidence.

#### 5.1.4.2 External reliability

The external reliability of a study can be established when outsiders can replicate the study reaching similar results. Therefore, a “detailed description of subjects” and “of the context and conditions under which the research was carried out” was provided. Moreover, “data collection and analysis methods” were presented in detail (Nunan, 1992: 61). In this way, the external reliability of findings was safeguarded.

### **5.2 Instrumentation: (b) Qualitative Data Collection Procedures**

Qualitative methodology provided opportunities to discern behaviour as it happened in its natural context. Cohen and Manion (2000: 110) advocate that this type of research allows ongoing behaviour to be watched.

Quantitative results obtained from the tests were interpreted by qualitative data analysis (Nunan: 1992). Classroom discourse data as well as interviews with participants provided more details on the process of CLIL implementation, both with and without the CLELD instrument.

### ***5.2.1 Interview protocol***

The three teachers who carried out the experiments were interviewed (all except the researcher). Interviews were carried out during the researcher's and the teacher's non-teaching time, lasting 20 minutes each. The aim was to get answers to the study's research questions, i.e. whether the CLELD model promotes CLIL students' L2 vocabulary and content learning better than the CLELD without language enhancement activities, and whether teachers consider their teaching more effective when using the CLELD model than when not using it.

The study's research questions were translated into interview questions which sought detailed answers (Appendix IV). The interview questions were first piloted with teachers participating in CLIL (Nunan, 1992). All the teachers were asked the same questions. The permission of the interviewees was obtained for recording data.

The possibility of biasing the data always looms as the interviewer might look for answers that verify his/her "preconceived notions" (Borg, 1981: 87). Awareness of the problem, allowed the researcher to exhibit self-control and watch how questions were put. The tone of voice aimed at achieving objectivity. Before starting the interview, the researcher explained the purpose and told the interviewees how the data would be used. Questions were put in a straightforward, clear and non-threatening way. Kitwood in Cohen and Manion (2000) asserts that "increased reliability of the interview is brought about by greater control of its elements" (p.63). Therefore, the interviewees of this study were asked to clarify their answers at the most in order to avoid misinterpretations.

Specific probes were used as suggested by Robson (1999) in order to get the interviewees to expand on a response: "a period of silence, an enquiring glance, mmhmm...and repeating what the interviewee said" (p.234). Effort was also made not to react with words or facial expressions in cases where the interviewee had a different view. Points were indicated in a neutral expression to avoid influence of opinion.

Possible subjectivity and bias on the part of the interviewer (Cohen and Manion, 2000) were controlled through affective evaluation of pupils which took the form of measuring attitudes through a five scale Likert type questionnaire. This was completed by participants in the experimental groups.

### ***5.2.2 Classroom interaction data***

Discourse from audio-taped CLELD lessons was placed under each item of the CLELD model. For this reason, ten 40-minute and three 80-minute lessons were videotaped. Approximately 16 hours of classroom interaction were analyzed in order to gain insights into how the model enhanced the students' academic and L2 vocabulary development.

Classroom interaction data from CLELD+LEA classroom of the first school were transcribed. The researcher-teacher and an independent analyst - another teacher, isolated and classified separately certain representative classroom interaction extracts (Nunan, 1992). These were placed under the appropriate items of the CLELD model and examined the students' response to the various CLELD strategies which were employed in the lesson. For example, extract 2 which demonstrated students' responses to a language focus task, i.e. matching a new word with its definition, was placed under the analytic teaching item of the Acquisition and Learning principle included in the CLELD model. The opening (initiation), answering (response), and follow-up moves of the teaching exchanges were examined (Dalton-Puffer, 2007).

Classification of extracts was in agreement in 98.5% of the cases. The high level of agreement indicated high internal reliability. The two teachers resolved disagreements in 5 out of the 84 discourse extracts, reaching an agreement regarding the relevance of discourse to specific principles outlined in the CLELD model. The cases which were further discussed were: 22 and 47.

### **5.3 Summary**

The quantitative measurements of the study include quasi-experiments that gathered data from genuine sixth grade primary schools of Cyprus. Six experiments compared teaching through L1, through CLIL+CLELD without using LEA, and through CLIL+CLELD with the use of LEA through multiple treatment. Subjects were pre- and post-tested in vocabulary and subject matter knowledge in the areas of Geography, Maths, and Science. Likert-type questionnaires aimed to examine students' attitudes towards the type of CLIL teaching. The qualitative measurements of the study include interviews from the CLIL teachers investigating the importance of the CLELD components as well as classroom interaction data demonstrating how students responded to the various performance guidelines included in the CLELD lesson planning instrument.

## CHAPTER 6: RESULTS AND ANALYSIS

The study presents both qualitative and quantitative data in an attempt to answer the following research questions:

1. Does the use of the Content and Language Integrated Learning (CLIL) for Elementary classes Lesson Delivery Model (CLELD) contribute to English language learners' (ELLs) vocabulary development?
2. Does the use of the CLELD Model promote subject matter learning of English language learners (ELLs) in the content areas of Mathematics, Science and Social Studies?
3. Does CLIL lead to better language proficiency in the area of L2 vocabulary knowledge as compared to traditional learning through L1? Are there significant differences in L2 vocabulary acquisition for pupils attending CLIL classes following the CLELD model with Language Enhancement Activities (LEA) versus pupils in CLELD without LEA?
4. Does CLIL lead to better subject matter knowledge as compared to traditional learning through L1? Are there significant differences in subject matter learning for pupils attending CLIL classes following the CLELD model with LEA versus pupils in CLELD without LEA? (Geography, Science, Maths)
5. Do ELLs receiving CLIL instruction with the CLELD model have positive attitudes towards this approach?
6. Do the elementary school teachers who use the CLELD model for lesson planning consider their teaching more effective than when not using it?
7. How can CLIL contribute to linguistic theory?

### **6.1 Research Question 1: Does CLELD promote ELL's vocabulary development?**

#### ***6.1.1 Datas source 1: Experiments***

Wilcoxon test was carried out to compare the pre- and post-scores of each subject of CLELD with LEA groups (Table 1).

	Geography	Science	Maths
	CLIL+CLELD+LEA	CLIL+CLELD+LEA	CLIL+CLELD+LEA
	vocabulary pre vocabulary post	vocabulary pre vocabulary post	vocabulary pre vocabulary post
Z	-5.779 <sup>a</sup>	5.713 <sup>a</sup>	5.970 <sup>a</sup>
Asymp. Sig. (2- tailed)	.000	.000	.000

**Table 1:** Pre-test, post-test comparison of vocabulary scores achieved by the CLIL+CLELD with LEA groups (Geography, Science and Maths quasi-experiments)

Data from CLIL implementation in three different subjects seem to demonstrate that the students involved in CLIL+CLELD+LEA exhibited a significant increase in vocabulary knowledge.

### 6.1.2 Data source 2: Student questionnaires

An affective evaluation of CLIL and the procedures by which it was delivered was conducted. A Likert-type five point scale questionnaire was administered to the subjects of the experimental groups. Participants were asked to report their experiences with CLIL learning and they had to respond to some statements by circling the appropriate point on the scale.

The majority of participants (96.6% ) in the CLELD+LEA model group believe that CLIL improved their English. However, only 75,5% of the students in the CLIL+CLELD without LEA groups answered positively. The lower percentage in the CLELD-LEA classes could be attributed to the absence of educational games and visual input through PowerPoint presentations which might have made lessons more interesting in the CLIL+CLELD+LEA classes.

Language improvement through CLIL	CLIL+CLELD+LEA	CLIL+CLELD-LEA
Yes	96.6%	75.5%
No	3.4%	24.5%

**Table 2:** CLELD+LEA and CLELD-LEA students' opinions about the impact of CLIL on L2 English development

The vast majority of the CLELD+LEA students (92% ) reported that their L2 vocabulary developed to a considerable or great extent (Table 3).

	% of pupils		Median	Mode
	Limited <sup>a</sup>	great <sup>b</sup>		
L2 vocabulary	3.4	92	5.00 <sup>c</sup>	5
Oral production	5.7	67.8	4.00	5
Written production	6.9	72.4	4.00	5

<sup>a</sup>Students either perceived the item as exhibiting very limited or limited development. <sup>b</sup>Students perceived the item as exhibiting cons or great development. <sup>c</sup>Very limited development; limited development; fair development; considerable development; great development

**Table 3:** CLELD+LEA students' opinions about the impact of CLIL on various aspects of L2 English development (N=87)

Pupils' opinions about the impact of various teaching strategies on learning were asked. Table 4 shows the percentages of students who disagreed and students who agreed with the importance of the strategies included in the CLELD instrument on L2 development, along with the medians and the modes.

Strategies	% of pupils		Median	Mode
	Disagreed <sup>a</sup>	Agreed <sup>b</sup>		
Task-based learning	4.6	79.3	4.00 <sup>c</sup>	5
Analytic (focus on target words: matching words with definitions and pictures)	11.5	71.2	5.00	5
Adjusting speech to students' level (eliminating syntactically complex sentences)	14.9	68.9	5.00	5
Exaggerated articulation	13.8	69	5.00	5
Extra-linguistic information - gestures	3.4	70.1	4.00	5
Non-linguistic representations (realia, pictures, maps)	1.1	83.9	5.00	5
L2 medium strategies	6.9	73.5	5.00	5
L1 medium strategies	11.4	78.2	5.00	5
Using CALL to present new material	3.4	83.9	5.00	5
Language games	2.3	86.2	5.00	5

<sup>a</sup>Students either perceived the item as having very limited or limited importance. <sup>b</sup>Students either agreed or absolutely agreed with the importance of the item. <sup>c</sup>Very limited importance; limited importance; some importance; considerable importance; great importance

**Table 4:** Percentages of CLELD+LEA students (N=87) who disagreed and agreed with the importance of the CLELD strategies on L2 development

Pupils involved in CLIL following the lesson planning tool developed in this study (with LEA) believe that the principles included in the tool are really important for learning language in CLIL classes: task-based learning, analytic teaching, adjusting speech to students' level, intonational enhancement, extra-linguistic information, non-linguistic representations, L2 and L1- medium strategies, CALL, language games. The majority of

students (83.9%) believe that non-linguistic representations and the use of CALL significantly contribute to L2 vocabulary enhancement.

A significant percentage of children (79.3%) claim that task-based learning is an interesting way to learn content along with the foreign language. The majority of pupils (86.2%) feel that language games are important for them in the lesson. This suggests that CLIL methodology for young primary school learners needs to include language-focused games. Non-linguistic representations are considered to provide comprehensible input and the use of CALL material is thought to be vital in enhancing comprehensibility.

### ***6.1.3 Data Source 3: Teacher Interviews***

The teachers involved in CLIL teaching were interviewed. Interviewees were asked to report their opinion about the usefulness of the contents of the CLELD model for more effective learning in a CLIL lesson (Appendix IV).

The teachers endorsed the importance of the CLELD items in promoting ELLs' vocabulary learning. They agreed that CLIL with CLELD appears to provide opportunities for active involvement of students in the learning process and the development of language. As it was stated, both experimental groups promoted their L2 vocabulary. However, teachers highlighted that L2 vocabulary improvement occurred to a greater extent in the CLELD case. Teacher 3 attributes this improvement to the fact that 'emphasis was placed on learning new vocabulary through games, underlining, providing L1 equivalents, presenting new vocabulary in colour'. In general, teachers seem to appreciate the role of the CLELD model on the students' L2 vocabulary development. This suggests that it could be a useful tool for CLIL teachers.

### ***6.1.4 Data Source 4: Classroom interaction***

Extracts taken from classroom interaction show that students in the CLIL+CLELD+LEA classes were allowed to encounter and use new vocabulary repeatedly thereby opportunities to learn new word items were maximized.

The principles which refer to effective language learning were followed during CLELD+LEA lessons. The following extracts demonstrate how students reacted to each principle and its related items.

#### 6.1.4.1 Pursuing both acquisition and learning

##### 6.1.4.1.1 Task-based or experiential teaching

Pupils were involved in purposeful learning. Students encountered target words in meaningful contexts. This process seemed to promote interlanguage development.

For instance, in Geography, students searched maps to find information about the products of Brazil and they unscrambled the target words.

(1) T: Look at these words. I want you to unscramble them. I also want you to open your map at page 54. Yes. And look at the products there. Page 54.

S: Coffee.

T: There is coffee. Very good. Coffee. What else? Hmm?

S: Grapes.

T: Grapes. Yes, S12.

S12: Vamvaki {cotton}.

T: Okay, cotton, cotton, coffee.

S: Tobacco

T: sugar cane, sugar cane, zacharokalamo {sugar cane}

S: kapnos {tobacco}

T: How do we say (in English)?

S2: Tobacco

T: Tobacco. Excellent. Bravo S2. And citrus fruit.

S: esperidoidi

T: citrus fruit, okay? (Geography lesson 3)

In the excerpt above, the students provided answers to the content-oriented question. The teacher's follow-up moves signalled acceptance of correct answers i.e. 'There is coffee. Very good. Coffee. What else? Hmm?', encouraging pupils to continue reporting answers using new vocabulary i.e. 'tobacco'.

##### 6.1.4.1.2 Analytic teaching

Language focus activities were given in the CLELD+LEA lessons (Willis, 1996). Students had opportunities to practise using the target words. Positive response to analytic teaching was exhibited. For example, the students had to match target words with their definitions.

- (2) T: Now. I want you to match this word with a phrase, aah?  
People can't find a job. What is this? Can you please find a correct word? People can't find a job. They don't have work. I give you two choices. Undernourishment? Or unemployment?  
Hmm? People don't have work.  
S4: To deftero {the second}  
T: Can you (.)  
S4: Unemployment.  
T: Unemployment. Aneryia {unemployment}.

(Geography lesson 4)

In the excerpt above, the teacher asked students to match a new word with a phrase. Student n.4 provided the answer in L1, and the teacher prompted the student to say the word in L2, saying 'Can you...'. Then, the student continued by reporting the target word: 'unemployment'. Finally, the teacher acknowledged that the speaker had provided the right answer.

#### 6.1.4.2 Comprehensible input

##### 6.1.4.2.1 Adjusting speech to learners' level

Short and simply constructed sentences were used to transmit meanings. For instance, in the next extract simple sentences involving subject, verb and object i.e. 'I am holding the funnel', were used by the teacher while carrying out the experiments.

- (3) T: I am holding the funnel, and I am sipping. I'm sipping now, and I want you to, look at this piece of photocopy paper, and what happens to it (.). What happens when I sip the air? ((pause)) The atmospheric pressure is pressing the paper to go (.)  
S: In the funnel  
T: inside the [funnel]  
S: [funnel] (Science lesson 3)

The student in the extract provided the correct answer exhibiting comprehension of what was requested, while at the same time generated the target word: 'funnel'.

#### 6.1.4.2.2 Exaggerated articulation

Target words were emphasized attracting the learners' attention. High pitch was used when producing target content words, thus focusing the learners' attention on new concepts.

- (4) T: There are many abandoned children, ABANDONED,  
egatelimena pedia {abandoned children} Abandoned children.  
Abandoned. Their parents left them.

When children were asked to fill in the missing words from sentences they replied correctly, exhibiting understanding of target words.

- (5) T: Children don't have a (.)  
S: Some children don't have a house. (Geography lesson 4)

#### 6.1.4.2.3 Extra-linguistic information

Extralinguistic cues such as gestures helped learners to guess the meaning of words and comprehend messages. For instance, the following extract shows a student's positive reaction to the teacher's question involving gestures.

- (6) T: Look at this table.  
In January (.) where is it colder, in Cyprus or Brazil?  
S: Cyprus  
T: The climate is cold ((the teacher uses gestures showing cold)) or  
tropical (in Brazil)?  
S16: Tropical (Geography lesson 2)

#### 6.1.4.2.4 Providing multiple non-linguistic representations

Pictures enabled children to convey meaning and helped conversation to continue, eliminating the need to translate in L1. For instance, in the following excerpt the teacher initiated interaction by showing a picture to the class. Student n. 3 responded positively by producing the appropriate target word, which demonstrates that the visual stimulant

enabled the child to create a link between the word and its visual representation. The teacher's feedback expressed acceptance of the answer while an additional question served to keep the conversation going. Another student continued the conversation by giving additional information i.e. 'they are undernourished'.

(7) T: Now. Look at these children. Do you want to tell me something about those children? What are those children? Aah? Do you know? Hmm? What do they remind you of? Yes, S3.

S3: Abandoned children.

T: ABANDONED children. These children are ABANDONED. What else? Do they have a home? A house? Yes?

S: They are undernourished.

T: Undernourished. Yes. Very good. What else? They are ho (.)

Ss: Homeless.

T: excellent. They are homeless. (Geography lesson 4)

#### 6.1.4.2.5 L2 medium strategies

Several L2 medium strategies were employed in the CLIL+CLELD+LEA class such as synonyms, paraphrasing and repetition in order to transmit messages. The following extract shows that synonyms were used to ensure that learners understood the meanings of words i.e. 'escapes', 'goes away'.

(8) T: Okay. Look here children. This is a suction cup. I'm going to press it on the table. The air escapes, ah? The air escapes, goes away.

Ss: ((Children nod their heads)) (Science lesson 3)

Paraphrasing was also used extensively. For instance, in the following excerpt the teacher elaborated the meaning of the word 'homeless' by using the paraphrase: 'They don't have a house. They stay in the street'.

(9) T: What else?

S: Poverty.

T: Poverty. Ftochia {poverty}. They are very poor. Homeless.

Look. Children, people, are homeless. They don't have a house.

They stay in the street. They sleep in the street. Have a look here. (Geography lesson 4)

Repetition was also used, as illustrated in excerpt 10, thus attracting the learners' attention to specific word items. Here, the teacher initiated conversational interaction by repeating the word 'neighbourhoods'. The answering move provided by Student n.7 demonstrates that his attention was drawn to the correct word: 'favelas'. The follow-up move provided by the teacher included a positive comment.

- (10) T: There are some poor neighbourhoods, poor neighbourhoods.  
How do they call them? Did you find out? [The poor ne  
S7: [favelas.  
T: Bravo S7. Can you please repeat loudly?  
S7: fAvelas.  
T: favElas. Yes. These are the poor neighbourhoods.  
(Geography lesson 4)

#### 6.1.4.2.6 L1 medium strategies

L1 medium strategies served to clarify a word's meaning. In the following excerpt, the teacher supplied the equivalent in L1 for some key words such as: 'sugar cane', to make sure that all the children understood the meaning of the word. Code switching was used. Children's reaction was an exclamation marker: 'Wo:::w' which showed comprehension of intended message.

- (11) T: Look at the sugar cane, zacharokalama {sugar cane}. They take the sugar canes, and they take alcohol, pernoun alkool apo ta zaxharokalama {they get al.cohol from the sugar cane}. They take this alcohol, and they put it in the cars  
Ss: Wo:::w (Geography lesson 3)

L1 was used as a cognitive tool allowing students to express how they perceived new content learning. For instance, excerpt 12 shows that a student responded positively to the teacher's comment in L1 and then he did so successfully when required to answer in L2 English.

- (12) T: The ratio between the circumference and the diameter of the

circle is called Pi.

Legete pe {it is called pe}, pai and is SYMBOLIZED with pi {pi}. Simvolizete me to gramma pe {It is symbolized with letter pe} ( $\pi$ ). It is around three point fourteen. Ara tris, tria komma dekatessera fores ti diametro dini tin, tin {so, three, three point fourteen times the diameter gives the, the}

S: tin periferia {the circumference}.

T: tin periferia {the circumference}. Circumference equals [diameter times three point fourteen.

S: [diameter times three point fourteen. (Maths lesson 3)

#### 6.1.4.2.7 CALL

Tasks and content-related information presented on PowerPoint slides was typographically enhanced and accompanied by pictures. Various excerpts included in this section, such as 6 and 10, illustrate that students' attention was drawn to the new content and language and understanding was enhanced.

#### 6.1.4.3 Output production

Opportunities for output production encouraged students to use new vocabulary in meaningful situations.

##### 6.1.4.3.1 Stimulating production of target language

Questioning was used to promote the students' oral production, which involved target words. The teacher received responses from students for most of the questions e.g.,

(13) T: What happens (.) when you put a book on a piece of dough?

Ah? What happens to the dough? Ti simveni sto zimari?

{what happens to the dough?} When we press it?

S: It's deformed.

T: Bravo. It is deformed. What happens?

Ss: It is deformed.

T: Very Good. (Science lesson 1)

In extract 13, the teacher's opening move prompted learners to report an observation. A student's answering move was a successful reply which involved the new word 'deformed', and the teacher praised the response.

Various questions were used to help learners use new vocabulary in order to transmit messages, e.g. 'What' questions, as shown in excerpt 14, helped students identify and use action verbs i.e.: 'presses the paper in the funnel'. The teacher finally evaluated the student's answer. A paraphrase was provided which signalled acceptance of correct answer.

- (14) T: What does the atmospheric pressure do? Hmm? The  
atmospheric pressure (.)  
S2: presses the paper in the funnel  
T: Bravo. Pushes the piece of paper inside the funnel.  
(Science lesson 3)

Sentence completion tasks allowed the learner to exhibit comprehension of the meaning of new vocabulary. In extract 15 the teacher provided some clues regarding the mineral wealth of the country and children replied correctly about the place where it is found.

- (15) T: They also discovered gold and diamonds, there, in this area.  
So, many people live there, and not many people live in the  
(.)  
S: Centre. (Geography lesson 4)

#### 6.1.4.4 Linguistic interaction

Extracts from classroom interaction show that conversational interaction between the teacher and the students enhanced comprehension and afforded learners with opportunities for communicating through the L2 in order to transmit messages while using the new vocabulary.

##### 6.1.4.4.1 Conversational modifications: confirmation checks, comprehension checks, clarification requests

Confirmation checks following previous speaker's utterance served to ensure understanding, e.g.

- (16) S: We can pull it  
T: We can pull the bag easily. (Science lesson 2)

The question tag ‘Okay?’ in line 2 of extract 17, functions as an appealer which seeks the students’ agreement. Children confirmed that they understood the message sent by the teacher. This indicates that comprehension checks employed by teacher seem to be necessary in the CLIL class in order to ensure that comprehension has been achieved.

- (17) T: People live there because of the plantations.  
Big cultivated fields. Okay? Do you understand?  
Ss: Yes (Geography lesson 3)

The teacher used comprehension checks to confirm comprehension of the target words as shown in excerpt 18, and to clarify the learners’ utterances.

- (18) T: Let’s try an experiment. In front of you, you’ve got two balls, of dough, okay. I want you, to take, your exercise book, and put it on one dough, please. Raise it. And then I want you to take three books and put them again on the ball, on the ball of dough. Is there more pressure or the same?  
Ss: More pressure.  
T: Bravo. There are more books, more books are pressing, so, so more pressure. There is more pressure on the dough. Open your booklet page 6. Children, have a look here. I want you to complete this sentence. The greater the weight over a body (.) What happens?  
S20: the pressure is more.  
T: Bravo S20. Very good. The greater the weight, the more the pressure, the greater the pressure. (Science lesson 2)

In the extract above the teacher poses a question in line 5 which received a correct answer. However, the teacher elaborated on the students’ answer in the follow-up move, by providing further explanation in order to enhance understanding i.e. ‘more books are

pressing, so, so more pressure'. Similarly, the teacher's follow-up move in lines 13 and 14 emphasizes the conclusion. In this way, students are exposed to new content and language repeatedly, thus enhancing possibilities for retaining new learning.

Reacting was used by the teacher in order to ensure topic continuity. The teacher's opening move in extract 19 aimed to examine learners' comprehension. Student n.2 replied although he hesitated to finish the sentence. The teacher used the particle 'okay' to aid conversational coherence. In this way, the student was allowed time to collect his thoughts before reporting. He finally reported the correct answer, i.e. 'warmed' in line 5. The teacher continued with a question which received the right answer, i.e. 'reduced' in line 7.

- (19) T: I want you to choose one sentence to complete. Read the sentences and tell me, tell me the answer.  
S2: When the air in a tin is ((pause))  
T: Okay, when the air in the tin is (.)  
S2: warmed  
T: What happens? It is (.)  
S2: reduced  
T: Reduced. Excellent. Areoni {reduced}.  
T: The (.) outside is greater.  
S: pressure  
T: Yes, the pressure is greater and it (.)  
S: deforms  
T: Yes, very good. It deforms the tin. And the (.) exercises pressures on bodies  
S: The air  
T: Yes. The (.)  
S: The atmospheric pressure  
T: The atmospheric pressure. Very good. (Science lesson 1)

Promoting conversational consistency in Teacher-Student interaction in the class seems to allow focusing on meaning while searching for the appropriate target word. This can help the students to use the new vocabulary in meaningful situations and increases the practice of new learning.

6.1.4.4.2 Semantically contingent responses: elicitation of reformulations, recasts, repetition, expansions

The teacher built on the learners' contributions, but extended them by presenting new language which could later be used by the learners. This helped learners develop their L2 vocabulary by exposing them repeatedly to correct input which included the target vocabulary.

In CLIL Science lesson 3, the pupils tried to explain why an egg falls in a bottle after the air had been removed from the bottle. The following extract illustrates that pupils managed to draw conclusions which were expressed through Teacher-Student interaction. The teacher's follow-up move in the third line gives an indication to the learner to continue the incomplete phrase in line 2 by providing the verb 'is pressing'. The student comprehended the meaning of the new word and continued the conversation by giving the correct answer: 'the egg'. Finally, the teacher rephrased and extended the students' answer in the follow-up move. This exposed learners to correct discourse and served to draw attention to the key words.

- (20) T: I put the egg. What happens?  
S: atmospheric pressure ((pause))  
T: atmospheric pressure is pressing the (.)  
S: the egg  
T: the egg in the bottle. The air exerts pressure (.) So, the  
atmospheric pressure pushes the egg in the bottle.  
(Science lesson 3)

Recasting served to reformulate the students' responses in a registrally appropriate way. For instance, in extract 21 the teacher asked the students to make predictions. The student's answering move had the correct meaning but it was grammatically incorrect: 'The tin will deformed'. The teacher did not provide an overt negative feedback. Instead, she indirectly restated and reformulated correctly the student's response in line 4, in order to expose the learners to the correct input.

- (21) T: I want you to make some predictions.  
S: The tin will deformed.  
T: Ah! That's a good idea. I close it. But we are not sure yet.

Z says that maybe the tin will be deformed (Science lesson 1)

#### 6.1.4.5 Keeping the affective filter down

Pupils played word games such as bingo. Extract 22 shows that students exhibited enthusiasm to the teacher's announcement that they would play a word game. Students listened, read and found the target words on their bingo cards. In this way, they practised receptive skills.

- (22) T: We are going to play bingo.  
Ss: ((BINGO!!!))  
T: You are going to work in pairs. You cross out three words. I am going to say words. If you have them cross them, direction, direction, cross out the word direction, weight, weight, reduce, miono {reduce}, suction cup, ventouza {suction cup}, candle, candle, dough, ti simeni {what is the meaning of} dough?  
Ss: zimari {dough}  
T: pressure, i piesi {pressure}  
Ss: Bingo, bingo.  
T: Very good. (Science lesson 1)

The teacher asked the students to unscramble a word. The students managed to do this successfully. For instance, Student n.20 put the letters in the correct sequence and produced correctly the new word: 'funnel'.

- (23) T: Look at this word. The letters are mixed up. Can you tell me which word it is? Ah? Which word?  
S20: funnel (Science lesson 3)

Lowering the affective filter through language games promoted the students' enthusiasm, and raised their interest and participation. Games promoted involvement of students of all ability levels.

### **6.1.5 Summary**

The data demonstrate that the adoption of the CLELD model with LEA in the CLIL lessons developed students' L2 vocabulary. Vocabulary tests from the experiments show that the learners exhibited a significant increase in vocabulary knowledge ( $p = .000$ ). The majority of pupils (92%) reported in the questionnaires that L2 vocabulary development occurred to a considerable or great extent. Children stated that the CLELD principles related to L2 learning are very important for developing L2 knowledge. Language games were found to be interesting and vital in the classroom by 86.2% of the participants, a fact suggesting that the children of this age feel the need to learn through games which stimulate their interest and motivation. Children also value the impact of non-linguistic representation and the use of CALL to present new content (83.9%). Teachers strongly believe that the CLELD model can help greatly improve L2 vocabulary knowledge.

Data from classroom interaction show that the CLELD items can aid vocabulary development. Students encountered and used target words while dealing with meaningful tasks and they were provided language practice through the language focused activities. Their understanding of new content and language was enhanced through comprehensible input strategies: adjusting speech to students' level, using exaggerated articulation, extra-linguistic information, non-linguistic representations, L2 and L1 medium strategies, as well as CALL. The promotion of output production through questions encouraged learners to meaningful discourse which included new vocabulary. Linguistic interaction enabled the teacher to eliminate misconceptions and scaffolded the learners' efforts to produce intended messages. Finally, language games activated the students' interest and participation allowing opportunities to the teacher to examine whether new vocabulary had been retained.

## **6.2 Research Question 2: Does CLELD promote ELL's subject matter learning?**

### **6.2.1 Data source 1: Experiments**

Wilcoxon test was carried out to compare the pre- and post-test scores of each subject of the CLELD with LEA groups (Table 5).

	Geography	Science	Maths
	CLIL+CLELD+LEA	CLIL+CLELD+LEA	CLIL+CLELD+LEA
	content pre content post	content pre content post	content pre content post
Z	-5.778 <sup>a</sup>	5.565 <sup>a</sup>	5.969 <sup>a</sup>
Asymp. Sig. (2- tailed)	.000	.000	.000

**Table 5:** Pre-test, post-test comparison of content scores achieved by the CLIL+CLELD with LEA groups

Data from CLIL implementation in three different subjects seem to demonstrate that the students involved in CLIL+CLELD+LEA showed a significant increase in content knowledge. This increase suggests that the CLELD model with LEA facilitates content learning.

### 6.2.2 Data source 2: Student questionnaires

Student questionnaires revealed that the vast majority of children (94.3%) in the CLIL+CLELD with LEA model group believe that CLIL enhanced content learning. Interestingly, only 69.1% of the pupils in the CLIL+CLELD without LEA group share the same opinion, suggesting that the CLIL lesson planning tool is required to guide teaching practices (Table 6).

Content Learning through CLIL	CLIL+CLELD+LEA	CLIL+CLELD-LEA
Yes	94.3%	69.1%
No	5.7%	30.9%

**Table 6:** CLELD+LEA and CLELD-LEA students' opinions about the impact of CLIL on content learning

Table 7 shows CLELD+LEA students' views about the importance of the following principles in content learning.

Strategies	% of pupils		Median	Mode
	Disagreed <sup>a</sup>	Agreed <sup>b</sup>		
State objective	4.6	75.9	4.00 <sup>c</sup>	5
Activate prior knowledge a) link new with prior learning	5.7	77	4.00	5
b) see in an advance organizer what is going to follow	12.6	63.2	4.00	5
Differentiate teaching – get involved in a variety of activities	14.9	67.8	4.00	5
Climate a. cooperative	4.6	75.9	5.00	5
Climate b. competitive - games	8	77	5.00	5
Climate c. individualistic	13.7	64.3	4.00	5
Meaningful learning	18.4	54	4.00	3
Interest – consolidate content through memory games	8	82.7	5.00	5
Use strategies e.g. find information from pictures, the titles etc	13.8	73.5	5.00	5
Cooperative learning	4.6	75.9	5.00	5
Practise with exercises on handouts or orally	9.2	73.6	5.00	5
Reinforce – get prizes when completing correctly the tasks	12.6	74.7	5.00	5
Review-Notetaking	14.9	60.9	4.00	5
Deal with activities at various levels of difficulty in order to experience success	6.9	70.1	4.00	5

<sup>a</sup>Students either perceived the item as having very limited or limited importance. <sup>b</sup>Students either agreed or absolutely agreed with the importance of the item. <sup>c</sup>Very limited importance; limited importance; some importance; considerable importance; great importance

**Table 7:** Percentages of CLELD+LEA students (N=87) who disagreed and agreed with the importance of the CLELD strategies on content learning

Pupils believe that content learning can be promoted when the teacher mentions the lesson's objective, activates prior knowledge, differentiates instruction, creates various classroom climates: cooperative, competitive, individualistic, presents content comprehension games, reinforces effort, and encourages notetaking. The majority of pupils (82.7%) believe that educational games are very important for content learning and retaining new material. This preference points to the interests of the learners in primary schools.

### 6.2.3 Data Source 3: Teacher interviews

Collectively, the teachers confirmed the usefulness of the CLELD instrument for developing subject matter knowledge. As teacher 3 commented, the students 'learned the new material to a great level'. In fact the teachers confessed that lessons were more interesting with CLELD.

Teachers were also cautioned that learning subject through CLIL might pose some difficulties to the learner due to the existence of difficult scientific terminology, which on

top had to be learned in L2. They strongly agreed that the students in the CLELD+LEA classes faced fewer difficulties. As teacher 3 said, in the CLELD+LEA case, ‘new vocabulary was not a problem’. This comment suggests that the way new vocabulary was treated in the CLELD+LEA classes made it easier to acquire content.

There was a general agreement that the students in the CLELD+LEA classes did not face serious difficulties in learning content, unlike children in the CLELD-LEA classes who faced more difficulties. As teacher n.1 stressed, ‘learning occurred more naturally’ in the CLELD+LEA case’.

#### **6.2.4 Data Source 4: Classroom interaction**

Classroom interaction data provided information for answering the second research question which refers to whether CLIL+CLELD promotes subject matter learning.

##### 6.2.4.1 Clarity

###### 6.2.4.1.1 Inform learners of the objectives

The teacher informed the students of what they would learn at the beginning of the lesson.

- (24) T: Well, today we are going to listen, read, write, and talk, about  
how to find the area of a circle (.) We are going to  
CALCULATE the area of circular discs. Ti simeni {what does  
it mean} calculate the area?

S: Na ipoloyisoume to emvadon {calculate the area}

(Maths lesson 5)

Students were told how they were expected to demonstrate competence in the new content. By stating the lesson’s objective, learners were allowed to focus their search and retention processes on target aspects of knowledge or processes of the lesson.

###### 6.2.4.1.2 Build on prior knowledge

In the following extract, the teacher aimed to elicit prior learning. The student’s reply in the answering move was correct. So, the teacher accepted the correct answer and continued to initiate further discourse. A student gave the correct answer in line 5. The teacher responded with “Okay” and asked the children to provide a missing word in order

to form an equation which they have learned in the previous lesson. The student's answer was correct so the teacher praised him in the follow-up move. This act of recalling prior knowledge would later serve as the basis to build new learning. Therefore it is a valuable component in the CLELD model as it enables the development of content learning.

- (25) T: What do we use to draw a circle? Ti xrisimopio {what do I use}? Raise your hand. To draw a circle.  
S: Compass.  
T: A compass. Okay. If the diameter is four, the radius is (.)  
S: Two.  
T: Two. Very good. Okay. The diameter is two times the (.)  
S: Radius.  
T: The radius. Very good. (Maths lesson 4)

#### 6.2.4.1.3 Provide differentiated instruction

Activities addressed various learning styles providing opportunities to all the children to show understanding. For example, for musical rhythmic intelligence, children tapped phrases rhythmically:

- (26) T: Let's sing. Let's clap with our hands (.) TWO times the RADIUS, gives the DIAMETER. All together now.  
Ss: TWO times the RADIUS, gives the DIAMETER.  
(Maths lesson 2)

Several activities involved movement for addressing kinesthetic learning style. For example, the teacher asked the students to use their hands to show the diameter and the radius of the circle.

- (27) T: Can you please show the diameter? I want you to use your hands  
Ss: ((Students open both hands))  
T: Very good. This is a diameter. This is another diameter.  
Okay. Now. Use again your hands to show me the radius.  
Ss: ((Students raise one hand))  
T: Bravo. One hand. (Maths lesson 1)

Some of the tasks and activities were easier than others in order to provide opportunities to all the students to participate. For instance, the first part of the following gap filling task was answered by a weak student while more extended answers were provided by more advanced students. Overt corrective feedback was provided by the teacher (line 5), which helped the student to continue and report the answer successfully (line 6).

- (28) T: Now. Look carefully. I want you to have a look at these  
two sentences and choose, only one, to answer, okay? I  
want you to think and tell me. Yes.
- S: Eeh. Brazil, products, eeh ((pause))
- T: Produces.
- S: Electric energy.
- T: Bravo. Electric energy. Now. Brazil is developing (.)  
Why? Do you remember the three reasons? Who wants to  
answer this question? Eeh? Why is Brazil developing?
- S: Energy.
- T: Yes, it produces electric energy. Number two.
- S: They use alcohol to move cars.
- T: Bravo. They use alcohol to move cars. And number three.
- S: Oil in the Atlantic.
- T: Yes, they found oil in the Atlantic. Excellent. Okay.

(Geography lesson 3)

Differentiated teaching raised student participation to the maximum in the classroom. Therefore, this CLELD item seems to be important for activating the learning processes of high, medium and low achievers in the class.

#### 6.2.4.2 Variety

##### 6.2.4.2.1 Vary modes of presentation

Children carried out experiments in groups to reach conclusions. For example, students took a piece of cardboard, placed it on a glass filled up with water, and turned the glass upside down in order to reach the conclusion that the atmospheric pressure is applied in all directions. The experiment activated the students' interest, who were led to conclusions related to content. The student in the following extract reported: 'All', which is the correct conclusion regarding the direction in which the atmospheric pressure is applied.

(29) T: So, to which direction is the atmospheric pressure exercised? To?

S: All

T: Bravo, bravo. (Science lesson 1)

Alternatively, the teacher carried out demonstrations as shown in extract 30, where the teacher cut a circle in pieces and put the pieces one next to the other in order to show the children that the area of the circle is close to the area of parallelogram. Children responded positively at the various stages of the demonstration (lines 11, 13, 19 and 31).

(30) T: Now. I have got three circles. This is the base of a bottle.  
Ene e vasi mias boukalas kiklikis, enas kiklos {it is the base of a bottle, a circle}. We cut it. We cut this circle (.) I cut the circle in eight equal parts, eight equal parts (.) ki afta ta kommatakia tha ta valo to ena dipla apo to allo na ftiaxo ena {I will put these pieces one next to the other to make a} shape. A shape similar to the parallelogram. Similar to the parallelogram. Okay? Do you understand?

Ss: Yes.

T: So, what is the area of shape one?

S: Two times seven.

T: Two times seven. How much is it?

S: Fourteen.

T: Fourteen square centimeters. Afto ine to emvadon tou parallilogramou {this is the area of the parallelogram}.

Hmm? So, it's the same with the area of the circle (.) Half circumference, ine e misi periferia epi afto {it's half circumference times this}, ine e {it's the}

Ss: Radius.

T: E aktina {the radius}. Bravo. The radius. So (.) Yia na vro to emvadon, prepi na pollaplasiaso {to find the area I must multiply}, half circumference, te misi periferia {half circumference}, times the radius, okay? (.) Pios na mou thimisi ton typo tis, tis periferias {who wants to remind me the equation of circumference?} Diameter

Ss: Times three point fourteen.

T: E misi periferia? Anti {Half circumference? Instead of }  
diameter, ti tha po {what do I say?}

S18: Diameter.

T: Bravo S18.

S18: Radius.

T: Radius times radius times three point fourteen.

(Maths lesson 5)

The students were scaffolded by the teacher and they were gradually led to find the area of the circle. Their answering moves, in lines 11, 13, 19, 26 and 31, showed that they comprehended what the teacher was asking and they responded correctly.

The students were also assigned to investigate a topic themselves and find out the answers to certain questions.

(31) T: Okay. Now. Farming, ktinotrofia {farming}, farming,  
farming. Can you please look at page 54, and tell me, what  
animals are there in Brazil? In the farms.

S24: Eeh, cows.

T: Cows, excellent, S7.

S7: Eemm, eemm, provata {sheep}

T: Sheep, okay, sheep. What else? (.) What are these animals?

S14: Pigs.

T: Bravo. Team B. There are pigs, okay. There are pigs, goats,  
sheep, cows, ox, ox ine to vodi {is the ox}, oxen the plural.

S7: Hen

T: Yes, poultry, poultry, poulerika {poultry}

(Geography lesson 4)

In the above extract, the teacher initiated classroom interaction using a problem solving task. The students worked individually and found out the correct information from the map. Their answers in lines 4 and 8 were correct. The answer in line 11 was correct. However, the teacher restated the answer using a more appropriate word, exposing students to the target vocabulary.

The data from these extracts suggest that the variety of the types of tasks employed in the CLIL classroom raised student participation and production of the new language. Therefore, varying modes of presentation in the CLIL class could enhance the students' subject matter learning.

#### 6.2.4.2.2 *Use various types of questions*

A variety of questions were used: questions asking for information, seeking clarification and asking for opinions.

Questions evaluated the students' knowledge. Student 20 gave the right content-related words: 'public houses', exhibiting that knowledge has been retained.

- (32) T: What did they do to face the problems? What does the government (.) What did the government do? They built (.) What houses? Do you remember? What houses? What did (.)  
Yes, S20.  
S20: Public houses.  
T: PUBLIC houses. Excellent. Public houses.  
(Geography lesson 4)

Questions served as ongoing evaluation of comprehension. For instance, the response provided by Student 16 in extract 33 showed understanding, so the teacher acknowledged, in line 5, that the student was right.

- (33) T: I'm going to press the balloon. What will it happen if I press it? (.) Look. It goes out. The air goes out. Where is there more pressure, inside or outside the balloon? Yes, S16.  
S16: inside  
T: Inside the balloon. Okay. (Science lesson 1)

The students interpreted information from maps reporting target words such as the one in line 2 of the following extract: i.e. 'east', which described content-related information.

- (34) T: It doesn't rain often (.) In which area? East or west?  
S: east

T: Bravo

(Geography lesson 2)

The students were called to form hypotheses as shown in the following extract. Their thinking processes were activated successfully as shown in lines 3 and 5.

- (35) T: To which direction is the atmospheric pressure exercised? (.) What do you think?  
S1: apo kato pros ta pano {upwards}  
T: Okay. Well. What do you think, S6?  
S6: From the sides. (Science lesson 1)

The learners provided explanations. When a student found difficulty in producing the appropriate target word, the teacher intervened and scaffolded conversation as shown in line 6. The student's answer in line 10, although minimal, showed understanding of new concepts.

- (36) T: Now. Look at this octopus. The octopus hooks. Hooks on the man's hand (.)  
Why do the suction cups stay on the man's hand? What is this force?  
S: The atmospheric pressure press the ((pause)).  
T: Bravo, presses the suction cups.  
T: Is there air under the suction cups? Echi aera apo kato apo tis ventouzes? {Is there air under the suction cups?}. What do you think S12?  
S12: No  
T: No, there is no air under the suction cups.  
(Science lesson 3)

Questions required students to transfer new knowledge to new situations. The students' answers, in lines 3 and 5, showed that they were able to generalize new knowledge to new situations.

- (37) T: So, in Troodos, in Troodos is there high pressure or low pressure? What do you think?

S24: low pressure

T: low pressure. Bravo S24. Here at the beach? In P?

Ss: high

T: Very good, high pressure because there are (.)

S: more layers

T: Bravo. Excellent. More layers of air. (Science lesson 2)

It seems that when students interact directly with the content presented to them through a variety of content questions recalling and understanding of subject material can be enhanced. So, the use of various types of questions which is one of the CLELD items seems to contribute positively to CLIL students' subject matter learning.

#### 6.2.4.2.3 Create various classroom climates

Children in CLELD classes had opportunities to work in various classroom climates. For instance, opportunities for cooperative learning were provided. Working and thinking with peers in groups encouraged children to exchange ideas and confirm the correctness of their views. For instance, in the following extract, the teacher's opening move, in lines 1-3, elicited the correct answer after the children had talked about it in their groups.

(38) T: I want you to, to think in your group and write down your answer. I'm going to give you a marker. Hmm? Why do we press the dropper? Hmm?

Ss: ((students think))

T: Group B. Yes, S18.

S18: To push the air out.

T: To push the air out. (Science lesson 3)

Competitions between groups stimulated students' efforts. Students reported content-related answers, such as 'The air has weight', and the 'The air can deform bodies' (extract 39).

(39) T: Now, I want you to make a sentence with this word, okay?  
One point for each sentence that you make, okay? Weight.

S: The air has weight.

T: The air has weight. Very good. So, you get one point. What about this group? Can you please tell me a sentence using

this word? Deform, paramorfono {deform}. What can the air do? Hmm? X?

S: The air can deform (\*)

T: Louder please

S: The air can deform bodies.

T: Bravo. So both teams are equal. (Science lesson 1)

Students were also allowed to work independently. Pupils answered questions (line 3) gaining individual points.

(40) T: Do you remember this thing that we measure the atmospheric pressure? It begins with b.

S: barometer (Science lesson 3)

A combination of competitive, cooperative, and individualistic climates promoted variety and seemed to have raised the learners' interest in lesson delivery. This combination is a valuable tool included in the CLELD model which can promote CLIL students' content learning.

#### 6.2.4.3 Task orientation

##### 6.2.4.3.1 Lesson plans reflect curriculum features

Lesson plans strictly adhered to the objectives outlined in the curriculum. The goals of all lessons were the ones included in the curriculum.

##### 6.2.4.3.2 Match goals with instruction

Activities matched the lessons' objectives in order to promote learning. For instance, children were asked to put some words in the correct order in order to form an equation.

(41) T: Now. Look at this (.) Can you put it in the correct order?

S7: Eeehh. Circumference (.)

T: circumference

S7: equals

T: equals

S7: Eeeh, diameter

T: diameter, times

S7: times three [point fourteen].

T: [point fourteen]. (Maths lesson 3)

In the above extract, the teacher encouraged the learner to form the equation. The learner managed to retrieve new terms and combine them in an appropriate way to form the equation. The extract shows that goal-oriented activities allow the learner to spend time-on-task. Therefore, learning time is maximized.

#### 6.2.4.3.3 *Objectives consider various levels of cognitive complexity*

Lessons included both lower order level objectives, such as reporting that we measure atmospheric pressure with a barometer, and higher order level objectives such as explaining and justifying that by reducing air from a certain space, the results of air pressure are made obvious (Science lessons 2 and 3). Students responded positively both to lower and higher order level objectives, thus showing that they learned the new material.

The students were required to show that they learned new material. For instance, the child in the following extract managed to form the equation successfully.

(42) T: I want you to put the words and the symbols in the correct place (.) What is the equation of the area? Hmm? What is the equation? Do you know? Yes?

S: Radius radius

T: Area

S: Area equals radius times radius times three point fourteen.

(Maths lesson 4)

They were also called to apply new knowledge. The student in extract 43 used the equation and calculated correctly the area of a circle. Although, he was tempted to answer in L1, the teacher prompted him to continue in L2 and this was done successfully.

(43) T: The radius is ten. What is the area? (.) What is the (..) area?  
Yes, S3.

S3: Eeehh, three (.) trakosia dekatessera {three hundred and fourteen}

T: Three hundred (.)

S3: Three hundred fourteen.

T: Bravo, S3. And fourteen square centimeters.

(Maths lesson 4)

The students were able to provide explanations to some phenomena caused by atmospheric pressure using a limited vocabulary (extract 44). The student's answer to the teacher's opening move (lines 3-4), showed understanding and ability to give explanation based on what was learned (line 6).

(44) T: Look at the second picture. Two suction cups. Ventouzes {suction cups}. Press them together. Then, they are not separate. Cannot separate. Den mbori na chorisoun {they cannot separate}. Why? What is the force which is pressing them together? Ah? S7?

S: The atmospheric pressure. (Science lesson 1)

The learners also formed conclusions. In the following extract, they were required to show whether they understood the reason why it was easier to pull the bag out of the vessel. The students' answer in line 5 shows that they reached the correct conclusion.

(45) T: Why did you pull easier the bag out of the vessel? (.)

S: Because we made holes. So, there was more air.

T: Yes, very good. There was more air under the bag, so, the inside pressure was the same as the (.)

Ss: outside

T: outside pressure. So, ehmm, we could pull out easily our bag.

(Science lesson 2)

The above extracts illustrate that when activities correspond to objectives of various complexity, then students can approach new learning employing initially lower and then higher order thinking skills. Learning can therefore be more effective. As a result, this appears to be a necessary component of the CLELD instrument.

#### 6.2.4.3.4 *Select appropriate instructional model*

Appropriate instructional models were employed in the CLELD classes. Science lessons were mainly based on experiments which led students to form conclusions, since English language proficiency and Science learning can develop through “inquiry-based Science instruction” (Lee, 2005: 505).

For example, the students carried out an experiment to see that the atmospheric pressure can exercise great forces. They pulled a plastic bag out of a vessel and saw that it would not come out.

- (46) T: You've got in front of you. You've got a vessel. Afto to dochio {this vessel}, a vessel. I put a plastic bag here. I want you to try to pull the thread, pull the thread, and tell me, hmm? What do you observe? (.) Can it come out?
- Ss: No.
- T: No, it can't come out. I want you to try. Take your pencil and make a hole. In the bag. In the inside. Yes, make some holes.
- Ss: Etsi? {like this?}
- T: Yes, like this. Very good. Now, lets try to pull the thread again. What (.) What happened now? Hmm?
- S7: It can come out easily.
- T: Easily. Bravo, S7 (.) Stin proti periptosi {in the first case} The bag couldn't come out because (.) Was there much air under the bag?
- S: No.
- T: No. Because I pressed the bag and there wasn't much air under the bag (.) Is there high or low pressure under the bag?
- S: Low.
- T: Hmm? Bravo. Low pressure ((pause))
- S: The atmospheric pressure
- T: The atmospheric pressure was pressing it. (Science lesson 2)

Student 7 made a successful observation: ‘It can come out easily’. Children managed to provide explanation as to why they could pull the bag out with ease. They attributed it to ‘low’ atmospheric pressure.

#### 6.2.4.3.5 Assign meaningful, goal-oriented activities

The students were asked to estimate answers. They made measurements and responded to the teacher’s requirement in the opening move (lines 1-3), which shows that they comprehended the meaning of the new concept: ‘area’. Their answers, in lines 9 and 14, show that they were involved in the task and they carried it out successfully.

- (47) T: Epologiste peripou, posa koutakia {estimate about, how many squares}, how many squares we need for the area of (.), of the glass, okay? We are going to do the same to find the area of a tin and a cellotape (.)
- Ss: ((Students start counting the squares that each shape covers))
- T: Tell me now, what is the area of the cellotape? Tou speed fix {of the cello tape}, What is the area? (.)
- S18: Thirty four
- T: Thirty four centimeters. The area of the cellotape is thirty four centimeters. And what is the area of the tin? To tenekedaki {the tin} Poso vrikate to emvadon tou {what is its area}?
- S20: Forty.
- T: Forty-five. About forty-five, forty-six square centimeters.
- Okay. (Maths lesson 4)

In the next extract, the teacher initiated interaction by asking children to synthesize information, which is a highly meaningful activity. They managed to do this successfully by reporting various products and therefore using new words such as, e.g. ‘tobacco’ and ‘citrus fruit’.

- (48) T: Now, I want you to compare, na sigrinoume {to compare}, compare the products, ta proionta {the products}, the products of Egypt, Cyprus, and Brazil. Okay? Now, Do you know some products of Cyprus, that we can’t find in Brazil

and Egypt? Hmm?

S: Potatoes

T: Potatoes. What else?

S: Olives

T: Olives, bravo, and carobs. In Brazil? What did we say about Brazil?

S: Coffee

T: Coffee. Bravo.

S2: Tobacco.

T: Okay, tobacco. Excellent, S7.

S: vamvaki {cotton}

T: cotton. Okay. Do you know anything in common? In Cyprus and Brazil? Hmm?

S: Citrus fruit. (Geography lesson 3)

The students responded positively to meaningful activities. Therefore, this CLELD item seems to contribute to the enhancement of subject matter knowledge.

#### 6.2.4.4 Engagement in the learning process

##### 6.2.4.4.1 Promote interest – Games

Activities included memory games which examined comprehension and enhanced retaining of new material. Games promoted excitement and participation. For instance, the children formed two groups and played ‘Who wants to be a millionaire’ answering questions related to the content taught. Children responded with an exclamation showing enthusiasm (line 3). The student in line 7 answered correctly using a target word: ‘southwest’.

(49) T: We are going to play now. We are going to play.  
Who wants to be a millionaire?

Ss: Wo:::w

T: Now. I want you to find the correct answer. You are in Cyprus. Brazil is on the (.) Which is the correct answer? Brazil is on the (.)

S: Southwest.

T: Southwest, noteodeteka (southwest), bravo. You get one

point.

(Geography lesson 5)

Competitions aroused interest as shown in line 2 of the following extract and increased production of new concepts: ‘great forces’ (line 6).

(50) T: Let’s play football

SS: Football!!

T: Now, number one, question number one, what can the atmospheric pressure exercise? What can it exercise? Yes, X.

Sx: Great forces.

(Science lesson 2)

Students responded with enthusiasm and recycled new knowledge while playing memory games. This demonstrates the importance of this CLELD item in promoting content learning.

#### 6.2.4.4.2 *Encourage the use of learning strategies*

The students were asked to elicit information from pictures. For instance, they were asked to identify areas of high pressure in a picture. The teacher initiated interaction by asking students to get information from a picture. A student provided the correct target words: ‘high pressure’ (line 4).

(51) T: Have a look at this picture ((pause)) Look at the sea. There are many layers of air pressing the sea. Hmm? (.) Is there high pressure or low pressure on the sea?

S: high pressure

T: Yes, there is high pressure on the sea. Very good.

(Science lesson 2)

The use of various learning strategies was a successful teaching technique which promoted content learning in the CLIL class. This suggests that various learning strategies should be a vital component of the CLELD instrument which can develop subject matter learning.

#### 6.2.4.4.3 Assign cooperative work

The students were systematically assigned cooperative work. The phrase ‘work in pairs and write your observations’ was heard many times. They helped one another and carried out tasks successfully. In extract 52, they talked with each other in their group and responded correctly to the teacher’s question, by using at the same time, new content words such as ‘overpopulation’ and ‘poverty’. Successful work in cooperative teams suggests that cooperative learning is an essential item of the CLELD model that should be considered by CLIL teachers.

- (52) T: So, I want you to have a look at these pictures and open your handouts, page 13, and work in pairs, read and find out the problems of Brazil. Find out the problems of Brazil. Underline the problems.
- Ss: ((Students read and talk with peers))
- T: Now. Everybody have a look here. I have a list of problems here. I want you to tell me, which of these are Brazil’s problems? Aah? Which are the problems of Brazil? Yes?
- S: Overpopulation.
- T: Overpopulation. Look. Many people live there. Lots of flats. Lots of houses. Okay. Many people live there. Big cars. Is this a problem?
- Ss: No.
- T: What else? Yes, S7.
- S7: Poverty. (Geography lesson 4)

#### 6.2.4.4.4 Provide guided practice

The students were provided with opportunities for practising or applying new knowledge through handouts, questions, verbal or written exercises.

In the following extract, the children were practicing on finding the circumference of a circle. They were guided by the teacher, who started pronouncing the equation and explained that they had to substitute a letter with a number. The student in line 4 responded correctly. Then, the teacher provided scaffolding with respect to the calculation that had to be carried out. A student reported the answer in line 8.

- (53) T: Na vroume tin periferia tou kiklou {lets find the circumference of the circle} Grapsete {write} Pi {pai} equals.  
 Anti d valte {instead of d write} ((pause))  
 S: Twenty-five.  
 T: Bravo. Twenty-five times three point fourteen, and CALCULATE. Epologiste to {calculate it}. Use your CALCULATOR. It is ((pause))  
 S: Seventy-eight point five.  
 T: Seventy-eight point five meters. (Maths lesson 3)

#### 6.2.4.4.5 *Reinforce effort and provide recognition*

Verbal praise was given by the teacher to individuals (e.g. 'Bravo'), as well as individual points with the aim to raise the students' motivation. Points were also given to groups for correct answers in games. For instance, in extract 54, the teacher prompted the children to answer a content question. A student answered correctly and the teacher gave a point. This served as a stimulant for other pupils to participate. Student 4 gave a correct content-related answer in line 8.

- (54) T : You are group A, you are group B. Okay ? Eeh, group A.  
 In Brazil is (.) What is the correct word. With high temperatures. It is (.) What do you think ?  
 S : hot  
 T : It is (.) It is hot. You get one point. Okay. It is hot. Your turn now. The climate in Brazil is (.) Hmm? Do you remember (.) Raise your hand and tell me.  
 S4 : tropical  
 T : Yes. It is tropical. One point to each group.  
 (Geography lesson 2)

The above extract demonstrates that the reinforcement of effort can stimulate participation and production of content-related knowledge. This suggests that effort reinforcement is an important item in the CLELD model which can promote subject matter learning.

#### 6.2.4.4.6 Assess progress and provide feedback

Feedback was given to individuals, groups and whole class. This included smiles, nods, talking with groups or giving answer keys, showing PowerPoint slides etc.

Group performance was assessed through activities such as stand up/sit down and other activities. The following extract shows that the students responded positively to the teacher's statement. Then, they provided the correct explanation in line 7.

- (55) T: Now. If this is true, stand up. If it's wrong, sit down. Mr Brown is very strong, strong. So, he doesn't feel the atmospheric pressure.  
Ss: ((students remain seated)).  
T: Very good. It's not because he's strong. Why he doesn't feel it? Because the inside pressure (.)  
Ss: neutralizes  
T: Bravo. Neutralizes the atmospheric pressure.  
(Science lesson 1)

Feedback was also given to individual students as shown in the following extract line 5.

- (56) T: Pi times the square of radius (.) Pedia, pia ine e sosti apantisi, ine e diametros {children, what is the correct answer, is it the diameter}, diameter, the area, or circumference?  
S1: Area.  
T: Area. Bravo, S1.  
(Maths lesson 5)

Monitoring student progress was found to contribute positively to learning the new content by raising awareness as to whether they had perceived things correctly. Therefore it can be considered to be a vital item of the CLELD model which can promote content learning.

#### 6.2.4.4.7 Reviewing new content and language knowledge, Summarizing, Note taking

The teacher reviewed and summarized important concepts during and at the end of lessons. In the following extract, the teacher's questions examined whether children had retained new content. The students responded correctly as shown in lines 6 and 12.

- (57) T: Have a look here. Today, we learned that the air has weight.  
 Hmm? We (.) inflated the balloon, fouskosame to baloni {we inflated the balloon} and (*we saw that*) it has weight. Okay?  
 So, the air exercises pressures ((pause))  
 T: To which direction is pressure exercised?  
 S: To all.  
 T: To all directions. And then, we saw some applications  
 ((pause))  
 What did we see? Hmm?  
 The suction cup is on the wall. Ti ine afto pou esproxe ti ventouza? {What is pushing the suction cup?}.  
 Ss: Atmospheric pressure.  
 T: The atmospheric pressure. The outside atmospheric pressure.  
 (Science lesson 1)

Note taking was encouraged:

- (58) T: I want you to open your writing journals. I want you to write productive resources and write also about the development of industry.  
 Ss: ((Students write down Brazil's productive resources: Oil, electric energy )) (Geography lesson 3)

The students responded positively to reviewing, which gave the teacher the opportunity to confirm whether they had focused their attention to the lesson's main points and whether they had learned them. So, reviewing can also be considered an essential CLELD item which can enhance subject matter learning in CLIL classes.

#### 6.2.4.5 Medium to high success rate

##### 6.2.4.5.1 Sequence lessons based on prior learning

CLELD lessons were carefully designed to be sequenced on prior learning. For example, in the third lesson of Geography, students were able to find the products of Brazil because they based new material on prior learning (second lesson), which related to the country's climate and the morphology of the ground. The teacher therefore prompted children to think about the country's products and they gave the right word in L1 (line 3 of the extract).

- (59) T: The forests of Amazon. What do you think? What do they give?  
 Ss: xelea {timber}  
 T: Which picture is the correct one? Number 1, 2, or 3?  
 S24: Three.  
 T: Bravo, S24. Number 3. So, they get caoutchouk they get caoutchouk, from the trunks of caoutchouk trees.  
 (Geography lesson 3)

The learning process is facilitated when new material is built on prior learning, and lessons are logically sequenced, as learners make logical connections between the various content-related items. Therefore, sequencing lessons on prior learning seems to be a vital item of the CLELD model which can facilitate subject matter learning.

6.2.4.5.2 Plan transition to new material in manageable steps

Transition to new material was planned in easy to grasp steps. For instance, in the third Science lesson, learners were informed of the objectives from the start:

- (60) T: We are going to see some phenomena caused by atmospheric pressure ((pause)) (Science lesson 3)

Then, prior knowledge was recalled. Student 2 reported a correct answer (extract 61).

- (61) T: The higher we go, the greater is (.)  
 S2: The reduction of atmospheric pressure. (Science lesson 3)  
 T: So, there is not much atmospheric pressure, on the top of a mountain. Yes? (Science lesson 2)

A funnel and paper experiment was carried out to reach conclusions.

- (62) T: The atmospheric pressure is pressing the paper to go  
 Sx: In the funnel. (Science lesson 3)

Children were then called to synthesize their observations from two experiments. Student 2 managed to do this successfully (extract 63, line2).

(63) T: What happened in both cases? Hmm?

S2: In both cases, the inside pressure is reduced.

(Science lesson 3)

The lesson ended with reviewing and note taking. Planning transition in manageable steps helped pupils to cope effectively with new material, understand and retain new content and language. Therefore, we consider plan transition in manageable steps to be an important element in the CLELD model which can promote subject matter learning in the CLIL class.

#### *6.2.4.5.3 Instruction produces moderate-to-high success rate*

Learners were involved in teacher-student interaction. They responded positively to the teacher's questions which were designed to produce moderate-to-high success. For instance, the proper instructional method such as the experiments in Science helped the children to make observations using target words (extract 64, line 2).

(64) T: What does the atmospheric pressure do? Hmm?

S2: Presses the paper in the funnel. (Science lesson 3)

The students were easily led to conclusions. They measured the circumference of circular objects as well as their diameter. They divided the circumference by the diameter and formulated the equation of the circumference. Then, they solved problems successfully (extract 65, line 4). The teacher confirmed that the answer was correct by saying 'Okay', in the follow-up move.

(65) T: The circumference of the back wheel is (.) two hundred and eighty-two (\*). Yes. What is its diameter (.) What did you do  
S2?

S2: Eeeh. We divided 282.6 by 3.14.

T: Okay. (Maths lesson 3)

True-false activities demonstrated that students understood new concepts (extract 66, line 5)

- (66) T: If this is true, hands up, if it's false, hands down. Read it please loudly.  
S7: All people in big towns of Brazil are rich.  
T: Is it true?  
Ss: No ((Students put their hands down)) (Geography lesson 4)

The selected extracts indicate that when students spend more than the average time on high-success activities, they are more likely to understand, interact with new content and retain it. According to Borich (2007), learners need to spend about 60% to 70% of their time on tasks that allow almost complete understanding of the material being taught' (p.16). Errors need to be only occasional. If a moderate-to-high success rate is achieved, then mastery of the content can then be produced. This suggests that the particular item is a useful strategy included in the CLELD that can promote content learning in CLIL classes.

In general, extracts from classroom interaction show that the CLELD components promote students' involvement in the learning process and increase their output production. Therefore, the CLELD model could be a necessary tool which can help the teacher develop learners' subject matter knowledge.

#### **6.2.5 Summary**

The data show that subject matter knowledge in the CLIL class can be enhanced by employing the CLELD model. Test scores show that learners in the CLIL+CLELD+LEA classes exhibited a significant development in content knowledge. The majority of students reported in the questionnaires that the CLELD key behaviours had a positive influence on content learning: stating the objective, activating prior knowledge, differentiating teaching, using a variety of teaching climates, providing meaningful tasks and promoting interest through games. Teachers mentioned the importance of the CLELD items.

Classroom interaction data show that the use of the CLELD model has a positive impact on content learning. Clarity was achieved by informing learners of the objectives. Prior learning was recalled successfully. Differentiated instruction gave opportunities to all the students to show comprehension. Variety promoted students' participation. This was achieved by varying modes of presentation. Learners managed to reach conclusions,

watched demonstrations and reported observations. Various questions elicited answers related to the subject matter. Various classroom climates promoted participation and answering of questions. Task orientation helped students to focus on the new content. Lessons reflected curriculum features and the activities matched the aims of the lesson. Students managed to produce new concepts in related manner to form equation (extract 40). Objectives took into account various levels of cognitive complexity. Students participated in the activities, e.g. they found the area of a circle (extract 42). An appropriate instructional model helped the children to reach conclusions. Learners had the chance to interact with new content through meaningful activities.

Engagement in the learning process attracted learners' interest. Active involvement was promoted through games. Children reported answers related to new content. They also accessed new material using learning strategies such as getting information from pictures. Guided practice helped children to apply new knowledge, while effort reinforcement promoted participation and production of answers. Feedback provided information about the correctness of answers. Medium to high success rate activated learners involvement. Sequencing lessons based on prior learning facilitated the creation of connections between prior and new learning. Planning transition in manageable steps helped students to respond. Instruction produced moderate-to-high success rate and thus allowed effective learning.

In general, the data suggest that the CLELD components which relate to effective content teaching facilitate effective learning of content.

### **6.3 Research Question 3: Does CLIL lead to better language proficiency in the area of L2 vocabulary knowledge as compared to traditional learning through L1? Are there significant differences in L2 vocabulary acquisition for pupils attending CLIL classes following the CLELD model with Language Enhancement Activities (LEA) versus pupils in CLELD without LEA?**

#### ***6.3.1 Data source 1: Experiments***

The means and standard deviations of students' vocabulary performance before the implementation of CLIL, at the end of, and 3 months after implementation of CLIL in the two experimental and control groups are shown in Table 8.

**Means and standard deviations for attainment of students at the control and the experimental groups during various stages of CLIL implementation**

Assessment	Control group		Experimental – CLELD without LEA		Experimental– CLELD with LEA	
	M	SD	M	SD	M	SD
<b>Before CLIL</b>						
Geography vocabulary test	9.97	6.13	10.49	6.40	8.88	9.12
Science vocabulary test	6.87	6.66	8.60	8.71	9.40	9.23
Maths vocabulary test	18.13	13.70	15.20	9.64	15.57	13.73
<b>End of CLIL</b>						
Geography vocabulary test	11.04	6.81	15.01	8.19	33.06	17.08
Science vocabulary test	8.10	7.48	14.60	10.88	32.00	18.47
Maths vocabulary test	18.35	13.37	26.64	14.41	50.29	22.90
<b>Three months after CLIL</b>						
Geography vocabulary test	11.34	6.94	14.13	7.80	27.93	16.54
Science vocabulary test	8.46	7.65	12.37	9.97	25.63	17.91
Maths vocabulary test	19.24	13.54	21.32	13.60	37.27	20.27

**Table 8:** Means and standard deviations for attainment of students at the control and the experimental groups during various stages of CLIL implementation (Vocabulary tests)

**6.3.1.1 Geography Experiments**

The two Geography experiments involved one control group that learned content through L1 Greek, and two experimental CLIL groups (CLELD without LEA and CLELD with LEA). The groups included 41, 51, and 44 eleven year old learners respectively.

Comparisons between the three independent groups revealed non significant differences regarding vocabulary knowledge at the outset of the study.

	Vocabulary pre-test
Chi-Square	3.925
df	2
Asymp. Sig.	.141

**Table 9:** Comparison of the three groups' vocabulary pre-tests (Geography quasi-experiments)

Wilcoxon test was carried out to compare the pre- and post- vocabulary scores of each subject of the L1, the CLELD without LEA and the CLELD with LEA groups (Tables 10 and 1).

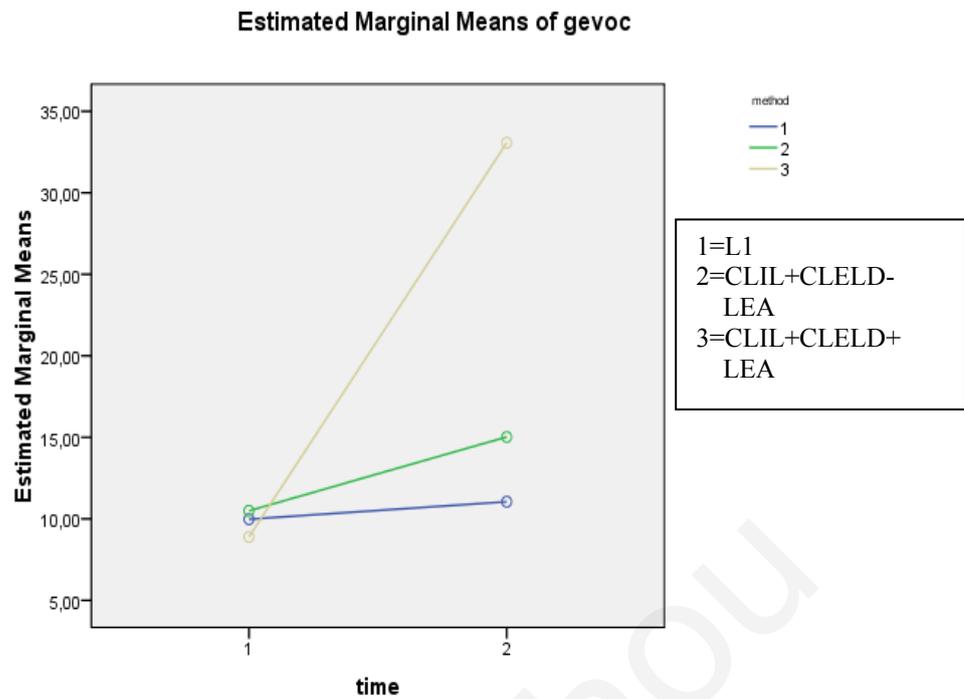
	Geography	
	L1	CLIL+CLELD-LEA
	vocabulary pre vocabulary post	vocabulary pre vocabulary post
Z	-3.266 <sup>a</sup>	-5.485 <sup>a</sup>
Asymp. Sig. (2-tailed)	.001	.000

**Table 10:** Pre-test, post-test comparison of vocabulary scores achieved by the L1 and CLIL+CLELD without LEA groups (Geography quasi-experiments)

The L1 group exhibited a significant difference in vocabulary learning. The mean increase of the L1 group in vocabulary learning could be attributed to out of school English language learning experiences such as taking private EFL classes. The two experimental groups also achieved a significant difference in vocabulary development.

Post-test comparisons between the three groups were carried out. A repeated measures multivariate analysis of variance (MANOVA) of treatment (Using L1, CLIL+CLELD without LEA or CLIL+CLELD with LEA) X Time (Before-Pre/End-Post) with student achievement in vocabulary tests as dependent variable was carried out. The results showed a significant method-Treatment X Time interaction,  $F(2,133) = 157.090$ ,  $p = .000$  for Geography vocabulary tests, favouring the CLIL+CLELD+LEA group.

Figure 15 shows that the students of the CLIL with CLELD without LEA group outperformed the children who learned content through L1 in vocabulary knowledge. The students of the CLELD with LEA group achieved higher grades than did students of the other two groups in vocabulary tests at the end of CLIL implementation. The findings show that the students of the CLELD with LEA group made more progress in this area.



**Figure 15:** Pre-test post-test comparison of the three groups' vocabulary scores (two Geography quasi-experiments)

### 6.3.1.2 Science experiments

The two Science experiments involved one control group that learned content through L1 Greek, and two experimental CLIL groups (CLELD without LEA and CLELD with LEA). The three groups included 39, 43, and 44 eleven year old learners respectively.

Pre test comparisons between the three groups showed that the three groups did not have any significant differences at the outset of the study in vocabulary ( $p = .444$ ) knowledge ( $p = .377$ ).

Science	
Vocabulary pre-test	
Chi-Square	1.626
df	2
Asymp. Sig.	.444

**Table 11:** Comparison of the three groups' vocabulary pre-tests (Science quasi-experiments)

Wilcoxon test was carried out to compare the pre- and post-scores of each subject of the L1, the CLIL+CLELD without LEA and the CLIL+CLELD with LEA groups (Tables 12 and 1).

	Science	
	L1	CLIL+CLELD-LEA
	vocabulary pre vocabulary post	vocabulary pre vocabulary post
Z	2.834	4.547 <sup>a</sup>
Asymp. Sig. (2-tailed)	0.005	.000

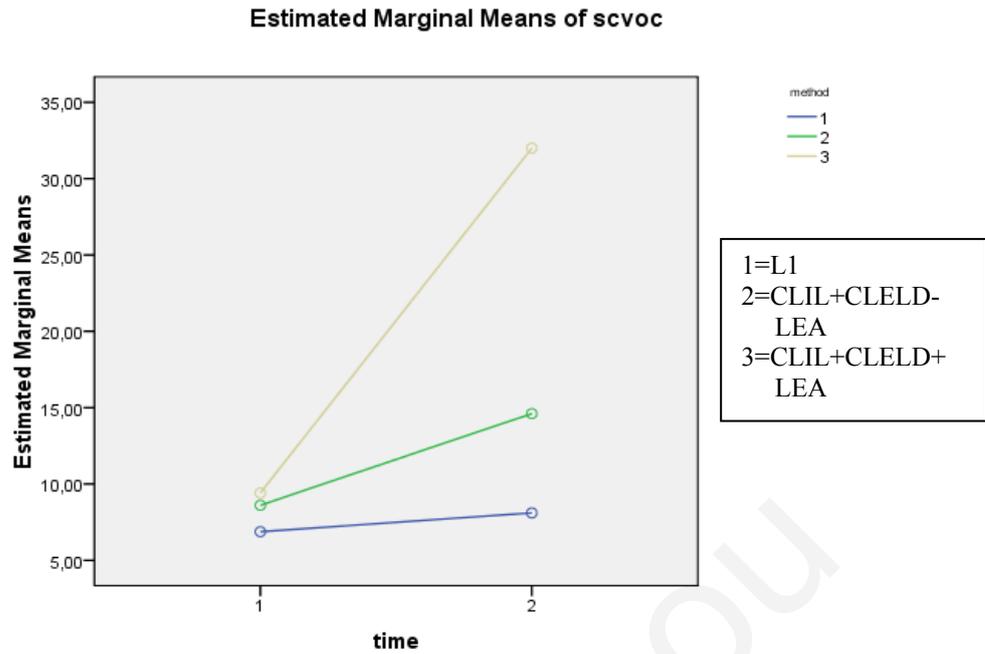
**Table 12:** Pre-test post-test comparison of vocabulary scores achieved by the L1 and CLIL+CLELD without LEA groups (Science quasi-experiments)

The L1 group, the CLELD without LEA and the CLELD with LEA group exhibited a significant difference in vocabulary learning ( $p = .000$ ).

A repeated measures multivariate analysis of variance (MANOVA) of treatment (Using L1, CLIL+ CLELD without LEA, or CLIL+CLELD with LEA) X Time (Before-Pre/End-Post) with student achievement in vocabulary tests as dependent variable was carried out.

The analysis showed a significant interaction between the method of CLIL instruction and time with performance in L2 vocabulary development favouring the CLELD with LEA method  $F(2,123) = 53.538$ ,  $p = .000$ .

Figure 16 shows that CLIL (without LEA) leads to better language proficiency in the area of L2 vocabulary knowledge as compared to traditional learning through L1. The students of the CLELD with LEA group achieved higher grades than did students of the other two groups in vocabulary tests at the end of CLIL implementation demonstrating that the students of the CLELD with LEA group had more gains in this area.



**Figure 16:** Pre-test post-test comparison of the three groups' vocabulary scores (two Science quasi-experiments)

### 6.3.1.3 Maths Experiments

The results of the two Maths experiments were calculated. The control group that learned content through L1 and the two experimental CLIL groups (CLELD without LEA and CLELD with LEA) of both experiments included 45, 50, and 47 eleven year old learners respectively.

Comparisons of the pre-tests showed that there were not significant differences in vocabulary ( $p = .561$ ) knowledge between the two experimental groups and the control group prior treatment (Table 13).

Maths	
Vocabulary pre-test	
Chi-Square	1.156
df	2
Asymp. Sig.	.561

**Table 13:** Comparison of the three groups' vocabulary pre-tests (Maths quasi-experiments) Wilcoxon test was carried out to compare the pre- and post-scores of each subject of the L1, the CLIL+CLELD without LEA and the CLIL+CLELD with LEA groups (Tables 14 and 1).

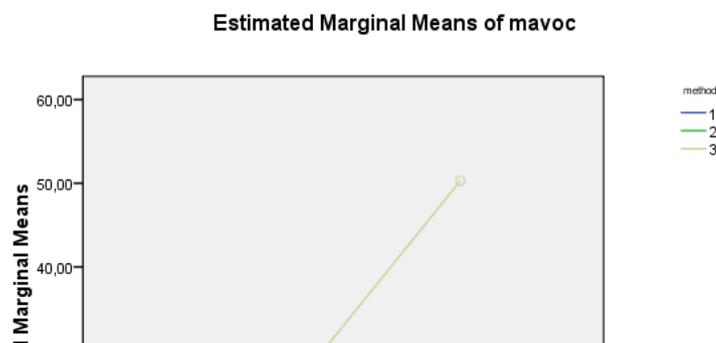
	Maths	
	L1	CLIL+CLELD-LEA
	vocabulary pre vocabulary post	vocabulary pre vocabulary post
Z	.518	-5,976 <sup>a</sup>
Asymp. Sig. (2-tailed)	.605	.000

**Table 14:** Pre-test post-test comparison of vocabulary scores achieved by the L1 and the CLIL+CLELD without LEA groups (Maths quasi-experiments)

The L1 group did not exhibit a significant difference in vocabulary development. The two experimental groups exhibited a significant difference in vocabulary learning ( $p = .000$ ).

Post test comparisons between the three groups showed a significant difference ( $p = .000$ ) in vocabulary development ( $p = .000$ ) favouring the CLELD groups. A repeated measures multivariate analysis of variance (MANOVA) of treatment (Using L1, CLELD-LEA, or CLELD+LEA) X Time (Before-Pre/End-Post) with student achievement in vocabulary tests as dependent variable was carried out. The results showed a significant Treatment X Time interaction,  $F(2,139) = 123.062$ ,  $p = .000$  for Maths vocabulary tests, favouring the CLELD with LEA method.

Figure 17 shows that CLIL+CLELD without LEA leads to better language proficiency in the area of L2 vocabulary knowledge as compared to traditional learning through L1. However, the students of the CLELD with LEA group achieved higher grades than did students of the other two groups in vocabulary tests at the end of CLIL implementation indicating that students of the CLELD with LEA group made more progress in L2 vocabulary development.



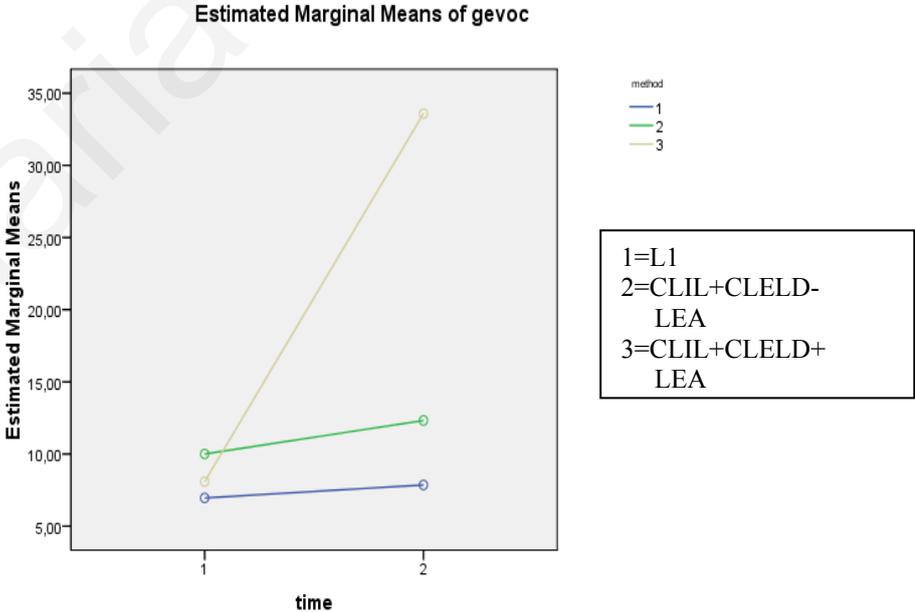
1=L1
2=CLIL+CLELD- LEA
3=CLIL+CLELD+ LEA

**Figure 17:** Pre-test post-test comparison of the three groups' vocabulary scores (two Maths quasi-experiments)

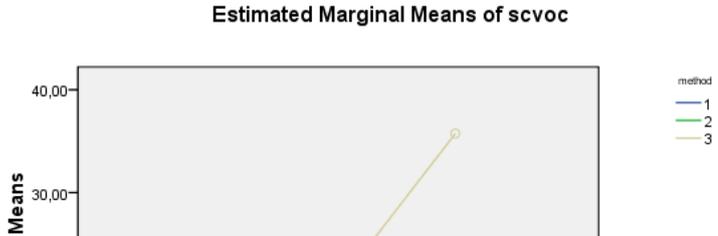
6.3.1.4 Participants of the first school: Consistency of scores in the three subjects

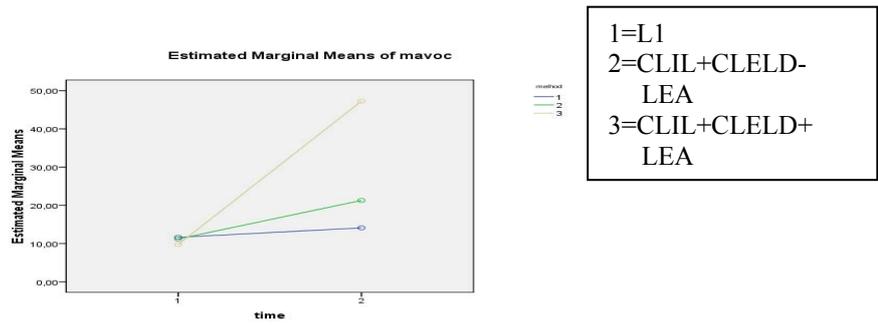
The students of the first school were involved in CLIL with CLELD+LEA in three different subjects: Geography, Science and Maths.

Repeated measures analysis showed a significant effect of the CLELD+LEA model X Time Interaction on students' L2 vocabulary development related to Geography unit  $F(2,67) = 93.75, p = .000$ , Science unit  $F(2,67) = 56.58, p = .000$ , and Maths unit  $F(2,67) = 51.65, p = .000$ . The pupils of the third group had more gains than the other two groups in the three different subjects.

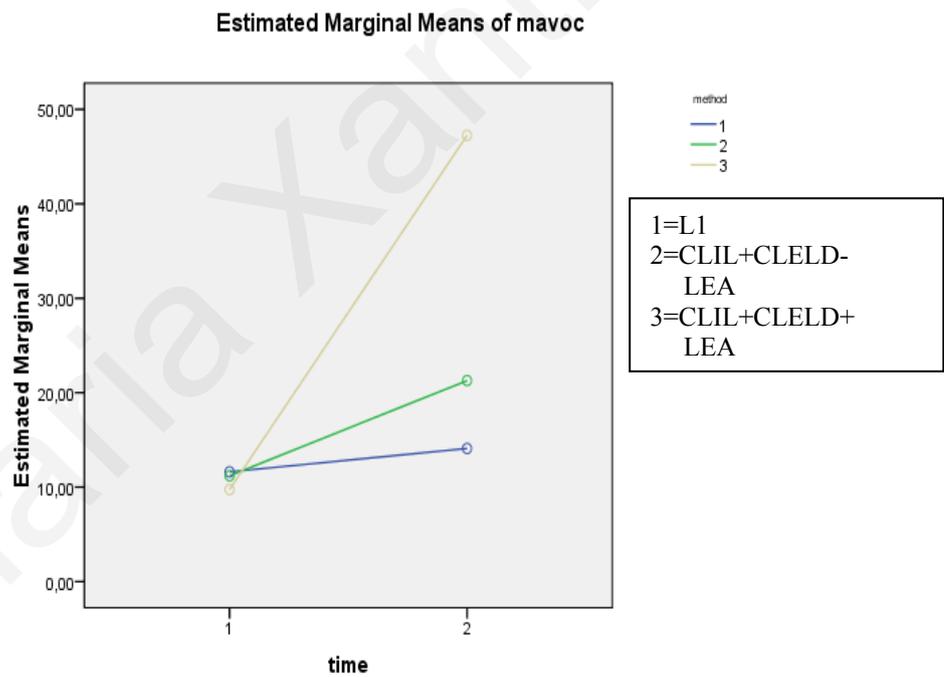


**Figure 18:** Comparison of the three groups' Geography vocabulary scores (school 1)





**Figure 19:** Comparison of the three groups' Science vocabulary scores (school 1)



**Figure 20:** Comparison of the three groups' Maths vocabulary scores (school 1)

Table 15 shows that the three post-test vocabulary scores of the CLELD+LEA group attending the first school were positively correlated.

Correlations between vocabulary post test scores

			Geography vocabulary post-test	Science vocabulary post-test	Maths vocabulary post-test
L1 group	Geography	Pearson cor.	1.000	.686	.874
	voc. post	Sig.		.001	.000
	Science	Pearson cor.	.686	1.000	.717
	voc. post	Sig.	.001		.000
	Maths	Pearson cor.	.874	.717	1.000
	voc. post	Sig.	.000	.000	
CLIL+ CLELD without LEA group	Geography	Pearson cor.	1.000	.812	.814
	voc. post	Sig.		.000	.000
	Science	Pearson cor.	.812	1.000	.765
	voc. post	Sig.	.000		.000
	Maths	Pearson cor.	.814	.765	1.000
	voc. post	Sig.	.000	.000	
CLIL+ CLELD with LEA group	Geography	Pearson cor.	1.000	.772	.770
	voc. post	Sig.		.000	.000
	Science	Pearson cor.	.772	1.000	.644
	voc. post	Sig.	.000		.001
	Maths	Pearson cor.	.770	.644	1.000
	voc. post	Sig.	.000	.001	

\* Correlation is significant at the 0.05 level (2-tailed)

**Table 15:** Correlation of the three vocabulary post-test scores achieved by the L1, CLIL+CLELD without LEA and CLIL+CLELD with LEA groups attending school 1

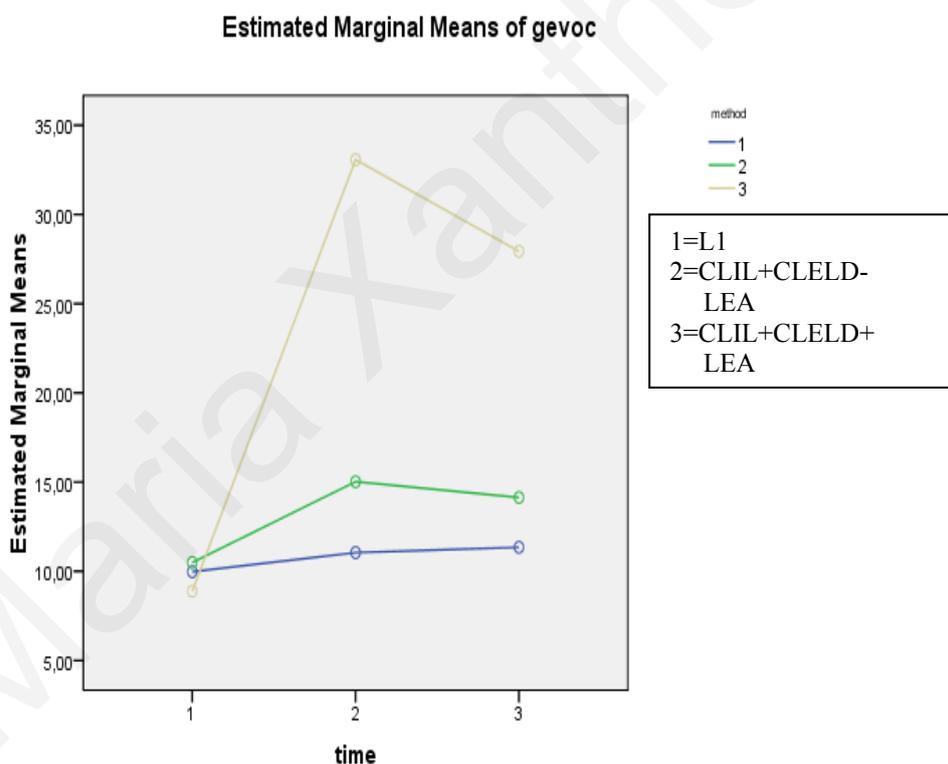
Similarly, the three post-test vocabulary scores of the CLIL+CLELD without LEA group attending the first school were positively correlated. The three post-test vocabulary scores of the L1 group attending the first school were also positively correlated, indicating consistency of performance among the different subjects.

### 6.3.1.5 Vocabulary retention – Delayed tests

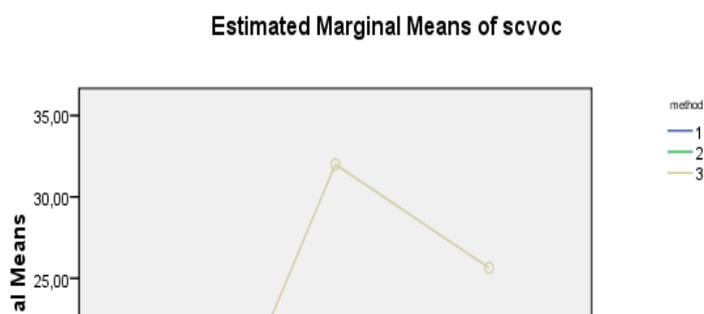
The pre-, post- and delayed vocabulary scores of the children attending the two Geography experiments were compared. A repeated measures multivariate analysis of variance

(MANOVA) of treatment (Using L1, CLIL+CLELD-LEA, or CLIL+CLELD +LEA) X Time (Before-Pre/End-Post/3 Months After [Post-Post]) with vocabulary achievement as dependent variable was carried out. The same procedure was carried out for the two Science and the two Maths experiments. Findings showed a significant Treatment X Time interaction favouring the CLELD+LEA group for Geography related vocabulary  $F(2,66) = 81.62, p = .000$ , Science vocabulary  $F = 46.27, p = .000$ , and Maths vocabulary  $F(2,66) = 32.65, p = .000$ .

Figures 21, 22 and 23 show that the students of the CLELD+LEA experimental group achieved higher grades than did their counterparts in the vocabulary assessment in the three subjects at the end of the implementation of CLIL and 3 months later.

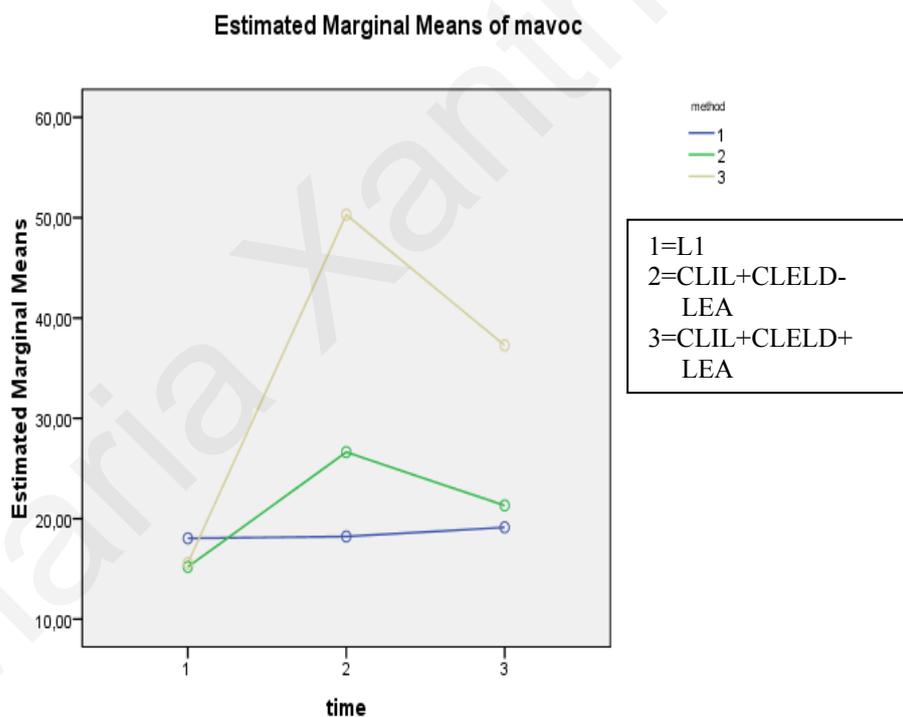


**Figure 21:** The pre, post and delayed vocabulary scores of the students attending the two Geography experiments



1=L1  
 2=CLIL+CLELD-  
 LEA  
 3=CLIL+CLELD+  
 LEA

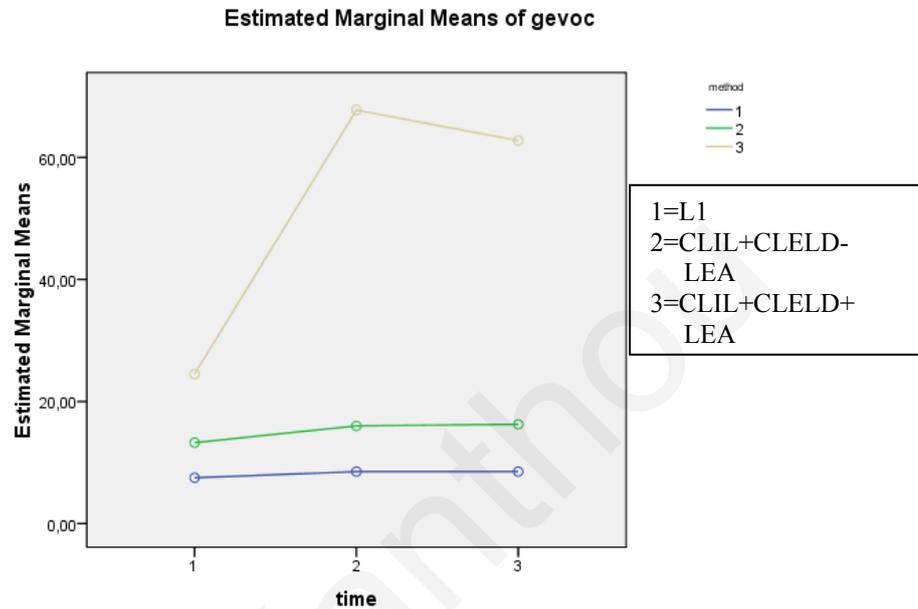
**Figure 22:** The pre-, post- and delayed vocabulary scores of the students attending the two Science experiments



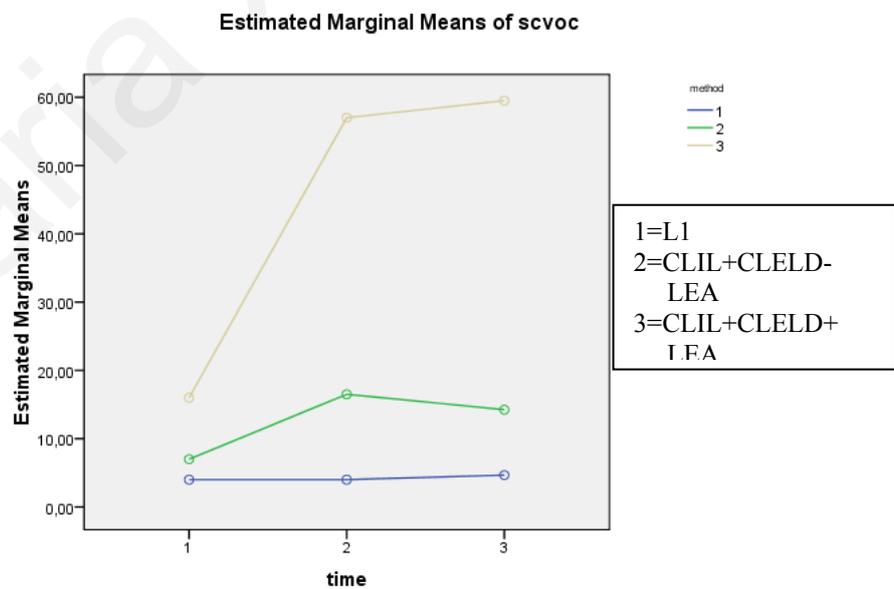
**Figure 23:** The pre-, post- and delayed vocabulary scores of the children attending the two Maths experiments

The plots illustrate a drop from the post-test to the delayed test perhaps because new language was not recycled after the programme. However, the significant difference favouring the CLELD+LEA group was maintained 3 months after implementation of the CLIL lessons.

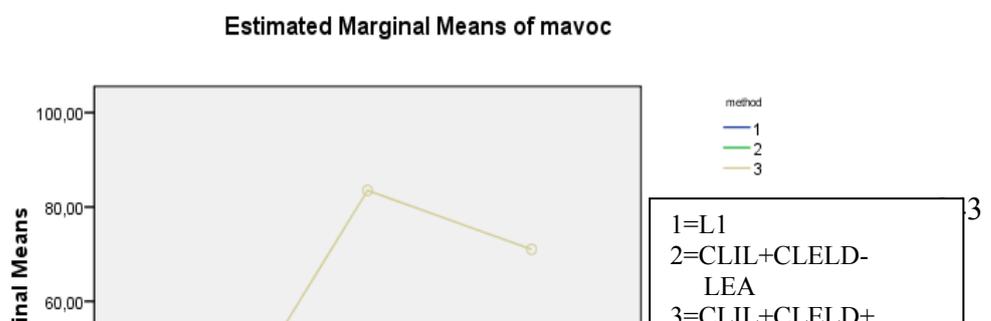
Statistical comparison of the performance of high-ability students across the three different methods has shown that high achievers in the CLIL+CLELD+LEA class had significantly more gains in L2 vocabulary development than their counterparts in the other classes ( $p=.000$ ) in the two Geography, the two Science and the two Maths quasi-experiments at the end of the implementation of CLIL and 3 months later (Figures 24, 25 and 26).



**Figure 24:** The pre-, post- and delayed vocabulary scores of the high performers (two Geography quasi- experiments)



**Figure 25:** The pre-, post- and delayed vocabulary scores of the high performers (two Science quasi- experiments)



**Figure 26:** The pre-, post- and delayed vocabulary scores of the high performers (two Maths quasi- experiments)

The above figures illustrate that the benefits of the CLELD+LEA model on L2 vocabulary learning were not due to the possibility that there were more high-ability students in the CLIL+CLELD+LEA class. They show that high performers had more L2 vocabulary gains in the CLELD+LEA classes than their counterparts in the CLELD-LEA classes.

### 6.3.2 Data source 2: Student questionnaires

Statistical analysis of the student questionnaires showed that most of the children of the CLELD with LEA group (92%) feel that the positive influence of the approach on vocabulary acquisition occurred to a considerable or great extent (Table 16). In contrast, only 53.2% of the CLELD without LEA group share the same opinion, indicating the beneficial effect of applying the model in CLIL classes. Added to this, although 53.2% is not a big percentage, it is yet considerable to suggest that CLIL even without LEA can develop students' L2 vocabulary knowledge unlike traditional learning through L1 which can not contribute to L2 development.

	CLELD+LEA		CLELD-LEA	
	Limited <sup>a</sup>	great <sup>b</sup>	Limited <sup>a</sup>	great <sup>b</sup>
L2 vocabulary	3.4	92	27.7	53.2

<sup>a</sup>Students either perceived the item as exhibiting very limited or limited development. <sup>b</sup>Students

perceived the item as exhibiting considerable or great development. °Very limited development; limited development; fair development; considerable development; great development

**Table 16:** CLELD+LEA and CLELD-LEA students' opinions about the extent of the impact of CLIL on L2 English development

### **6.3.3 Data source 3: Teacher interviews**

The teachers gave positive answers to the third research question regarding L2 vocabulary development in CLIL as opposed to traditional classes where students are taught through L1. As teacher 3 reported: 'Children benefit from CLIL even without CLELD'. This claim suggests that CLIL classes can enhance L2 vocabulary. Teacher 2 stated that children 'can learn several new words'.

Teachers expressed certainty about the increase in L2 vocabulary benefits when CLIL teachers use CLELD model with LEA. As teacher 1 explained 'There was a difference in L2 vocabulary with CLELD. Students' attention was drawn through games, pictures ...There was a different way of approaching new material'.

Teachers' responses suggest that the use of the CLELD model with LEA in the CLIL classroom can help the student to learn more L2 vocabulary than in the CLIL without LEA class.

### **6.3.4 Classroom interaction**

Students were called to use target words in sentences. However, this was not required as a meaningless drilling activity but as a game which had a purpose. In this way, learners were motivated to participate while at the same time they focused their attention on the target words which they had to produce in meaningful contexts.

For instance in the following extract, the teacher required students, in the opening move, to put new words, such as 'Mato Grosso', in content correct sentences in order to play a game. Student 2 started and then hesitated to continue. The teacher encouraged the child to continue and the learner managed to respond correctly, using the target word 'plateau'. Similarly, another student of the opposite team answered correctly in line 9. He used 'Brazil' as a starting point and included the new word 'plateaus' in the sentence.

(67) T: Make sentences using these words. We are going to play noughts and crosses. This group here, noughts, and this

group here, crosses, hmm?  
S2: Mato Grosso ((pause)).  
T: Yes  
S2: is a plateau of Brazil.  
T: Your turn. Come on.  
S: Brazil has three plateaus.  
T: Three plateaus. Very good. (Geography lesson 1)

The extract shows that the language enhancement activities which are included in the CLELD model appear to provide opportunities to the learners to come across the new words more times than in the CLELD-LEA classes. Therefore, students listen and produce the new vocabulary repeatedly and this gives them the chance to promote their L2 vocabulary knowledge to a greater extent.

### **6.3.5 Summary**

The data show that the CLELD+LEA model can help CLIL students achieve significantly better in L2 vocabulary learning than the CLELD-LEA or traditional learning through L1. Vocabulary test scores show a significant impact of the CLELD+LEA model on L2 vocabulary development. Participants in the CLELD+LEA classes outperformed their counterparts. Statistical comparison of pre- post- and delayed vocabulary tests showed that the CLELD+LEA groups exhibited significantly better results than the other two groups in the two Geography, the two Science and the two Maths experiments. Students of high ability performed significantly better in the CLELD+LEA classes. Furthermore, consistency of scores achieved by the three groups of the first school in Geography, Science and Maths was witnessed.

Student questionnaires show that most of the pupils in the CLELD+LEA classes (92%) believed that CLIL+CLELD+LEA had influenced positively L2 vocabulary development. In contrast, only 53.2% of the students in the CLELD-LEA classes believe that. Teachers exhibited enthusiasm about the CLELD+LEA model. They claimed that it benefits students' L2 vocabulary development to a much greater extent than CLELD without language enhancement activities. Classroom interaction data show that learners in the CLELD+LEA classes had more opportunities to encounter and use new words repeatedly through interesting language enhancement activities.

**6.4 Research Question 4: Does CLIL lead to better subject matter knowledge as compared to traditional learning through L1? Are there significant differences in subject matter learning for pupils attending CLIL classes following the CLELD model with LEA versus pupils in CLELD without LEA? (Geography, Science, Maths)**

**6.4.1 Data source 1: Experiments**

**Means and standard deviations for attainment of students at the control and the experimental groups during various stages of CLIL implementation**

Assessment	Control group		Experimental – CLELD without LEA		Experimental – CLELD with LEA	
	M	SD	M	SD	M	SD
<b>Before CLIL</b>						
Geography content test	19.04	12.46	21.43	8.41	20.77	10.03
Science content test	27.75	14.58	25.72	10.17	23.26	11.35
Maths content test	19.15	12.90	19.68	12.97	21.59	14.40
<b>End of CLIL</b>						
Geography content test	46.12	16.08	39.66	13.74	59.45	17.48
Science content test	64.45	20.68	46.07	15.35	61.63	16.83
Maths content test	68.06	23.93	54.82	29.65	78.65	20.10

**Table 17:** Means and standard deviations for attainment of students at the control and the experimental groups during various stages of CLIL implementation (Subject matter tests)

**6.4.1.1 Geography Experiments**

Comparisons between the three independent groups revealed non significant differences regarding content knowledge at the outset of the study.

Geography	
	Content pre-test
Chi-Square	1.902
df	2
Asymp. Sig.	.386

**Table 18:** Comparison of the three groups’ pre-tests (Geography quasi-experiments)

Wilcoxon test was carried out to compare the pre- and post- scores of each subject of the L1, the CLELD without LEA and the CLELD with LEA groups (Tables 19 and 5)

Geography

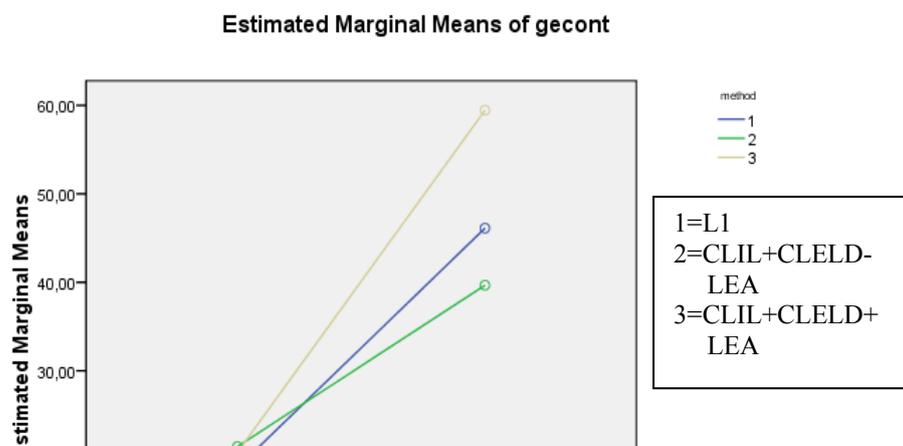
	L1	CLIL+CLELD-LEA
	content pre	content pre
	content post	content post
Z	-5.561 <sup>a</sup>	-5.991 <sup>a</sup>
Asymp. Sig. (2-tailed)	.000	.000

**Table 19:** Pre-test, post-test comparison of subject matter scores achieved by the L1 and CLIL+ CLELD without LEA groups (Geography quasi-experiments)

The L1 group exhibited a significant difference in content learning. The two experimental groups achieved a significant difference in content learning.

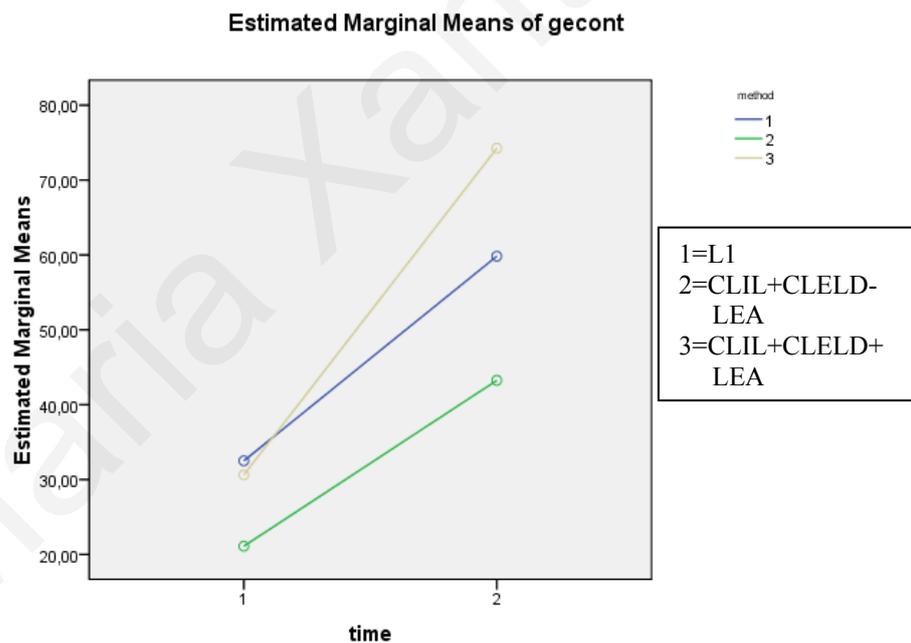
Post test comparisons between the three groups were carried out. A repeated measures multivariate analysis of variance (MANOVA) of treatment (Using L1, CLIL+CLELD without LEA or CLIL+CLELD with LEA) X Time (Before-Pre/End-Post) with student achievement in content tests as dependent variable was carried out. The results showed a significant Treatment (method) X Time interaction  $F(2,133)=19.107$ ,  $p= .000$  for Geography subject matter tests.

Figure 27 shows that the L1 group did better in subject matter learning than the CLIL+CLELD-LEA group. However, the students of the CLELD with LEA group achieved higher grades than did students of the other two groups in content tests at the end of CLIL implementation. The findings show that the students of the CLELD with LEA group made more progress in content learning than the CLELD without LEA group or the L1 group.



**Figure 27:** Pre-test post test comparison of the three groups' Geography scores (two Geography quasi-experiments)

Statistical comparison of the performance of high-ability students across the three different methods, has shown that content learning in the CLIL+CLELD+LEA classes proceeded more successfully than learning in the CLELD-LEA or L1 classes. This indicates the positive effect of the CLELD strategies on Geography knowledge development (Figure 28).



**Figure 28:** Pre-test post-test comparison of high achievers' Geography scores (two Geography quasi-experiments)

#### 6.4.1.2 Science experiments

Pre test comparisons between the L1, and the two experimental CLIL groups (CLELD without LEA and CLELD with LEA) showed that the three groups did not have any significant differences at the outset of the study in vocabulary ( $p = .444$ ) and content knowledge ( $p = .377$ ).

Science	
Content pre-test	
Chi-Square	1.950
df	2
Asymp. Sig.	.377

**Table 20:** Comparisons of the three groups' pre-tests (Science quasi-experiments)

Wilcoxon test was carried out to compare the pre- and post-scores of each subject of the L1, the CLIL+CLELD without LEA and the CLIL+CLELD with LEA groups (Tables 21 and 5).

	Science	
	L1	CLIL+CLELD-LEA
	content pre content post	content pre content post
Z	5.430	5.391 <sup>a</sup>
Asymp. Sig. (2-tailed)	.000	.000

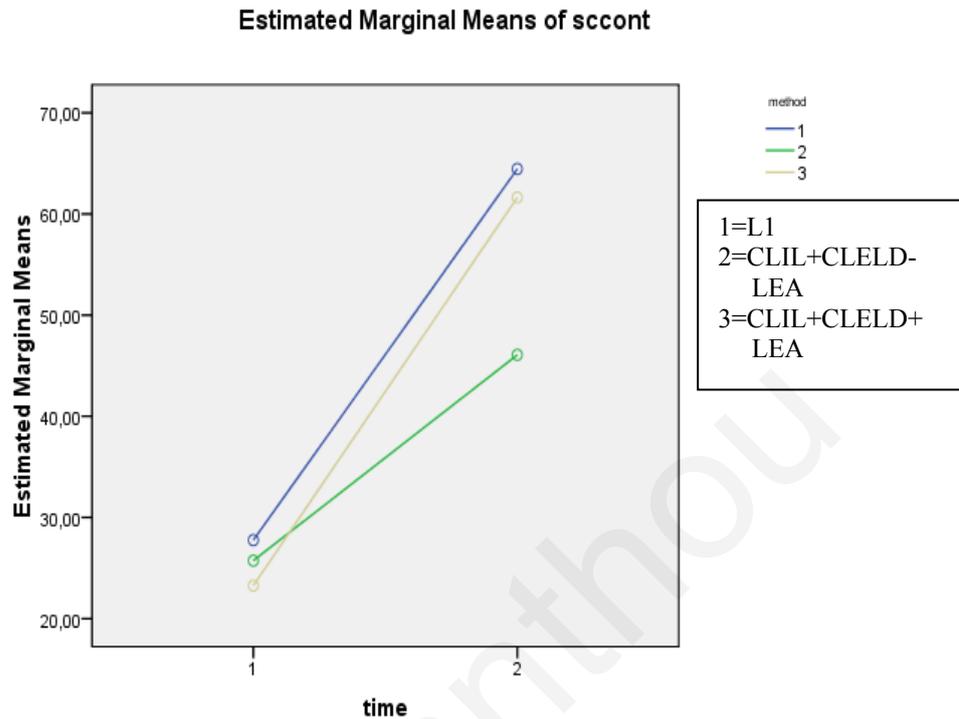
**Table 21:** Pre-test post-test comparison of subject matter scores achieved by the L1 and the CLIL+CLELD without LEA groups (Science quasi-experiments)

The three groups exhibited a significant difference in content learning ( $p = .000$ ).

A repeated measures multivariate analysis of variance (MANOVA) of treatment (Using L1, CLIL+CLELD without LEA, or CLIL+CLELD with LEA) X Time (Before-Pre/End-Post) with student achievement in content tests as dependent variable was carried out. The L1 group scored higher than the other two groups in subject matter post tests  $F(2,123) = 12.056$ ,  $p = .000$ . The mean scores of the Science post-tests of the L1 group was 64.45 means as compared to 61.63 of the CLELD with LEA group and 46.07 of the CLELD without LEA. However, the CLELD with LEA group exhibited higher mean increase (38.37) than the L1 group (36.7) and the CLELD without LEA group (20.35).

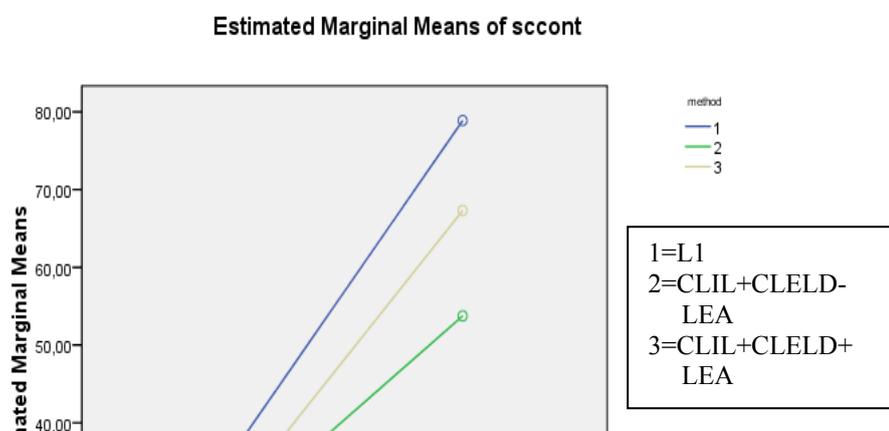
Figure 29 shows that traditional learning leads to better subject matter learning than CLIL+CLELD-LEA. The students of the CLELD with LEA group achieved higher grades than did students of the other two groups in content tests at the end of CLIL

implementation, demonstrating that the students of the CLELD with LEA group made more progress in this area.



**Figure 29:** Pre-test post-test comparison of the three groups' Science scores (two Science quasi-experiments).

Statistical comparison of the performance of high-ability students across the three different methods has demonstrated that the development in Science produced comparable results in the CLIL+CLELD+LEA classes as in the L1 classes. However, these two groups outperformed the CLIL+CLELD-LEA classes, thus demonstrating the positive effect of LEA strategies on content learning (Figure 30).



**Figure 30:** Pre-test post-test comparison of high achievers' Science scores (two Science quasi-experiments)

#### 6.4.1.3 Maths Experiments

The results of the two Maths experiments were calculated. The control group which learned content through L1 and the two experimental CLIL groups (CLELD without LEA and CLELD with LEA) of both experiments included 45, 50, and 47 eleven year old learners respectively.

Comparisons of the pre test subject matter scores showed that there were not significant differences in content knowledge ( $p = .725$ ) between the two experimental groups and the control group prior treatment (Table 22).

Maths	
Content pre-test	
Chi-Square	.642
df	2
Asymp. Sig.	.725

**Table 22:** Comparison of the three groups' pre-tests (Maths quasi-experiments)

Wilcoxon test was carried out to compare the pre- and post- Maths scores of each subject of the L1, the CLIL+CLELD without LEA and the CLIL+CLELD with LEA groups (Tables 23 and 5).

Maths		
	L1	CLIL+CLELD-LEA
	content pre	content pre
	content post	content post
Z	5.765	5.895 <sup>a</sup>

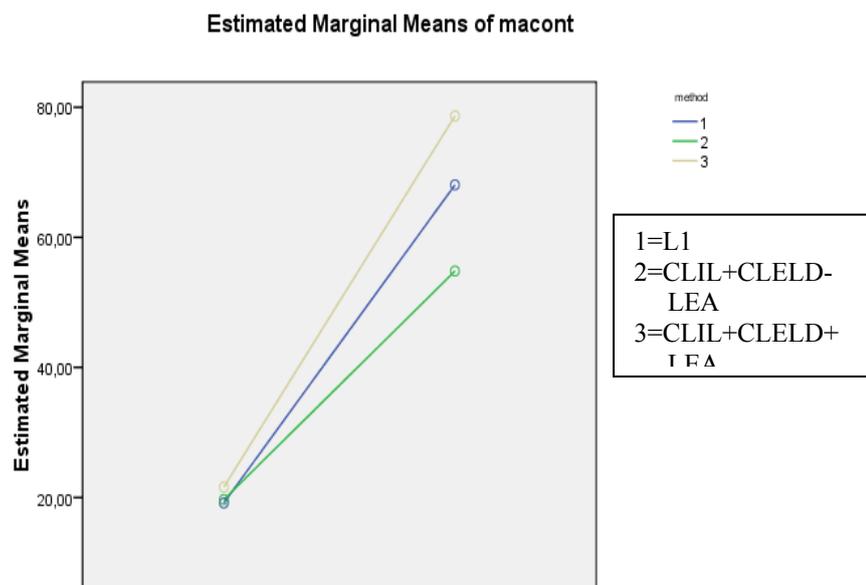
Asymp. Sig. (2-tailed)	.000	.000
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**Table 23:** Pre-test post-test comparison of subject matter scores achieved by the L1 and the CLIL+CLELD without LEA groups (Maths quasi-experiments)

The L1 group and the two experimental groups exhibited a significant difference in content learning ( $p = .000$ ).

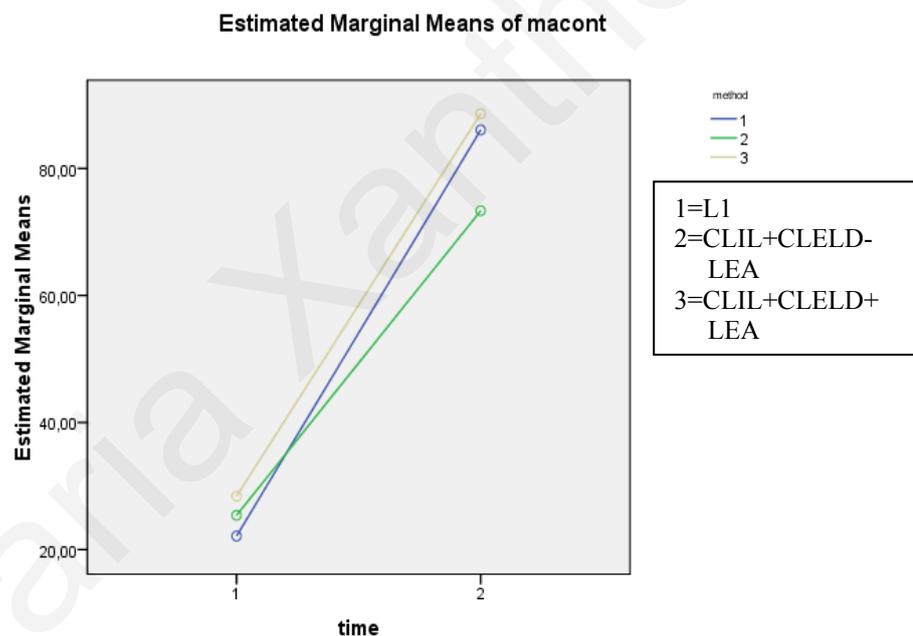
Post-test comparisons between the three groups showed a significant difference ( $p = .000$ ) in content learning ( $p = .000$ ) favouring the CLELD groups. A repeated measures multivariate analysis of variance (MANOVA) of treatment (Using L1, CLELD-LEA, or CLELD+LEA) X Time (Before-Pre/End-Post) with student achievement in content tests as dependent variable was carried out. The results showed a significant Treatment X Time interaction,  $F(2,139) = 11.698$ ,  $p = .000$  for Maths subject matter tests favouring the CLELD with LEA method.

Figure 31 shows that learning through L1 leads to better subject matter learning as compared to learning through CLIL+CLELD without LEA. The students of the CLELD with LEA group achieved higher grades than did students of the other two groups in content tests at the end of CLIL implementation indicating that students of the CLELD with LEA group made more progress in this area.



**Figure 31:** Pre-test post-test comparison of the three groups' Maths scores (two Maths quasi-experiments)

Statistical analysis of the performance of high-ability students across the three different methods, has demonstrated that the development in Maths produced comparable results in the CLIL+CLELD+LEA classes as in the L1 classes. However, these two groups outperformed the CLIL+CLELD-LEA classes ( $p = .010$ ), indicating the positive effect of the CLELD strategies on content learning (Figure 32).



**Figure 32:** Pre-test post-test comparison of high achievers' Maths scores (two Maths quasi-experiments)

#### 6.4.1.4 Participants of the first school: Consistency of scores in the three subjects

The students of the first school were involved in CLIL with CLELD+LEA in three different subjects: Geography, Science and Maths. The post-test subject matter scores of the CLELD+LEA students were compared in order to examine consistency of scores.

Repeated measures analysis showed a significant effect of the CLELD model X Time interaction on students' academic performance in Geography  $F(2,67) = 44.61$ ,  $p = .000$ , Science  $F(2,67) = 17.50$ ,  $p = .000$ , and Maths  $F(2,67) = 14.51$ ,  $p = .000$ . The pupils of the

third group had more gains than the other two groups in the three different subjects (Figures 33, 34, 35).

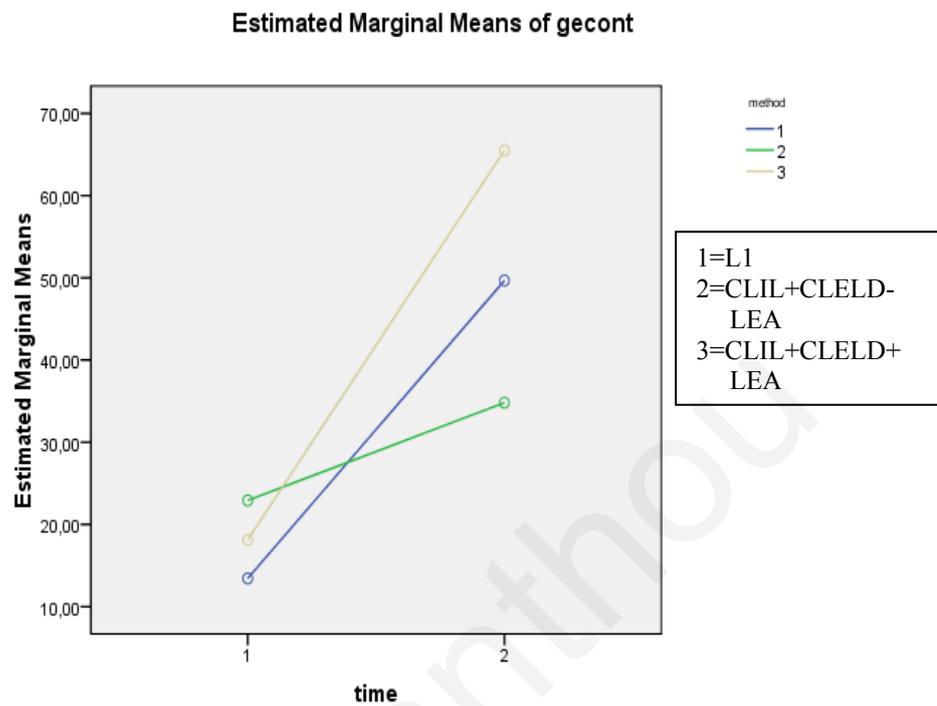
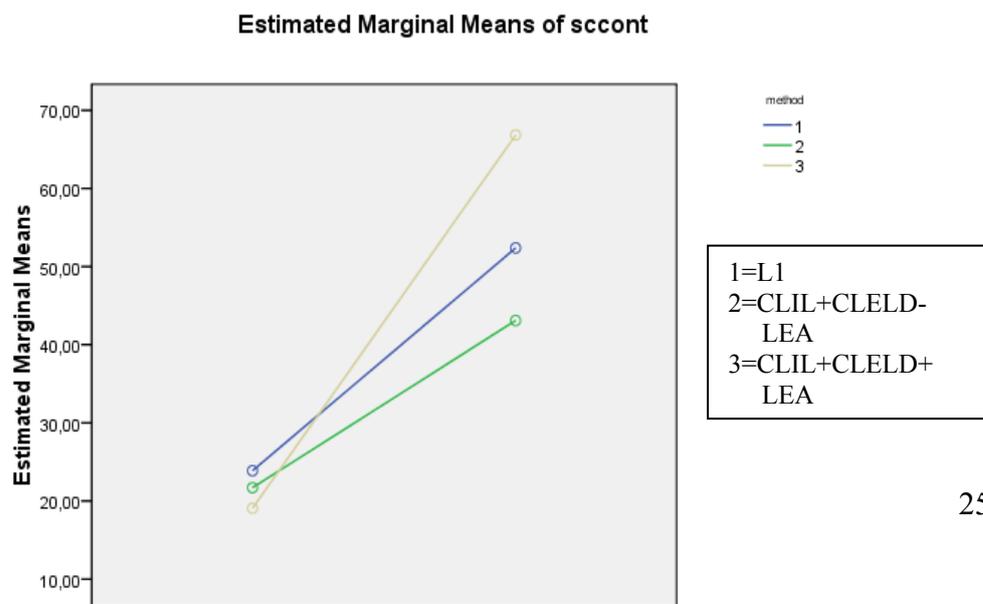
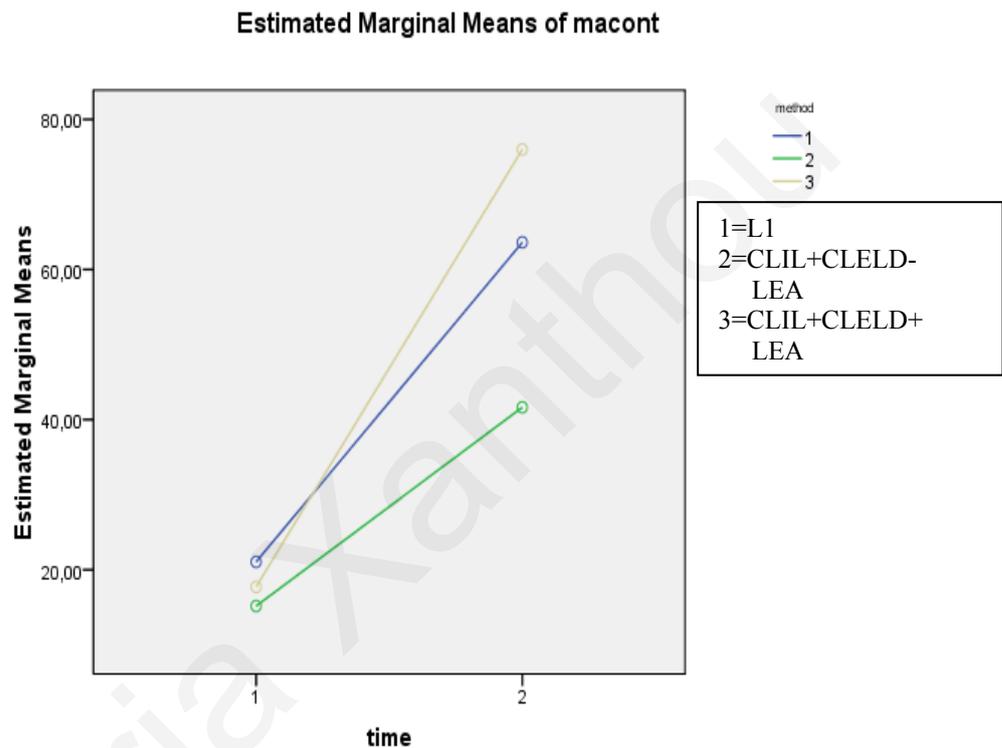


Figure 33: Comparison of the three groups' scores in Geography (school 1)



**Figure 34:** Comparison of the three groups' scores in Science (school 1)



**Figure 35:** Comparison of the three groups' scores in Maths (school 1)

The Geography content post-test scores of the CLELD+LEA (N=24) group attending the first school were highly correlated with the Maths content post-test scores. Science scores were positively correlated with the Maths scores. Results suggest that students' success occurred at all subjects.

Correlations between subject matter post-test scores

Geography content post-test	Science content post-test	Maths content post-test
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L1 group	Geography	Pearson cor.	1.000	.685	.713
	cont. post	Sig.		.001	.000
	Science	Pearson cor.	.685	1.000	.574
	cont. post	Sig.	.001		.007
	Maths	Pearson cor.	.713	.574	1.000
	voc. post	Sig.	.000	.007	
CLIL+	Geography	Pearson cor.	1.000	.479	.489
CLELD	cont. post	Sig.		.015	.013
without	Science	Pearson cor.	.479	1.000	.268
LEA	cont. post	Sig.	.015		.195
group	Maths	Pearson cor.	.489	.268	1,000
	cont. post	Sig.	.013	.195	
	Geography	Pearson cor.	1.000	.336	.494
CLIL+	cont. post	Sig.		.108	.014
CLELD	Science	Pearson cor.	.336	1.000	.393
with	cont. post	Sig.	.108		.058
LEA	Maths	Pearson cor.	.494	.393	1.000
group	cont. post	Sig.	.014	.058	

Correlation is significant at the 0.05 level (2-tailed)

**Table 24:** Correlation of the three content post test scores achieved by the L1, CLIL+CLELD without LEA, and CLIL+CLELD with LEA groups attending school 1

The Geography content post-test scores of the CLIL+CLELD without LEA group attending the first school, were highly correlated with the Maths and the Science content post-test scores. The three post-test scores of the L1 group attending the first school were positively correlated.

#### 6.4.2 Data source 2: Student questionnaires

The views of the children who participated in CLELD with LEA and CLELD without LEA classes were asked. Most of the children of the first group (73.6%) feel that the positive influence of the approach on subject matter learning occurred to a considerable or great extent. In contrast, only 54.3% of the CLIL+CLELD without LEA group share the same opinion. This finding shows the beneficial effect of applying the model in CLIL classes (Table 25).

	CLELD+LEA	CLELD-LEA
	% of pupils	% of pupils

	Limited <sup>a</sup>	great <sup>b</sup>	Limited <sup>a</sup>	great <sup>b</sup>
Content learning	6.8	73.6	37.3	54.3

<sup>a</sup>Students either perceived the item as exhibiting very limited or limited development. <sup>b</sup>Students perceived the item as exhibiting considerable or great development. <sup>c</sup>Very limited development; limited development; fair development; considerable development; great development

**Table 25:** CLELD+LEA and CLELD-LEA students' opinions about the extent of the impact of CLIL on content learning

#### 6.4.3 Data source 3: Teacher interviews

The teachers opine that CLIL can be successful when the students have a satisfactory L2 language knowledge. They caution that CLIL in primary school may not be successful because students do not possess a high level of L2 knowledge. As Teacher 1 reported, 'several children may face comprehension difficulties with CLIL, so I don't think that CLIL can lead to better subject matter knowledge than learning through the mother tongue'.

The teachers believe that although children can learn subject matter through English, better outcomes from CLIL children in content learning are not expected. This can only occur when the teacher uses particular techniques. As Teacher 2 emphasized: 'I don't think that better subject matter learning can occur if the teacher doesn't use some techniques, such as using a PowerPoint presentation to present what is said orally in the class'. In this vein, Teacher 3 stated her belief that both CLIL and learning through L1 can lead to similar levels of subject matter learning when children have reached a satisfactory L2 background and added that: 'when children are young as in the elementary school then CLELD methodology can be very useful to the teacher to bring better results'.

These opinions provide support for the use of the CLELD+LEA model in CLIL classes. There was a general agreement that the use of CLELD is critical in promoting content learning considerably in the CLIL class. Teacher 2 claimed that the CLELD+LEA group showed more improvement than the CLELD-LEA group and Teacher 1 explained that 'there is difference both in the teaching-learning process and in the outcomes'. This could be attributed to a greater effort to focus on new language in CLELD+LEA classes which finally leads to better concept learning.

In general, the teachers' opinions seem to provide support to the hypothesis that CLELD seems to be important for content learning in the elementary school.

#### **6.4.4 Data source 4: Classroom interaction**

Classroom interaction data show that the children were involved in learning processes which allowed them opportunities to interact with new content.

Instructional variety is an important key behaviour included in the CLELD model which stimulated the students' involvement with target content. Various types of questions were used to activate the students' both lower and higher thinking skills in order to promote deeper involvement with the content. For example, 'What' questions examined students' comprehension of new concepts. The student in extract 68 responded to the teacher's question.

- (68) T: What do they do to the environment?  
S: Destroy it. (Geography lesson 2)

The students were required to transfer knowledge to new situations. In the following extract, the teacher presented a situation and required explanation. The student provided the right answer but failed to form the verb correctly, i.e. 'it deformed', so the teacher provided corrective feedback.

- (69) T: Look at the last picture now. This is a girl. Okay? The girl was in Troodos. She filled this bottle (\*) water. Okay? She filled it with water. When she went down to Nicosia, look at the bottle. What happened to the bottle?  
S: it deformed  
T: It was deformed. (Science lesson 3)

Task orientation is another important key behaviour included in the CLELD model which provided opportunities to the learners to interact with new content. For example, the use of appropriate instructional model prompted learners to get involved in new learning. For example, the students investigated some topics and then reported what they had found. In the following extract, the teacher initiated discourse by asking a content-oriented question. A student answered correctly and the teacher encouraged the child to provide more information by presenting the student's answer as incomplete. A correct answer was provided in line 5.

- (70) T: The industry has developed. Why?

S: They move cars.

T: Eeh. They move cars with ((pause))

S: Alcohol.

T: Alcohol. They use alcohol. (Geography lesson 4)

Engagement in the learning process is another important key behaviour in the CLELD mode. Guided practice served to promote engagement in the learning process. The following extract shows that the students were given opportunities to apply new learning. Student 18 responded successfully (line 3). Therefore, guided practice activities gave the students the opportunity to show whether they had learned new content.

- (71) T: Tell me now, what is the area of the cellotape? Tou speed fix {of the cello tape}, What is the area? ((students think))  
S18: Thirty four  
T: Thirty four centimeters. The area of the cellotape is thirty four centimeters. (Maths lesson 4)

Games served to promote engagement in the learning process. In extract 72, the teacher assigned tasks to each group. The children were motivated to participate in order to gain points. They responded correctly in lines 5-6, 11 and 13.

- (72) T: Let's play football now. Group one, group two. Okay?  
Now, group one first. You can use your answer board here (\*\*). A circle with two cm radius. What is its area? Find the answer and tell me please ((pause))  
S: Two times two times three komma dekatessera ison dodeka komma peninta exi {komma fourteen, equals twelve comma fifty-six}.  
T: Twelve point fifty-six. Very good. Okay. This group now.  
A circle has a three centimeter radius (.) What is its area? (.) Use your calculator.  
S7: Eehh. Three times three, times three point fourteen  
T: Yes? Equals?  
S7: Twenty-eight point twenty-six.

T: Okay. Twenty-eight point twenty-six. (Maths lesson 4)

Data from classroom interaction illustrate that CLELD items kept learners' involvement to high levels. Thus, the students' time-on-task was maximized and content learning was achieved.

#### **6.4.5 Summary**

The data show that the CLELD+LEA model can promote content learning in the CLIL class. Statistical analysis of the tests shows that the L1 groups outperformed the CLIL+CLELD-LEA groups in content learning. However, the students in the CLELD with LEA groups made more progress than those in the CLELD without LEA groups or the L1 groups. High ability students had similar benefits with high performers in L1 classes in Science and Maths experiments. They had more benefits in the CLIL+CLELD+LEA classes than the participants in CLIL+CLELD-LEA or L1 classes in the Geography experiments. Noteworthingly, high achievers in the CLELD+LEA classes performed better than their counterparts in CLELD-LEA classes. This finding suggest that content learning can be promoted when LEA are provided which strengthen L2 learning. Consistency of scores has also been found in the CLELD+LEA group's performance of the children attending the first school, across three different subjects.

The students' questionnaires reveal that the CLELD+LEA instrument has a positive impact on content learning. A greater percentage of children in the CLELD+LEA classes (73.6%) believe that CLIL promotes content learning as compared to the CLELD-LEA classes (54.3%). The teachers were reluctant to admit that content learning in CLIL classes is as effective as in L1 classes. They believe that subject matter learning in CLIL classrooms can be as successful as in CLIL classrooms when CLELD model is considered. Classroom interaction data demonstrate that content learning in CLELD+LEA classes proceeded effectively. The learners activated learning processes and interacted with new content. A variety of questions examined the students' comprehension successfully or required higher order thinking skills (e.g. 'It deformed' in extract 68). Task orientation encouraged students to get involved with new material. For instance, they found answers to problems (e.g. 'They move cars' with 'alcohol' in extract 69). Finally, guided practice and games allowed children to engage in the learning process and were given opportunities to report content-related answers.

In general, the data suggest that the CLELD items which relate to subject matter learning can promote learners' subject matter learning in the CLIL class to a greater extent than when using the CLELD-LEA.

## 6.5 Research Question 5: Do ELLs receiving CLIL instruction with the CLELD model have positive attitudes towards this approach?

### 6.5.1 Data source 1: Student questionnaires

Statistical analysis of the student questionnaires showed that a great percentage of the children of the CLELD+LEA model group (49.4%) believe that new vocabulary poses difficulties to a very limited or limited extent for the process of learning. Less pupils in the CLELD without LEA group (41.5%) do not consider it to be a problem. Interestingly, a much greater percentage of pupils in the CLELD-LEA group feel that new terminology poses problems to a considerable or great extent (34.1%) as compared to 9.1% of the students in the CLELD+LEA classes. This finding suggests that LEA included in the CLELD model eliminate comprehension difficulties posed by new terminology and promote students' positive attitudes about the CLELD+LEA methodology.

	CLELD+LEA		CLELD-LEA	
	Limited <sup>a</sup>	great <sup>b</sup>	Limited <sup>a</sup>	great <sup>b</sup>
Difficulties posed by new vocabulary	49.4	9.1	41.5	34.1

<sup>a</sup>Students either perceived the item as posing very limited or limited development. <sup>b</sup>Students perceived the item as posing much or great difficulty. <sup>c</sup>Very limited difficulty; limited difficulty; some difficulty; much difficulty; great difficulty

**Table 26:** CLELD+LEA and CLELD-LEA students' opinions about difficulties posed by new vocabulary

### 6.5.2 Data source 2: Teacher interviews

The teachers supported that children in the CLELD with LEA classes exhibited enthusiasm and positive attitudes towards CLIL. The children in the CLIL+CLELD-LEA class did not exhibit enthusiasm when they had the CLIL lessons. As Teacher 2 reported, 'The CLELD (with LEA) class was anticipating for the lesson'. The teacher emphasized that 'It is important for the children to anticipate the delivery of the lessons'.

The teachers were positive that the CLELD+LEA group responded with more enthusiasm than the pupils in the CLELD without LEA group. Teacher 2 said characteristically that 'The pupils of the CLELD (with LEA) group were more excited'. These statements

suggest that the pupils in the CLELD+LEA classes exhibited positive attitudes towards CLIL.

### **6.5.3 Data source 3: Classroom interaction**

Classroom interaction data provided information about the students' attitudes towards the CLELD model with LEA.

For instance, extract 73 shows that games and competitions in groups promoted enthusiasm and positive attitudes. The teacher initiated interaction by asking a question. A student gave an incorrect answer. The teacher evaluated the answer and explained the term in L1 to eliminate misconceptions. Then, students gave content-related words, such as 'timber', and 'tobacco' (lines 8 and 12) which were correct. The teacher acknowledged that the student was right and prompted children to report more information. High level of participation occurred.

- (73) T: Let's play basketball, okay? Group A, group B, okay? Now.  
Tell me products, proionta {products} related to forest wealth. Can you tell me some products? Hmm?
- S: Coffee.
- T: No. In the forest, the forest. You get two points for each thing that you tell me. Forest wealth, dasikos ploutos {forest wealth}, forest wealth.
- S: Timber.
- T: Timber, very good. And what else?
- S: Caoutchouc.
- T: Agriculture. Tell me products.
- S7: Tobacco.
- T: Tobacco. Very good. What else?
- S: Cotton.
- T: Cotton, okay, what else? Yes, S3.
- S3: Sugar cane.
- T: Sugar cane, zacharokalama {sugar cane}, sugar cane
- S4: Coffee.
- T: Yes, okay .... Mineral wealth.

What is there in Brazil?

S20: Diamonds.

T: Diamonds, excellent. What else? Hmm?

S14: Gold.

T: Gold, chrisafi {gold}, diamonds, yes.

S: Copper.

T: Copper, bravo.

S: Iron.

T: Iron, very good. So, who is the winner? Hmm? Team B.

This team is the winner. (Geography lesson 3)

In the final follow-up move the teacher evaluates participation and acknowledges the winner: 'This team is the winner'. This made effort more purposeful.

Extracts illustrate that the type of tasks that were employed in the CLELD+LEA lessons promoted the students' positive attitudes towards the lesson and motivated them to participate.

#### **6.5.4 Summary**

The data demonstrate that the children had positive attitudes towards the CLELD model with LEA. Student questionnaires revealed that 34.1% of the pupils in CLIL+CLELD-LEA classes face difficulties with new vocabulary to a considerable or great extent. Interestingly, only 9.1% of the children in CLIL+CLELD+LEA classes share this opinion. This finding shows that LEA eliminate difficulties with new terminology.

The teachers believe that the learners in CLELD+LEA classes exhibited more interest and enthusiasm than those in the CLELD classes without LEA. Students in the CLIL+CLELD+LEA classes had positive attitudes and they were looking forward to the lesson.

Classroom interaction data demonstrated that students in CLIL+CLELD+LEA classes had positive attitudes towards learning. Various CLELD items, such as games and competitions, promoted the learners' motivation and raised participation. The students were required to report new vocabulary in order to gain points. The data show positive attitudes and active involvement in the tasks.

## **6.6 Research Question 6: Do the elementary school teachers who use the CLELD model for lesson planning consider their teaching more effective than when not using it?**

### **6.6.1 Data source 1: Teacher interviews**

The CLIL teachers stated that the components of the CLELD+LEA model are important for effective teaching in CLIL classes. Regarding the usefulness of the CLELD components related to effective language teaching, the teachers strongly agreed that they are important for effective language development in CLIL classes.

The acquisition and learning principle was identified by all teachers as being essential for language development. They strongly believe that learners are able to develop L2 English through interesting topics of Geography, Science and Maths. On the one hand, the pupils deal with meaningful tasks, while, on the other, they are allowed to focus on new language. Teacher 2 reported that ‘learners can simultaneously learn content and improve their L2 English through interesting topics’. Placing emphasis on learning new vocabulary in CLIL classes is considered to be important because it gives opportunities to the learners to ‘focus their attention on new vocabulary’ (Teacher 2). The teachers claimed that the students responded positively to language focus activities such as language games. As Teacher 1 said: ‘Children responded with great interest to language games’. Teacher 3 commented that ‘Each time they were waiting to play language games such as bingo’. The children dealt with language focus activities in an enjoyable manner.

The comprehensible input principle was considered by the teachers as very important in primary school CLIL classes. Adjusting speech to learners’ level was found to be vital for ‘transmitting new terminology’ and helping students understand new meanings (Teacher 3). Pupils were ‘facilitated to follow’ what the teacher was saying (Teacher 2).

The teachers felt that the use of exaggerated articulation helps them to highlight target words and therefore attract the students’ attention to new vocabulary. They agreed that the provision of extra-linguistic information is useful in verbal communication because ‘it facilitates transmission of messages’ (Teacher 1) and ‘comprehension of the meanings of words’ (Teacher 2). The provision of non-linguistic representations was considered to be very important for EFL learning. As Teacher 1 explained the children were allowed to ‘connect the picture with the word’. The learners ‘used more than one senses at the same

time' (Teacher 1) and this helped remembering the words. Another reason why non-linguistic representations were considered to be important is that they helped to clarify word meaning. According to the second teacher, 'a picture is worth a thousand words', and therefore, pictures are required in the CLIL class in order 'to eliminate misconceptions and difficulties'. A third reason for the necessity of using pictures is that they facilitate learning of the students who 'possess visual learning style'. Several students were allowed to access new content more easily. Teachers claimed that the use of L2 medium strategies, such as repetition and paraphrasing, is very important for achieving comprehension and transmitting meanings. L2 medium strategies were thought to facilitate vocabulary learning as they attracted attention to new vocabulary and made meanings more transparent. According to Teacher 2 repetition can even 'help word retention'. L1 medium strategies were also considered to be helpful in classroom communication as they facilitate clarification of 'some points' (Teacher 1) which might seem vague to the children. In this way, 'terminology is clarified' (Teacher 3) and students avoid misconceptions. Last, all the teachers identified the use of CALL as very important in the CLIL class for promoting interest and focusing students' attention on target aspects of the lesson. As teacher 2 observed: 'one can immediately see the difference between the class which was exposed to the PowerPoint presentation with the other class which was not exposed. The other class did not like CLIL as much as the CLELD (with LEA) group'. This observation suggests that CALL can be used to raise students' interest in the lesson as they watch what has to be done and the conclusions on the PowerPoint slides. Moreover, the language presented on the slides can promote noticing the new language items. Teacher 3 pointed out that 'emphasis can be placed on target linguistic elements'. This can facilitate language learning.

The teachers agreed that the promotion of output production facilitated language development. Teacher 2 claimed that it is important to give students 'opportunities to speak and also to write' (Teacher 2). Output production was stimulated through questioning. Teacher 1 observed that 'questioning encouraged students to use and learn the new terminology'. By dealing with tasks on handouts, opportunities for writing new vocabulary were given. Teachers supported that in this way, learners 'had more chances to learn the new words' (Teacher 3).

The teachers stated their belief that linguistic interaction in the classroom is an essential principle for L2 learning. It was noted that it gave learners the opportunity to clarify their

thoughts and reach higher levels of comprehension. Moreover, when the teacher talked to the students about new content, this allowed the teacher to evaluate ‘whether the learner can use new vocabulary to communicate answers’ (Teacher 3). This gave information to the teacher about the students’ difficulties with new content and language. Further, teacher-student conversation gave the opportunity to the teacher to give some indirect or direct feedback. Teacher 2 stated that ‘if they (children) say something wrong, the teacher can repeat correctly’. Therefore, indirect feedback can be provided. Teacher 1 added that ‘we give them the opportunity to correct some mistakes’. Hence, direct feedback is also useful.

Keeping a low affective filter is the last principle related to language development which has been included in the CLELD model. The teachers expressed the opinion that a low affective filter was especially important for students of primary school age as it eliminated stress in the classroom and simultaneously promoted the students’ participation. The children were excited about language games. Teacher 3 reported that ‘Each time they were waiting to play language games such as bingo’. Several language games were used in the classroom which promoted the pupils’ active involvement in the lesson. As Teacher 1 said: ‘They responded with great interest to games’. Simultaneously, this allowed children to focus their attention on new vocabulary.

Regarding the importance of the CLELD+LEA components related to effective subject matter teaching, the teachers supported that they are essential for effective content learning in CLIL classes and that they can enhance learning outcomes as compared to CLELD without LEA.

The clarity key behaviour was considered by the teachers to be vital for successful content learning. Stating the objective explicitly was found to be useful for promoting clarity in the lesson. Teachers 2 and 3 explained that children know what follows and they ‘focus on the lesson’s objectives’ (Teacher 3). Therefore, more opportunities were created to notice and learn the target concepts. The teachers also believed that the activation of prior knowledge was vital because children were allowed to build new learning on prior knowledge and thus ‘create connections’ (Teacher 3) which allowed more permanent learning (Teacher 1). Moreover, the children were allowed to review and recycle previous learning, and thus ‘consolidate learning to a greater extent’ (Teacher 2). Differentiating teaching was also considered to be important in promoting clarity in the lesson. The

teachers reported that the presentation of activities accommodated the students' various learning styles and thereby facilitated all the learners to access and learn new content. The provision of both difficult and easier tasks allowed children of various proficiency levels to respond.

The teachers agreed that the variety key behaviour included in the CLELD model contributed to the students' success. Varying modes of presentation, i.e. "combining both direct and indirect teaching methods" (Teacher 3), arose the students' interest and involvement in the learning process (Teacher 1). Teacher 2 explained that 'it is monotonous to employ constantly the same mode of presentation'. Learning was promoted when various teaching methods were employed. Using various types of questions was identified by all the teachers as a factor contributing to creating variety in the lesson and promoting learning. Each type of question promoted a specific domain of learning new content. For example, the 'what' questions examined the students' recalling of facts. 'Why' questions called the children to try and evaluate things (Teacher 3). According to the second teacher, this CLELD item 'helped the children to comprehend basic knowledge and also to analyze and synthesize knowledge'.

The teachers also maintained that the use of various learning climates promoted learning in the CLIL class. Opportunities for working cooperatively, competitively and individually were allowed, which promoted the students' involvement in the learning process. The teachers reported that these three types of learning climates were conducive to learning. Cooperative learning allowed students of high proficiency to help weak students. Competitive climate through games helped all the students to participate (Teacher 2). Working individually was also helpful because this gave the teacher the opportunity to examine whether all the children understood what they were taught (Teacher 3).

Task orientation was identified as an important key behaviour included in the CLELD model which enhanced learning of new material. The lessons reflected curriculum aims. The teachers attributed the successful results to the goal-oriented lessons (Teachers 2 and 3). Goals were matched with instruction. The children learned content by dealing with content-oriented activities. The purposeful tasks helped the children to 'reach the target' (Teacher 2). The teachers supported that the successful outcomes were also due to the types of objectives which considered various levels of cognitive complexity. As Teacher 1 pointed out, this CLELD item 'helped children acquire and retain new content'. Teacher 3

remarked that knowledge was retained because pupils ‘comprehended meanings but also drew conclusions by themselves’. Therefore, learning was deeper.

Selecting an appropriate instructional model was also considered by teachers to contribute to task orientation, and ultimately leading to effective learning. Teacher 1 affirmed that the use of problem-solving tasks was an appropriate model for Social Studies which allowed students to find information from various sources and answer questions. Teacher 2 attested that discovery learning allowed children to discover knowledge through experiments in Science and draw conclusions. Similarly, Teacher 3 documented that discovery learning encouraged learners to discover mathematical equations and retain them. Meaningful learning activities were identified as essential for content learning in CLIL classes. The main reason is that it promoted the students’ interest and motivation.

The teachers verified that engaging students in the learning process is a key behaviour included in the CLELD which led to the students’ success. Interest was attracted through memory games. Teacher 1 noticed that ‘even the weak students talked and reported answers’. Games worked as stimulants which raised participation. Encouraging the use of learning strategies was considered to be an important CLELD item which allowed students to direct and construct their own learning. Teachers noted that the students ‘were brainstorming things they knew on the topics. So, they easily connected old with new things’ (Teacher 1), and they ‘were also getting information from pictures. This enhanced their comprehension’ (Teacher 3). Cooperative learning is considered by the teachers to be very important because it stimulated students (Teacher 1). Weak students profited as they were scaffolded by high achievers and students of high proficiency had the opportunity to clarify some concepts while they were explaining them. Teachers avered that the provision of guided practice helped CLIL students achieve their content-related goals. They said that children had opportunities to write and speak about new material that was taught. For example, Teacher 3 reported that ‘children were given opportunities to practice using the equations. I think this helped them to learn the new content’. Teachers affirmed that the provision of reinforcement was important because it motivated learners. Therefore this CLELD item could be an excellent stimulant for participating and learning. Assessing progress and providing feedback was also found to be an important item of CLELD model by the teachers. Teachers disclosed that assessing progress gave them the chance to make sure that the children understood and learned what they were taught. This was done on an individual and a group basis. Hence, help was provided to overcome difficulties

(Teacher 2). Teachers also stated that reviewing and notetaking were important in the learning process. Students were allowed to concentrate on the main ideas of the lesson and thus retention was enhanced.

The teachers expressed the belief that medium-to-high success rate is an important key behaviour included in the CLELD model which can promote content learning. They supported that sequencing lessons based on prior learning was important for remembering new content. As Teacher 1 explained: 'New content was built on what was taught at the previous lessons. Children comprehend new content more easily'. It seems that logical sequencing of lessons helped the learners to retain new content. The teachers also acknowledged that planning transition to new material in manageable steps helped children to learn more easily the new material (Teacher 2), because they were able to 'digest new content' as it was divided in clear steps (Teacher 3). Finally, the teachers declared that it was very important for the CLIL learners to spend most of their time on high success activities. This activated the students' involvement and gave them the opportunity to experience success. Therefore, instruction producing moderate-to-high success rate should be regarded as an important CLELD item for teachers.

#### **6.6.2 Data source 2: Classroom interaction**

Classroom interaction data showed that students in CLELD+LEA classes were given opportunities to focus on new language. They were exposed to new vocabulary more repeatedly and they had more opportunities to produce new words, i.e.: 'agriculture'.

(74) T: Now. I want you to match. Growing plants. Mineral?

Agriculture? Or farming?

S: Agriculture.

T: Yes. Bravo. Agriculture. Yeoryia {agriculture}

(Geography lesson 3)

Classroom data showed that the teacher witnessed high levels of student participation. For instance, in Maths classes, children dealt with content tasks and practised solving problems, as shown in the following extract (lines 3, 10, 12 and 15). The teacher's answers show content: e.g. 'Bravo. Three' (line 11), 'Okay' (line 13) and 'Thirty. Very good' (line 16).

- (75) T: The circumference of a circle is one hundred and seventy two point seven. What is its diameter?
- S1: Fifty five.
- T: Fifty five. Bravo S1. The radius is one point five. What is its circumference? E aktina, e aktina ine enamisi {the radius, the radius is one point five}, prota apola {first of all}, How much is the diameter?
- S3: Eeh, nine.
- T: E diametros {the diameter}
- S3: Three.
- T: Bravo. Three. Ke {and} the circumference?
- S3: Nine point forty-two.
- T: Okay. The circumference is ninety four point two. What is the diameter?
- S: Thirty.
- T: Thirty. Very good. (Maths lesson 3)

### **6.6.3 Summary**

The data demonstrate the teachers' belief that their teaching is more effective when following the CLELD model with LEA in the CLIL classroom. The teachers exhibited enthusiasm regarding the positive impacts of the CLELD model with LEA. They stressed the need for using the CLELD+LEA model as it can promote language development. The acquisition learning principle allowed students opportunities to learn language in meaningful settings while at the same time they focused their attention on new language through analytic teaching which involved language games. The comprehensible input principle facilitated comprehension and understanding of meanings. The output production principle promoted the students' L2 production. Questioning allowed pupils to retrieve and produce target vocabulary. The linguistic interaction principle helped children to clarify misconceptions. Finally, the low affective filter promoted participation in a stressfree environment.

The teachers declared that the use of the CLELD items can promote subject-matter learning to a greater extent than when not using it. The clarity key behaviour helped children to build new learning on prior knowledge and access new content. Variety of teaching methods, questions and learning climates promoted students' participation. Task

orientation allowed learners to focus their attention and effort on the target content. Engaging students in the learning process activated students of all ability levels. For instance, they helped one another in cooperative settings and were all offered guided practice and reinforcement. Medium-to-high success activities allowed most of the students to achieve the lesson's objectives and experience success.

Classroom interaction data showed that students in the CLELD+LEA classes had more opportunities to focus their attention and retention processes on target language, while at the same time they were responding to content-oriented tasks with guided practice.

## **6.7 Research Question 7: How can CLIL contribute to linguistic theory?**

### ***6.7.1 Data source 1: Experiments***

The data from CLIL implementation in three different subjects (Geography, Science and Maths) demonstrate that the students involved in CLIL either with CLELD with LEA (Table 1, shown in section 1 of this chapter) or with CLELD without LEA (Tables 10, 12 14) exhibited a significant increase in vocabulary knowledge ( $p = .000$ ). Interestingly, figures 15, 16 and 17 show that the students of the CLELD with LEA group achieved higher grades than did students of the other two groups in vocabulary tests related to Geography, Science and Maths at the end of CLIL implementation.

The subjects involved in CLIL implementation either with CLELD+LEA (Table 5) or with CLELD-LEA (Tables 19, 21, 23) exhibited a parallel increase in subject matter knowledge. Interestingly, figures 27, 29 and 31 show that the students of the CLELD with LEA group achieved higher grades than did students of the other two groups in subject matter tests at the end of CLIL implementation in Geography, Science and Maths.

Statistical comparison show that CLIL students benefit both in vocabulary and subject matter learning. Therefore, language learning does not appear to occur in isolation. On the contrary, language development in CLIL classes appears to develop in an interactive manner in combination with content learning. Benefits are maximized under appropriate conditions which enhance benefits. The data suggest that the CLELD model provides the necessary conditions for more successful development of language along content learning.

### ***6.7.2 Data Source 2: Student questionnaires***

The students' questionnaires reveal that the majority of students involved in CLIL with the CLELD+LEA model (96.6%) reported that CLIL improved their English (Table 2). More specifically, 92% of the students reported that their L2 vocabulary developed to a considerable or great extent (Table 16). Furthermore, most students in the CLIL+CLELD+LEA classes (94.3%) believe that CLIL developed content learning (Table 6). The majority of the learners (73.6%) feel that content knowledge was positively influenced to a considerable or great extent (Table 25).

The findings suggest that CLIL can simultaneously promote language and content to a great extent.

### **6.7.3 Data source 3: Teacher interviews**

The teachers affirmed that CLIL with the CLELD model developed both the students' L2 vocabulary and their subject matter knowledge to a great extent. They observed that the pupils learned the new material while, at the same time, they developed their L2 English.

The teachers explained that 'new content was built on what was taught at the previous lessons' (Teacher 1). This helped students to comprehend new content more easily and create links between prior and new learning. Teachers supported that sequencing lessons based on prior learning was important for remembering new content and language. As Teacher 1 explained: 'It seems that logical sequencing of lessons helped the learners to retain new content'.

The teachers finally emphasized that reinforcement motivated learners to participate and report content-related answers which included new vocabulary in order to gain points or praise. High levels of reinforcement affected effort and production of language. Language development was promoted. These statements suggest that language development occurs in an interactive manner in relation to other types of information such as content-related knowledge.

### **6.7.4 Data source 4: Classroom interaction**

The following extracts from classroom interaction provided information for answering the seventh research question. The data suggest that language learning occurs along content learning. CLIL appears to provide opportunities for an active involvement of students in

the learning process and the simultaneous development of language, subject matter knowledge and cognition.

Language learners in CLIL classes used new vocabulary to express content related meanings as they encountered new vocabulary while dealing with meaningful tasks.

The data show that they were able to retrieve and use new word items in order to express content oriented answers. For instance, Student 7 (in extract 76) gave a correct answer (lines 5-6) to the teacher's request which included the new term 'atmospheric pressure'. The teacher accepted the answer as correct (line7).

- (76) T: Choose one sentence that you want to complete and tell me the answer. S7.  
S7: On the top of the mountain (.)  
T: louder please  
S7: On the top of the mountain there is low atmospheric pressure.  
T: Low atmospheric pressure. Excellent.  
S2: The atmospheric pressure exercises forces. The higher we go, the less pressure we can feel. (Science lesson 2)

Cognitive development, which involves the employment of thinking processes, occurred along language development. For instance, in Maths the students learned the new words 'diameter' and 'circumference' and applied numbers to the equation, finding answers to problems. To illustrate, the student in the following extract responded to a problem containing new terms to carry out the cognitive process of calculation.

- (77) T: The diameter of the small wheel is twenty-five (.). So, what is the circumference of the small circle? ((pause))  
S: Seventy-eight point five.  
T: Bravo. Seventy-eight point five. (Maths lesson 3)

A higher order process activated by CLIL students was the provision of explanations. The following extract indicates that the student's cognitive development co-occurred with L2 vocabulary development as the new term 'atmospheric pressure' was retrieved and produced in order to provide an explanation. In extract 78, students were asked in the

teacher's opening move, to explain why two suction cups cannot be separated apart when being pressed together. A student gave the correct answer in line 2.

- (78) T: What is the force which is pressing them together? Ah? S7?  
S7: The atmospheric pressure.  
T: Yes. Bravo. The atmospheric pressure is pressing them.  
There is no air under, under the suction cups. The atmospheric pressure is pressing the suction cups.  
(Science lesson 1)

Extract 79 illustrates that the pupils also managed to draw conclusions, as shown in lines 2 and 3. CLIL promoted the students' content knowledge as well as their cognitive development allowing them to handle effectively higher order processes such as evaluation of data from experiments. The students' answer 'all' shows that they comprehended and learned the new words 'direction' and 'pressure'.

- (79) T: So, to which direction is the pressure exercised?  
S1: To all  
S2: all  
T: So, the conclusion. The atmospheric pressure is exercised to all directions. Okay. (Science lesson 1)

The children were assigned to compare the results of experiments and identify similarities or synthesize conclusions. Student 2, in the following extract, reported the similarities between the two experiments (line 4).

- (80) T: I want you to compare, na sigkrinete {to compare} the funnel and the egg experiments. What happened in both cases? Hmm?  
S2: In both cases, the inside pressure is reduced.  
(Science lesson 3)

Language learning appears to be affected by prior and later learning. For instance, in the following extract the students recalled new concepts which were encountered in the previous lesson i.e 'circumference' (line 3), 'diameter' (line 5) and 'radius' (line 7).

- (81) T: Okay. Do you remember this thing we saw last time? This is the (.)  
 Ss: Circumference.  
 T: This blue line is the (.)  
 Ss: Diameter.  
 T: Diameter. This is the (.)  
 Ss: Radius.  
 T: Radius. Eh aktena {the radius}, radius, okay? And, the diameter is [two times the radius.  
 Ss: [Two times the radius.  
 T: Bravo. (Maths lesson 2)

The next extract demonstrates that the students managed to retain previous learning. They retrieved prior learning shown in the previous extract (diameter and radius) to complete statements and solve problems which involved the new word items: ‘If the circle has 6 cm diameter, then its radius is 3 centimeters’. Thus, the relationship between content learning and language learning was strengthened. In line 9, the teacher acknowledged the correct answer.

- (82) T: Choose one sentence and tell me the answer. Okay. The first? Anybody wants to try the first? The second.  
 S: I use a compass to draw a circle.  
 T: I use a (.)  
 S: Compass to draw a circle.  
 T: I use a compass to draw a circle. What about the first one?  
 S2: We use a compass to draw a circle. If the circle has 6 cm diameter, then its radius is 3 centimeters.  
 T: is 3 centimeters. Very good. (Maths lesson 2)

Reinforcement raised participation in the lesson. It motivated students to listen carefully and respond to content questions using the new vocabulary, e.g. ‘pressure’ (line 4). The teacher reinforced the student both verbally, i.e. ‘excellent’, and tacitly, i.e. ‘you get a diploma’.

- (83) T: We are going to play. Okay ? If you answer correctly, then your group gets a diploma ((pause)) The air goes in the tin, and exerts, what, on the milk. It exerts what?  
S7 : pressure  
T : It exerts pressure. Excellent S7. You get a diploma.  
(Science lesson 3)

Motivation, which was raised through the use of comprehension games, promoted the students' participation and production of new word items in content oriented answers. For instance, in the following excerpt, the students reported answers in order to knock down bottles and get points. The student's answer in line 7 'pressing it', suggests that the child comprehended the meaning of the target words 'deformed' and 'pressure' pronounced by the teacher's opening move (lines 5-6).

- (84) T: Now, the suction cups here can lift the table, because the (.) escapes. What thing escapes?  
S: The air.  
T: The air. Excellent. This group now. The bottle was filled up in Platres. Now, the girl is in Nicosia. Look at the bottle, it is deformed because the outside pressure is (.)  
S4: pressing it  
T: Yes, it is pressing the bottle and it is greater, or (.) lower?  
Ahh?  
S6: greater  
T: Bravo, S6. It is greater. (Science lesson 3)

### **6.7.5 Summary**

Test scores show that CLIL students develop both their vocabulary and content knowledge at the same time. Under appropriate conditions, i.e. by using the CLELD model with LEA, the academic gains are even greater. Student questionnaires demonstrate that the majority of pupils involved in CLIL (96.6%) believed they had improved their L2 English and felt that their L2 vocabulary had developed considerably. Furthermore, the students (73.6%) believed that their content knowledge had also improved. These answers point to the simultaneous development of language and content knowledge.

The teachers affirmed that the children in the CLIL classes developed both content and their language knowledge. Constructing new knowledge on prior learning promoted language learning. Reinforcement encouraged participation and production of new content and language. Motivating students through games encouraged them to retrieve and produce language while reporting content-related information. These observations point to the interactive nature of language learning.

The data from classroom interaction illustrate that language learning takes place along content learning and cognitive development. The students learned new language while dealing with content-oriented tasks. Cognitive development occurred along language learning. The pupils were involved in higher order thinking, such as the provision of explanations or drawing conclusions, which included understanding and production of new language. Last, reinforcement of the students' efforts and motivation to participate through games, raised their involvement in the lesson and their production of new language.

## **CHAPTER 7: SUMMARY OF STUDIES – SYNTHESIS OF RESULTS, SUMMARY OF THE CURRENT STUDY, CONCLUSIONS OF THE STUDY, IMPLICATIONS**

### **7.1 Summary of research studies – Synthesis of results**

The development of the CLELD model was based on research synthesis in the areas of L2 vocabulary learning, L2 teaching and subject-matter teaching. Review of studies in these areas has revealed the following.

#### ***7.1.1 Effective L2 teaching***

Research review revealed the importance of five principles related to effective EFL learning that could be adopted in the CLIL class: pursuing both acquisition and learning, providing comprehensible input, promoting students' output production, promoting linguistic interaction and keeping the affective filter down.

#### 7.1.1.1 Pursuing both acquisition and learning

This CLIL teacher can achieve acquisition and learning by employing both task-based, meaningful learning and explicit, analytic teaching.

##### *7.1.1.1.1 Task-based or experiential teaching*

According to the Acquisition-learning theory, acquisition takes place subconsciously and so learners have more possibilities of acquiring language when dealing with meaningful activities (Ausubel, 1968, Met, 1991, Krashen in Ellis, 1990, Grabe & Stoller, 1997). Meaning raises the need for communication (Halliday, 1978, Van Lier, 1988, Pica, 1988, Fotos & Ellis, 1991, Prodromou, 1995, Collentine & Freed, 2004).

Current trends in L2 vocabulary acquisition call for contextualizing target vocabulary (Zimmerman, 1997b). L2 learners need to learn two forms of a target L2 word: the semantic, i.e. the word's meaning, and the morpho-phonological form (Radford et al., 1999, Jiang, 2000). For this to occur, the target word needs to be presented in meaningful settings (Ellis, 1995, Bogaards, 2001). Word pairs and lists cannot provide deep vocabulary comprehension because the learner cannot reach full understanding of the L2 word, i.e. the word's grammatical characteristics, its form (spelling and pronunciation), the words it usually appears with and how it is related to other semantic concepts (Nation, 1990, 2001, 2005, Craig & Tulvig, 1975, Redman & Gairns, 1987, Read, 2004). L2 vocabulary involves understanding a word's meanings, its associations with other words and the contexts in which the word appears. Therefore target vocabulary should better be learned in context (Gipe, 1980, Duffelmeyer, 1984, Liu & Nation, 1985, McKeown et al., 1985, Nagy & Herman, 1987, Gauthier, 1991, Coomber & Peet, 1993, Ooi & Lee Kim-Seoh, 1996, Coady, 1997, Henricksen, 1999).

Meaningful learning can be provided through task-based or experiential teaching in CLIL environments (Crandall, 1993). Tasks are meaningful, goal-oriented, outcome-evaluated activities which have a real-world relationship (Skehan, 1998, Ellis, 2003). Research synthesis has shown that task-based instruction promotes grammatical and lexis acquisition

(Keck et al., 2006). However, task-based learning can have better academic outcomes when integrated with the analytic approach.

#### *7.1.1.1.2 Analytic teaching*

Research in L2 vocabulary acquisition has shown that inferring word meaning from context does not seem to be an easy task (Kelly, 1990, Prince, 1996, Nassaji, 2003), let alone leading to a similar level of retention with the meaning-given technique (Mondria, 2003). Likewise, incidental learning seems to require a certain degree of attention (Nation and Coady, 1988, Schmitt, 1990, 1993, Robinson, 1995). L2 learners may need to pay close attention for more effective learning (Schmitt and Schmitt, 1995). So, context may need to be combined with explicit/direct vocabulary instruction (Huckin & Coady, 1999, Read, 2004). Mental effort into understanding the L2 word item seems to be necessary (Hulstijn, 1992) and therefore incidental learning needs to be followed by intentional learning (Hulstijn et al., 1996). The role of consciousness in L2 acquisition has been emphasized by the Noticing hypothesis. Noticing enables the transition of input into intake and therefore attention seems to be vital in this process (Schmitt, 1990, Truscott, 1998).

L2 learners need to be provided with opportunities to recall target words (Baddeley, 1990; Schmitt & Schmitt, 1995) in order to strengthen the link between the word's form and meaning. Retrieving can be done either for receptive purposes, i.e. retrieving a word's meaning or for productive purposes, i.e. retrieving a word's form (Nation, 2001). So, both receptive and productive activities are required. Students' active participation is encouraged by teaching strategies such as the oral gap filling strategy, namely completing the teacher's phrases using target words (Robinson, 2005).

Tasks in CLIL classes need to allow interaction with language and content, in a Language-Content-Task (LCT) framework (Short, 2002).

The analytic approach, which involves teaching specific L2 features such as vocabulary, needs to be integrated with the experiential approach of content-based teaching (Swain, 1988, Harley, 1989, 1992, 1993, Allen et al. 1990, Short, 2002). Langam (2003) advocates that focused language instruction is required to develop the students' academic English in CLIL setting. Short (1994) refers to the importance of explicit vocabulary teaching. Activities may include guessing games involving target vocabulary, and miming games for promoting the contextualized use of specific verb vocabulary (Harley, 1993). Coonan (2007) shows that "separate language activities" (p.635) serve to consolidate target

vocabulary that has been accessed. Therefore, the CLIL teacher should focus on new vocabulary as well as meaningful learning in order to enhance L2 benefits.

#### 7.1.1.2 Providing comprehensible input

The CLIL teacher needs to teach at and slightly above the students' level, providing them with comprehensible input (Krashen, 1982, 1985, Dirven and Oakeshott-Taylor, 1985, Echevarria et al., 2004, De Graaf et al., 2007). For this to be achieved, the following should be considered:

##### 7.1.1.2.1 Adjusting speech to learners' level

The L2 teacher needs to speak more slowly but naturally (Henzl, 1979; Kelch, 1985; Ellis, 1990; Chaudron, 1983, 1985a), use morphosyntactic simplifications by eliminating structurally complex sentences (simple sentence structure: Subject – Verb – Object, reduction of embedded clauses – Krashen, 1985), use repetition and paraphrasing. Its importance in CLIL teaching has been shown by Mitchell (1988) and Met (1994).

##### 7.1.1.2.2 Exaggerated articulation

This includes higher pitch, exaggerated intonation (White, 1987; White, 1996; Xanthou, 2006).

##### 7.1.1.2.3 Extra-linguistic information: body language

Body language involving gestures have been shown to be useful for promoting L2 understanding and proficiency (Wong-Fillmore, 1985, Markee, 1997, Cabrera, & Martinez, 2001; McCafferty 2004; DeGraaff et al., 2007).

##### 7.1.1.2.4 Multiple non-linguistic representations

Multiple, non-linguistic representations (Marzano et al., 2001, Tellez & Waxman, 2006, Kessler & Quinn in Crandall, 1987, Crandall, 1993, Coonan, 2007, De Graaff et al., 2007) include pictures as the static images stick longer to memory than moving images (King et al. in Crandall 1987 showed positive outcomes on social studies learning through the L2, Short, 1994, DfEE, 2000), realia - real objects (object manipulation was found to increase academic achievement in Science learning through the L2 by Amaral et al. 2002, and in social studies learning through the L2 by King et al. in Crandall 1987; Ramirez & Stromquist, 1979; Met, 1994; DfEE, 2000), mathematical apparatus, diagrams (DfEE, 1999; Coonan, 2007), hands-on activities (Maths - Mohan, 1986; Saville-Troike, 1984), graphs, maps (King et al. in Crandall 1987 – social studies, Coonan, 2007), tables, Venn

diagrams (Short, 1994), timelines (Mohan, 1986), multimedia (Tang, 1992; King et al. in Crandall 1987 revealed positive impact on social studies learning through the L2), e.g. Powerpoint presentations (Xanthou, 2006), videoclips (Chun & Plass, 1996; Plass, 2002; Clovis, 1997; Jones & Plass, 2002 showing that it supports L2 listening comprehension), graphic representations (Marzano et al., 2001; Crandall, 1993; Mohan, 1986). Short (1994) has shown that graphic organizers assist comprehension and retention of target vocabulary and content in social studies CLIL classrooms, grades 6-9.

#### 7.1.1.2.5 L2 medium strategies

L2 strategies include examples, definitions, synonyms (Ramirez & Stromquist, 1979; Wong-Fillmore, 1985; Met, 1994; Harklau, 1994; De Graaff et al., 2007), paraphrase (Met in Cenoz & Genesee, 1998: 59), repetitions or partial self repetitions (Snow, 1972; Hatch et al., 1975; Hamayan & Tucker, 1980; Chaudron, 1983; Wong-Fillmore, 1985; Met, 1994; Long, 1996; Cabrera & Martinez, 2001; Jensen & Vinther, 2003; Robinson, 2005; Xanthou, 2006; Coonan, 2007), explanations, contrasts with similar items, clue-giving: suggesting an associated concept (Mitchell, 1988) and linguistic frameworks (i.e. noun phrase, verb phrase, adjective phrase, plus new information each time allowing the meaning to develop incrementally) which seem to promote academic learning in CLIL Geography and Science classes (Robinson, 2005). Such frameworks are necessary if the meaning of a target word is to be expanded or developed incrementally (Schmitt, 2000) through a semantization process (Henricksen, 1999), i.e. reorganizing the learners' interlanguage semantic networks through definitional links in order to elaborate on aspects of a new word's form and meaning (Hulstijn, 2001).

Repeated/recurring and multiple exposures to target L2 vocabulary seem to enhance L2 acquisition as shown by research (Herman et al. 1987; Hwang & Nation, 1989; Rott, 1999; Schmitt & Carter, 2000; Nation, 2005; Kim, 2006). Coomber & Peet (1983) concluded that learners need to hear, read, write, and speak using the target words. Robinson (2005) showcased the importance of repeated encounters with target new words in CLIL Geography and Science CLIL classrooms.

#### 7.1.1.2.6 L1 medium strategies

L1 could be used judiciously in the CLIL class. The use of L1 in the CLIL classroom provides cognitive tools for learning a subject (i.e. Science - Rodriguez & Bethel, 1983; Cuevas, 1984; Lucas & Katz, 1994; Cummins, 1999; Lee, 2005; Fradd et al., 2002; Behan

& Turnbull, 1997; Lin, 2006; Coonan, 2007; Merisuo-Storm, 2007). Students should be allowed to use their L1 as a cognitive tool for learning content as additive effects have been shown in subject learning (Science) in CLIL classrooms (Tobin & McRobbie, 1996; Kearsley & Turner, 1999; Lee, 2002; Lee 2003; Lee 2004; Pinter 1999; Swain & Lapkin 2005; Xanthou, 2006). Swain (2000), and Behan & Turnbull (1997), examined classroom-based discourse in CLIL environments finding that the use of L1 assisted knowledge construction, task management, information sharing, and vocabulary search. A pupil could supply the L1 equivalent, the teacher could provide translation, and language switching could be used that is repeating in L1 what was provided in L2 (linguistic code-switching has been found to be effective for CLIL classes (Cleghorn, 1992; Blake & Sickle 2001; Lee 2005, Leung, 2005, Langer, 2007, Serra, 2007, Gajo, 2007). L1 can be used in instruction to retrieve the students' experiences and knowledge, talk about more sophisticated topics or introduce key L2 terms through L1 discourse which offers semantic context to master the subject. Students can use L1 to assist one another, ask and answer questions and interact socially (Lyn, 2006).

#### 7.1.1.2.7 CALL

Technology can be used as a tool to instruct learners, among other uses, to promote clarity in the CLIL lesson. The teacher can use computers to present audio, visual, and written materials (Kern, 2006).

CALL material needs to be developed aiming to enhance input comprehension (Chapelle, 1998, Sharwood Smith, 1991). This can be achieved through semantic maps and stressing key words (Long, 1996). Key concepts and vocabulary can be emphasized through typographical enhancement in written input: boldfacing, colouring, underlining, circling (Kessler and Quinn in Crandall, 1987 – Science through L2). In doing so, L2 development can be positively influenced (Doughty, 1991).

The use of computer programmes to construct knowledge of reflection was found to be effective in promoting academic development in content areas taught through the L2, i.e. providing comprehensible input and meaningful explanations of content by Xanthou (2006). Thus, it could be used effectively in the CLIL class.

#### 7.1.1.3 Promoting students' output production

#### 7.1.1.3.1 Stimulate production of target language

Output production helps learners to access and use L2 knowledge, increasing their level of fluency. Second, their L2 knowledge is tested. Third, they reflect upon their interlanguage internalizing knowledge and finally notice their linguistic deficiencies. Therefore, the teacher needs to stimulate “the use of the target language” (De Graaff et al., 2007: 609), by pushing output production in the L2.

CLIL students need to be provided opportunities for practising or applying new knowledge (Gagné & Briggs, 1979, Output hypothesis - Swain, 1985). Reports, answers to questions, responses to oral and written tasks and providing explanations can stimulate output production (De Graaff et al., 2007). Therefore, the CLIL learner needs to be encouraged to produce output in order to learn new content and language.

#### 7.1.1.4 Promoting linguistic interaction

The interaction hypothesis acknowledges the impact of social mediation, holding that meaning negotiation facilitates L2 acquisition (Long, 1983, 1996; Pica, 1994; Gass & Varonis, 1994; Ellis et al., 1994; MacKey, 1999; Swain, 2000; Lantolf, 2000; Gibbons, 1998; 2003). The social constructivist theory holds that the social environment is responsible for meaning-making (Vygotsky, 1962; 1978). Social and interactional contexts help students control language (Halliday, 1993).

CLIL teachers need to help the students reach the zone of proximal development, namely the area of their potential development (Mason & Sinha, 1993; New London Group, 1996). Teacher-student interactions such as recasting, clarification requests and indicating the need for reformulation (‘Can you explain that more?’) have been found to promote the use of scientific register (Gibbons, 2003) in CLIL classrooms and constitute instances of effective CLIL teaching performance (De Graaff et al., 2007).

Participating or observing interaction has been found to benefit L2 development (Pica, 1992; Ellis et al., 1994). CLIL teachers need to provide opportunities for linguistic interaction between themselves and the learners. Learners can be asked to expand on their responses using prompts such as ‘What else..?’ or ‘Can you tell us more about that?’.

The CLIL teacher needs to make use of verbal scaffolding such as paraphrasing, procedural scaffolding such as peer work, and instructional scaffolding such as using graphic organizers to illustrate content (Echevarria et al., 2004).

#### 7.1.1.4.1 Conversational modifications

Interactional features include confirmation checks following a previous speaker's utterance, comprehension checks and clarification requests (Pica & Doughty, 1985a). Cabrera and Martinez (2001) demonstrated the positive impact of comprehension checks. Lyster and Ranta (1997), Lyster (2002b) and De Graaff et al. (2007) have shown the positive impact of clarification requests on L2 development.

#### 7.1.1.4.2 Semantically contingent responses

Long (1996) refers to semantically contingent responses involving recasting, i.e. reformulating students' meanings in registrally suitable ways. Recasting has been found to be beneficial on L2 development (Pica, 1994; Ellis, 1995; Lyster & Ranta, 1997; Lyster 1998a; Mackey & Philp, 1998; Mackey, 1999; Mackey et al., 2000; Han, 2002; Lyster, 2002; Iwashita, 2003; Leeman, 2003; Philp, 2003; Gibbons, 2003; Carpenter et al., 2006).

Negotiating and enriching students' input or using protracted language events (i.e. repeating and expanding learners' speech) has been found by the research synthesis carried out by Tellez & Waxman (2006) to increase L2 proficiency. Hence, these strategies can be used in the CLIL class for promoting learning through interaction.

#### 7.1.1.5 Keeping the affective filter down

Affective filter is assumed to affect language acquisition (Krashen, 1982). Affective factors need to be taken into account in order to achieve the lesson's goals (Council of Europe, 2001). In elementary classes, the pupils' instinct for fun and play needs to be considered (Larsen 2000; Ministry of Education and Culture, 2006) for promoting interest in the task and raising motivation to participate (Council of Europe, 2001).

#### 7.1.1.5.1 Language games involving target vocabulary and new concepts

The Affective filter hypothesis assumes that a stress-free learning atmosphere promotes learning by reducing anxiety (Crandall, 1987; Krashen in Ellis, 1990). Language games may include word anagrams, spelling games, and word search (Coomber & Peet, 1993; Santana-Williamson, 2002). These are likely to bring pleasure in EFL learning, promoting

students' interest and participation in the CLIL class (Prodromou, 1995; Larsen, 2000; Xanthou, 2006).

### ***7.1.2 Effective subject matter teaching***

Research review uncovered that the following key behaviours are essential for promoting subject matter learning: lesson clarity, variety, task orientation, engagement in the learning process and moderate-to-high success rate. Thus, they could be used by the CLIL teacher for enhancing academic benefits.

#### ***7.1.2.1 Lesson clarity***

Lesson clarity is an essential key behaviour acknowledged by Borich's research synthesis as contributing to effective learning. His findings coincide with that of Sammons et al. (1995) who conducted a review of research studies on school effectiveness on behalf of the British schools inspectorate OFSTED.

##### ***7.1.2.1.1 Inform learners of the objectives***

The CLIL teacher needs to inform the students of the lesson's objective (s). Both content and language objectives should be considered. This may include the particular skills expected to be mastered by the end of the lesson (Echevarria et al., 2004; Borich, 2007).

##### ***7.1.2.1.2 Build on prior knowledge***

The cognitive constructivist theory assumes that learning involves construction which builds on learners' prior knowledge (Piaget, 1963). New information is integrated into schemata, thereby creating meaningful associations (Carrell & Eisterhold, 1983; Carrell, 1984, 1987; Floyd & Carrell, 1987; Echevarria et al., 2004; Kaufman, 2004). Connections between past and new knowledge promote better learning (Bruner, 1968; Bransford & Johnson, 1972; Grabe & Stoller, 1997).

Students' prior knowledge needs to be explored and activated (Cuevas, 1984; Marzano et al., 2001; Borich, 2007). This includes both world and linguistic knowledge. Prior linguistic knowledge needs to be activated for effective L2 vocabulary acquisition. New words need to be incorporated into language that is already known in order to create associations which will enable recalling words (Stahl, 1983; Stoller & Grabe, 1993; Schmitt & Schmitt, 1995; Martin et al. 2002). Activation of prior linguistic knowledge

may involve extralingual or contextual cues (Palmberg, 1987) or intralingual cues such as suffixes (Carrell, 1983). Prior knowledge can be accessed through questions, pictures, photographs, interviewing, picture and sentence matching, semantic webs and a word wall (Gibbons, 1998; 2003).

The new lesson should reflect task-relevant prior learning as new knowledge needs to relate to established entities (Ausubel, 1968; Segalovitz, 1997). The use of informal everyday language facilitates the thinking process and therefore learning (Leung, 2005, Gibbons, 1998), bridging the gap from everyday discourse to academic register. Prior experiences serve as the contexts within which target content and language will be built and understood (Palmberg, 1987; Ellis, 1990; Echevarria et al., 2004; Tellez & Waxman, 2006; Coonan, 2007). Incorporating learners' prior linguistic (including L1) and world knowledge was found to be beneficial in learning Science through the L2 (Lee, 2004; 2005). Instruction should be cognitively based by employing students' everyday experiences (Moje et al., 2001) for reasoning and argumentation, e.g. deep questions.

Advance organizers should be used to present new content that will be exposed to students (Mehan, 1986; Short, 1994; Marzano et al., 2001; Borich, 2007). This kind of organizers can provide a structured overview of topics.

#### *7.1.2.1.3 Provide differentiated instruction*

Classroom activities should address the learning styles of all learners, i.e. by following the VAK neurolinguistic programme (Reid, 1987; Tomlinson, 1995; Campbell et al., 1996; Hess, 1999; Tomlinson & Alan, 2000; Marzano et al., 2001; Rao, 2002; Xanthou, 2005; Christian, 2006; Koutselini-Ioannidou, 2006) and considering Gardner's (1983) multiple intelligences, i.e. linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic (King et al in Crandall, 1987), interpersonal, intrapersonal, naturalistic (Borich, 2007).

Content differentiation can be achieved when texts are offered at more than one reading level, the teacher reteaches some learners, and students can make use of computer programmes and texts. Process differentiation can be achieved when activities are given at various levels of difficulty. Self-access corners and interest centres including extra activities directed at various levels of proficiency can help process differentiation. Product differentiation can accommodate a CLIL class by allowing oral, visual, kinesthetic,

musical, spatial, creative products depending on the student's or the group's readiness (Tomlinson, 1995; Segalovitz, 1997; Hess, 1999; Tomlinson & Allan 2000; Borich, 2007).

#### 7.1.2.2 Instructional variety

Instructional variety is an important behaviour contributing to effective teaching that should be employed in the CLIL class. It can include the following key features:

##### 7.1.2.2.1 Vary modes of presentation

The teacher can use a combination of presentation techniques such as presenting, modeling, asking questions, allowing independent practice, discussing, providing for guided practice, direct, indirect, cooperative learning, hands-on activities (Ramirez & Stromquist, 1979; Short, 1994; Borich, 2007).

Various grouping styles could be employed in the CLIL classroom. These may include individual work, partners, triads, small groups of four or five, cooperative learning groups, and whole-groups. At least two different grouping structures should be used during a lesson (Cuevas, 1984; Porter, 1986; DfEE, 1999; Echevarria et al., 2004; Coonan, 2007).

##### 7.1.2.2.2 Use various types of questions

Various content questions can be used in the CLIL class to increase output production. These include direct questions (e.g. 'What does X mean?'), lower-order questions (e.g. 'What was the...'), fact questions requiring recall of information, closed questions (e.g. 'What is the function of...'), open questions requiring more than one correct answer (e.g. 'How has X influenced our lives?'). Process questions should also be included in the lesson requiring students to analyze, synthesize, problem-solve, create, judge (Borich, 2007).

##### 7.1.2.2.3 Create various classroom climates

The teacher may allow a competitive, cooperative, or/and individualistic type of climate in the classroom (Borich, 2007) in order to enhance variety in the lesson and promote the students' interest.

#### 7.1.2.3 Task orientation

Learning tends to be more effective when focusing on teaching a subject and helping learners acquire content (Borich, 2007). The review of research synthesis on school effectiveness carried out by Teddlie & Reynolds (2000) revealed that 'maintaining task

orientation in the classroom' (p. 146) contributes to school effectiveness. Task orientation is achieved when the following exist:

#### 7.1.2.3.1 Lesson plans reflect curriculum features

Lessons should be developed following curriculum objectives.

#### 7.1.2.3.2 Match goals with instruction

Instruction needs to be organized around goals and it should not be influenced by classroom management tasks.

#### 7.1.2.3.3 Objectives consider various levels of cognitive complexity

Objectives refer to attainment of a particular behaviour. Cognitive objectives could consider Bloom et al.'s taxonomy (1984) including: knowledge (e.g. list, recall, describe, match, identify, name), comprehension (e.g. estimate, explain, predict, summarize), application (e.g. change, relate, compute, solve, demonstrate, prepare, use), analysis (e.g. diagram, subdivide), synthesis (e.g. categorize, create, design, produce), and evaluation (e.g. criticize, justify, compare, defend, support, contrast, judge) (Bloom & Krathwohl, 1977; Chamot, 1983). Objectives should refer to both lower-level cognitive skills and higher level ones (Borich, 2007).

#### 7.1.2.3.4 Select appropriate instructional model

Both direct and indirect instruction strategies may benefit the learner. The teacher may use direct instruction for achieving knowledge and comprehension objectives and indirect instruction to accomplish higher level skills. Direct instruction can be used for learning content, e.g. facts, action sequences, and rules which are vital for moving to higher-order thinking (Gentile & Lalley, 2003). It can make use of modeling, guided student practice, allowing independent practice and provision of feedback. Indirect instruction allows students to form hypotheses, provide explanations about observations, get involved in classroom dialogue, deal with problem-solving and individual projects. Generating and testing hypotheses has been found by Marzano et al. (2001) to be an effective teaching practice, while teachers have also reported its effectiveness (Kyriakides et al., 2006). A hypothesis is formed followed by evidence analysis and decision about the truthfulness of the scenario. Indirect instruction involves questions which guide the inquiry process and encourage the discovery of the various sides of a problem. Some types of indirect instruction include concept learning, inquiry learning and problem solving. Concept

learning allows students to understand concepts through demonstration of examples and non examples placed on Yes/No columns. Then learners can create their own examples.

#### 7.1.2.3.5 Assign meaningful goal-oriented activities

Tasks may include identifying similarities and differences (Solomon, 1995; Marzano et al., 2001), and generating and testing hypotheses (Marzano et al., 2001; Amaral et al., 2002; Lee, 2005) etc. The latter involves problem identification, hypothesis formation, brainstorming of solutions, investigation (data collection and analysis), discussion, forming conclusions and reaching generalizations. Learning is developed through observation, description, and experimental investigation.

Problem solving involves: identifying a problem, stating objectives, collecting data, interpreting, and forming conclusions. Problem-solving tasks enable learners to choose and order various data and look for answers building on known concepts. Learners achieve deep understanding of new concepts as they find relationships between new and prior concepts which are stored in their mind. Simultaneously, learners make efforts to describe their experiences using the target language. Coonan (2007) has shown that this type of learning works in CLIL classes.

Alternatively, the teacher can use either inductive or deductive teaching. In the first case, children are allowed to draw generalizations, while in the second, they are presented with generalizations and they are required to apply some principles in specific instances.

The Department for Education and Employment (1999) and The Second Language Approach to Mathematics Skills (SLAMS) suggest the use of deductive teaching to a certain extent (Cuevas, 1984). The DfEE (1999) groups the instructional events of a Maths lesson in the L2 into 'warm-up', dealing with mental arithmetic, introduction of topic, involving the teacher working with the class and then the students working in groups on various meaningful tasks, and finally discussion. The SLAMS approach involves diagnosis of content knowledge, activities to develop skills for accomplishing mathematics objectives (individual tasks and group work), preventive language strategies to review content in students' L1 and work with ESL activities to raise the L2 level of competence in order to master content (Cuevas, 1984).

Inquiry-based Science instruction involves investigating and providing explanations (Rodriguez & Bethel, 1983; Kelly & Breton 2001; Amaral et al., 2002). Learning by doing in Science includes practice in small groups, teacher-guided reporting session – clarifications and recasting. Students’ current language resources are first used and gradually the focus is placed on new language and writing generalizations (Gibbons, 1998; 2003). Teacher and peer interaction involves discussing, asking questions, forming hypotheses, predicting and evaluating evidence data (Gibbons, 2003). Employing scientific inquiry in the L2 Science classroom has been shown to have a positive impact on academic development (Rodriguez & Bethel, 1983; Kessler and Quinn in Crandall, 1987; Gibbons, 1998; 2003; Kelly & Breton, 2001; Fradd et al. 2002; Lee, 2005).

#### 7.1.2.4 Engagement in the learning process

CLIL teachers need to maximize the level of students’ engagement in the learning process. Students should actively think about the activities while they work with them or when they use what is presented (Weinstein & Mignano, 1996). For this to be achieved, the following need to be considered:

##### 7.1.2.4.1 Promote interest – Games

Activities in the CLIL classroom could include memory games such as word tennis and football, general knowledge true-false quizzes, noughts and crosses etc (Coomber & Peet, 1993; Willis, 1996; Xanthou, 2006). Games motivate students to participate attracting their interest.

##### 7.1.2.4.2 Encourage the use of learning strategies

Learners need to learn how to use strategies to process new information. Facilitating the ‘use of strategies’ was used by CLIL teachers in the Netherlands in their effort to promote language development (De Graaff et al., 2007: 609) and provide effective CLIL teaching performance. Cognitive strategies may include brainstorming, peer tutoring, completing graphic organizers to illustrate connections between prior and new knowledge, notetaking, and underlining (Barton et al., 2002). Comprehension strategies may include predicting and summarizing what a reading text is about (Marzano et al., 2001). The teacher may encourage the use of comprehension strategies by asking questions related to pictures, titles, bold words to help the learner understand meanings. Metacognitive strategies include monitoring one’s thinking, being aware of the learning process, and reflecting (O’Malley & Chamot, 1990, Echevarria et al., 2004).

Higher order thinking can be activated by employing constructivist thinking. Learning can be based on inquiry which encourages students to get involved in hands-on investigation or problem solving which encourages observation and data collection, e.g. finding the most important products of a country. Process questions can be used, such as indirect, higher-order, divergent, open, and concept questions which encourage learners to use personal experiences and knowledge to build or construct their own meanings.

#### *7.1.2.4.3 Assign cooperative work*

Research has shown that cooperative learning promotes content learning (Johnson et al., 1981; Humphrey et al., 1982; Sherman & Thomas, 1986; Bossert, 1988; Chi et al., 1994; Pica, 1994; Manlove & Baker, 1995; Slavin, 1995, 1996; Greenwood & Delquadri, 1995; Johnson et al., 1998; Koutselini & Theophilides, 1998; Singhanayok & Hooper, 1998; Johnson & Johnson, 1999; Lomangino et al., 1999; Lyle, 1999; Johnson et al., 2000; Marzano et al., 2001).

Cooperative learning has been found to be effective for developing the L2 (Tellez & Waxman, 2006). Beginners may cooperate when dealing with simple tasks such as listing and grouping. Advance learners can repeat, paraphrase, explain, and clarify (Varonis & Gass, 1985; Porter, 1986; Urzua, 1987, Meyer et al., 1994; Pica, 1994; DiCamilla & Anton, 1997; Hirvela, 1999; Liu & Hansen 2002; Vine, 2003; Rydland & Aukrust, 2005, Rollinson, 2005).

Cooperative learning can be used effectively in the CLIL class (Cuevas, 1984; Moss, 1992; Crandall, 1993; Short, 1994; Klingner & Vaughn, 2000; Coonan, 2007). Peer interaction allows students to discuss, ask questions, form hypotheses, predict, and evaluate evidence data (Gibbons, 1998; 2003 and Amaral et al., 2002 in the area of L2 Science learning). Pair work has been found to be more effective allowing two-way information exchange (Pica & Doughty, 1985a). Cooperative activity needs to be characterized by goal specification. The goal needs to be related to previous and future learning and the end product needs to be specified.

Research synthesis of studies related to effective teaching strategies carried out by Marzano et al. (2001) has praised the role of cooperative learning in heterogeneous classes. Mixed ability grouping in the class has been found to promote learning (Manlove & Baker,

1995; Lyle 1999; Ireson & Hallam, 1999). The benefits of cooperative learning have been demonstrated by O'Donnell et al. (1985), Chi et al. (1994), Greenwood & Delquadri (1995), and Johnson & Johnson (1999).

#### 7.1.2.4.4 Provide guided practice

Guided practice helps learners to access and use L2 knowledge increasing their level of fluency. Second, their L2 knowledge is tested; third, they reflect upon their interlanguage internalizing knowledge and finally notice their linguistic deficiencies.

CLIL students need to be provided opportunities for practising or applying new knowledge (Gagné & Briggs, 1979, Output hypothesis - Swain, 1985) via a variety of verbal or written exercises. The teacher could stimulate “the use of the target language” (de Graaff et al., 2007: 609), pushing output production in the L2.

#### 7.1.2.4.5 Reinforce effort and provide recognition

Students may use a rubric to follow their effort and achievement, and record this relationship on a chart. When some standard of performance has been attained, students can be rewarded. This can be done through personal recognition, abstract rewards, and coupons, or certificates (Marzano et al., 2001).

Various types of rewards can be used by the teacher to praise students' work. These may include verbal praise and extra credit (Laar et al., 1989; Mortimore, 1991; Borich, 2007).

#### 7.1.2.4.6 Assess progress and provide feedback

Monitoring pupil progress has been found by research synthesis on school effectiveness to be a key factor for effective learning (Sammons et al. 1995; Borich, 2007). Feedback can be given to individuals, groups or/and whole class including reading aloud, smiles, nods, talking with groups or giving answer keys, showing transparencies etc. The output hypothesis supports that the production of modified output is crucial to second language development (generated by Swain, 1985, 1995; Long, 1996, and tested by Pica, 1988, 1992; Nobuyoshi & Ellis, 1993; Schmit, 1993; Donato, 1994; Swain, 1995; Izumi et al., 1999; Bygate, 1999; Bigelow, 2000; Nakahama et al., 2001; Izumi, 2003). The provision of feedback by the teacher seems to promote successful output (Kyriakides et al., 2006). However, peer feedback could also be helpful (De Graaff, 2007).

#### 7.1.2.4.7 Review new content and language knowledge, Summarizing, Note taking

The CLIL teacher needs to review and summarize important concepts during and at the end of a lesson. Students in CLIL classes can be allowed to illustrate knowledge in many ways. For example, they can complete outcome sentences either orally or in journals beginning with “I learned...” (Echevarria et al., 2004, Cuevas, 1984).

Notes can help in reviewing content (Carrier & Titus, 1981). The teacher can help students to write the most important information (Marzano et al., 2001: 46) in various ways such as using an informal outline or webbing.

#### 7.1.2.5 Moderate-to-high success rate

Success rate is related to the rate at which the students comprehend the tasks they deal with. Partial understanding is required to form the basis for the teacher to scaffold learning (Borich, 2007). When CLIL learners understand the task higher achievement levels are reached. This can be achieved when considering the following:

##### 7.1.2.5.1 Sequence lessons based on prior learning

The teacher needs to organize a unit and each lesson of the unit in a way that tasks are built on prior learning (Borich 2007). Activities need to correspond to the language and subject level of the students. CLIL students need to deal with activities designed for their language and subject level. This has been found to be beneficial when teaching Maths to ELLs (Dale and Cuevas in Crandall, 1987).

##### 7.1.2.5.2 Plan transition to new material in manageable steps

The lesson should be broken down into small parts. Activities need to be given in a step-by-step manner, and expected work should be demonstrated. Pacing needs to be matched to students' level. The teacher can read aloud if required.

##### 7.1.2.5.3 Instruction produces moderate-to-high success rate

Learners need to spend about 60% to 70% of their time on tasks that allow almost complete understanding of material.

The research findings in the areas of effective L2 learning and subject matter learning form the foundation for the development of the CLELD model.

## 7.2 Summary of the current study - Conclusions

Traditional language learning does not seem to promote foreign language learning to the anticipated level (Van de Craen & Mondt, 2003; Rodiki, 2004; Kazamias et al., 2005). Thus, the increase of exposure to the foreign language, i.e. by adopting CLIL, could enhance learners' language development (Council of Europe, 2001).

CLIL is based on the position that developments in knowledge, language and cognition take place simultaneously (Segalowitz, 1997). In this framework, language acquisition is assumed to occur implicitly (Krashen, 1982), linguistic interaction promotes language learning (Vygotsky, 1962; Lantolf, 2000) and the individual constructs knowledge by creating connections between prior and new learning (Piaget, 1963).

Research outcomes in the area of CLIL implementation revealed a positive effect of CLIL on learners' L2 development. Content learning can also proceed successfully in CLIL classes. However, a number of early and recent studies did not show the expected improvement in L2 development, perhaps because the emphasis was placed on content learning. In this way, L2 learning was downplayed. Furthermore, several studies demonstrated that subject matter learning in CLIL classes was not as successful as in classes where learners were taught through the medium of L1. These findings suggest that the use of CLIL methodology can enhance teaching and learning.

The current study focuses on effective content and language integrated learning for promoting both content knowledge and L2 vocabulary development. A CLIL lesson delivery model is developed on the basis of synthesis of research findings in the area of L2 vocabulary development, L2 language learning and effective subject matter learning.

The CLELD model developed in this study is based on research findings in the areas of effective L2 teaching and subject matter teaching. Review of L2 acquisition theories has revealed the importance of five principles which can contribute to L2 development of CLIL students: pursuing both acquisition and learning (Krashen, 1982; Schmidt, 1990), providing comprehensible input (Krashen, 1985), promoting students' output production (Swain, 1985, 1985), promoting linguistic interaction (Long, 1983, 1996; Swain, 2000) and keeping the affective filter down (Krashen, 1982; Crandall, 1987).

Research review has shown that several teaching strategies can be employed in order to successfully implement the principles. Acquisition and learning principle requires the use of meaningful, experiential learning along analytic teaching, i.e. explicit language instruction (Short, 2002; Langman, 2003; De Graaff et al., 2007). The comprehensible input principle can be achieved by adjusting speech to learners' level (De Graaff et al., 2007), using exaggerated articulation (White, 1987), providing extra-linguistic information (Cabrera & Martinez, 2001; De Graaff et al., 2007), providing non-linguistic representations (Marzano et al.; Tellez & Waxman, 2006; Coonan, 2007), employing both L2 medium (Met, 1994; Harklau, 1994; Long, 1996; Robinson, 2005) and L1 medium strategies (Cleghorn, 1992; Lucas & Katz, 1994; Cummins, 1999; Lin, 2006; Coonan, 2007; Serra, 2007) and using CALL to present new material in a comprehensible way (Chun & Plass, 1996; Kern, 2006; Xanthou, 2006). Output production requires the use of various types of creations which can promote noticing linguistic weaknesses (Swain, 1995) and metalinguistic reflection on language use (Donato, 1994). Further, retrieval and production of new vocabulary create connections in memory (De Bot, 1996). Linguistic interaction can be more effective when the teacher employs confirmation and comprehension checks, and clarification requests (Pica & Doughty, 1985; Pica et al., 1987, 1989; Lyster, 2002) as well as semantically contingent responses which can clarify meaning and promote the use of target language (Short, 1994; Pica et al., 1996; Mackey, 1999; Mackey et al., 2000; Han, 2002; Lyster, 2002; Iwashita, 2003; Leeman, 2003; Philp, 2003; Gibbons, 2003; Carpenter et al., 2006). Keeping the affective filter down can be achieved through games which promote the students' interest and require retrieval and production of new vocabulary (Crandall, 1987; Xanthou, 2006).

Research review of studies which included synthesis and meta-analysis of research in the area of effective subject matter learning has revealed five key behaviours which can promote learning (Borich, 2007; Marzano et al., 2001). These key behaviours are included in the CLELD model as they are assumed to help the CLIL teacher provide effective teaching of content. They include: lesson clarity, instructional variety, task orientation, engagement in the learning process and moderate-to-high success rate. Various strategies can be used in the CLIL class in order to implement successfully these key behaviours and enhance learning. Lesson clarity can be supported by informing learners of the objectives in order to allow them to notice target aspects of the new lesson, knowledge, building new learning on pre-existing knowledge, thereby creating associations in memory (Echevarria et al., 2004; Coonan, 2007) and providing differentiated instruction in order to

accommodate the learning styles of all the students (Tomlinson & Allan, 2000; Koutselini-Ioannidou, 2006). Instructional variety can be achieved with the use of various modes of presentation (Echevarria et al., 2004; Coonan, 2007), i.e. individual, pair and group work, a variety of questions, i.e. both lower and higher-order questions and various classroom climates, i.e. competitive, cooperative, individualistic. Task orientation requires the use of lesson plans which follow curriculum features, instruction which matches with goal-setting, objectives at various levels of cognitive complexity, appropriate instructional model, i.e. direct and indirect (Rodriguez & Bethel, 1983; Kessler & Quinn in Crandall, 1987, Kelly & Breton, 2001; Fradd et al., 2002), and meaningful activities, i.e. identifying similarities - differences and generating - testing hypotheses (Marzano et al., 2001; Lee, 2005, Coonan, 2007). Engagement in the learning process can be achieved by promoting the students' interest, i.e. through memory - comprehension games, encouraging the use of learning strategies, i.e. cognitive and comprehension strategies (Echevarria et al., 2004), assigning cooperative work, which allows students to interact in order to achieve task completion (Klingner & Vaughn, 2000; Gibbons, 2003; Coonan et al., 2007), providing guided practice in order to enable students to exhibit understanding of new concepts (Echevarria et al., 2004), reinforcing effort and providing recognition in order to promote participation (Wiersma, 1992), assessing progress and providing feedback for drawing the learners' attention to certain aspects of knowledge (Kyriakides et al., 2006) and reviewing new material - summarizing - notetaking in order to direct retention processes towards target knowledge (Echevarria et al., 2004). Medium-to-high success rate can be succeeded by sequencing lessons based on prior learning, planning transition to new material in manageable steps in order to facilitate comprehension of new content, and providing instruction which produces moderate-to-high success rate, thereby allowing students to exhibit comprehension and experience success.

The effectiveness of the CLELD model in content and vocabulary learning in elementary school classes was examined. It was also investigated whether the language enhancement activities (LEA) which were included in the CLELD model enhanced content and vocabulary learning in CLIL+CLELD classes to a greater extent than in the CLIL+CLELD classes which were not provided LEA. The students' attitudes towards CLIL+CLELD and the teachers' opinions regarding the effectiveness of the CLELD model in lesson delivery were examined. Finally, whether CLIL can contribute to linguistic theory was explored.

A pre-post test experimental research design was used to examine the academic effects of the CLELD model as compared to CLELD without LEA, and learning content through L1. The CLELD with LEA classes were offered language enhancement through a multiple treatment approach that involved focusing on new vocabulary through analytic teaching, i.e. matching target words with pictures/definitions, reading the list of new words at the end of the lesson, playing games which involved new vocabulary such as bingo, saying what a picture represents, finding the word that starts with a specific letter (I spy a word beginning with...), exploring word anagrams, and being exposed to PowerPoint presentations which allowed students to see what was said orally, e.g. new vocabulary accompanied with pictures.

Pre- post-testing and multiple repeated measures analyses were employed in order to investigate the impact of the CLELD instrument on L2 vocabulary and content learning. Likert-type questionnaires provided information about the students' views on the effectiveness of CLIL delivery in both cases. Classroom interaction data shed more light on the processes leading to students' success. Interviews from the teachers who taught the CLIL lessons using both approaches gave further information.

Data analysis yielded the following answers to the research questions, confirming the hypotheses:

### ***7.2.1 Answers to the research questions***

#### **1. The use of the Content and Language integrated learning for Elementary classes Lesson Delivery Model contributes to English language learners' (ELLs) vocabulary development.**

Data show that the use of the CLELD model in the CLIL class promotes vocabulary development. Experiments demonstrate that students involved in CLIL+CLELD+LEA lessons had a significant development in vocabulary learning ( $p=.000$ ).

Student questionnaires reveal that 92% of the pupils in the CLELD+LEA classes believe that L2 vocabulary improvement occurred to a considerable or great extent. Learners reported that the principles related to L2 learning included in the CLELD are essential to language development: meaningful learning, analytic teaching, comprehensible input (adjusting speech to learners' level, intonational enhancement, extra-linguistic information, non-linguistic representations, L2 and L1 medium strategies, incorporating CALL, and language games. Students agreed or absolutely agreed (86.2%) that language games are

interesting and important in the lesson. Almost equally essential for them are the non-linguistic representations (83.9%) and the use of CALL to present new content.

Teachers stated their belief that when following the CLELD model L2 vocabulary knowledge was considerably improved. They agreed that CLIL implementation following the key performance criteria of the CLELD lesson delivery model, which involves language enhancement activities, seems to raise the students' involvement in the learning process and develop their L2 vocabulary knowledge.

Data from classroom interaction illustrate that when the teacher follows the CLELD principles there is a positive impact on L2 development. Students were involved in meaningful learning. They encountered and used new vocabulary while dealing with purposeful tasks, i.e. they searched maps and found content-related answers which involved target vocabulary. Further language focus practice through analytic teaching, which involved matching new words with definitions, strengthened the students' learning of new vocabulary.

Comprehensible input facilitated the students' understanding of new content and language. For instance, adjusting speech to the learners' level, which was achieved by eliminating syntactically complicated sentences, facilitated understanding of the process while carrying out an experiment and promoted production of the target word 'funnel' (extract 3). Exaggerated articulation attracted the learners' attention to new words. When learners were required to complete a sentence right after exaggerated articulation they did so successfully. Extra-linguistic information enhanced effective transmission of meanings and elicited appropriate responses involving new vocabulary e.g. 'tropical'. The provision of multiple, non-linguistic representations helped the children associate the meaning of a word, e.g. 'abandoned' (extract 7), with visual representations. Children produced the target vocabulary and further related discussion was created. L2 medium strategies such as synonyms, paraphrasing and repetition, promoted the students' understandings by providing further input which described the target words, i.e. the phrase 'goes away' in place of 'escapes' (extract 8). L1 medium strategies served to clarify meanings. The students' responses showed that they comprehended messages where further clarification in L1 was provided. Moreover, L1 was successfully used as a cognitive tool which helped the students to exhibit perception of meanings. CALL drew the students' attention to new content and language which were presented on the slides.

Opportunities for output production stimulated the learners to produce new words in meaningful context. Questions prompted students to retrieve and use new vocabulary, i.e. 'It's deformed' (extract 13). Children used new words to report observations and answer comprehension questions.

Linguistic interaction between the teacher and the students facilitated understanding of meanings, eliminated misunderstandings, and allowed opportunities for using new vocabulary in meaningful communication. Confirmation and comprehension checks confirmed comprehension of meanings. The teacher provided further explanations to the students' incomplete utterances. Reacting to students' responses through the use of markers, such as 'okay', aided conversational consistency and prompted students to search for the answer. Incomplete sentences produced by the teacher prompted children to look for the appropriate target word, i.e. 'pressure' and 'deforms' in extract 19. Semantically contingent responses produced by the teacher provided learners with indirect corrective feedback and thus allowed them to see how new words were placed correctly in sentences.

Last, language games motivated students of all ability levels to participate in reading and producing target words, i.e. 'funnel' (extract 23). Therefore, children were given opportunities to encounter the target vocabulary repeatedly and therefore word retentions was enhanced.

## 2.The use of the Content and Language integrated learning for Elementary classes Lesson Delivery Model promotes subject matter learning of English language learners (ELLs) in the content areas of Mathematics, Science and Social Studies.

Data demonstrate that the use of the CLEL+LEA model in the CLIL classes develops subject matter knowledge. Tests reveal that learners involved in the CLIL+CLELD+LEA classes had a significant development in Geography, Science and Maths knowledge ( $p=.000$ ).

The questionnaires administered to the students in the CLELD+LEA classes show that the majority of students reported a positive impact of CLELD on content learning. Learners believed that the key behaviours related to content learning included in the CLELD model were important for content knowledge development: stating the objective, activating prior knowledge, differentiating teaching, employing a variety of teaching climates (i.e.

cooperative, competitive, individualistic), providing meaningful tasks and promoting interest by consolidating content learning through educational games. Children exhibited a particular preference for educational games. The vast majority of learners (82.7%) claim that they are important for subject matter learning. This preference reveals primary school pupils' interests which can be combined with learning.

Teachers were convinced that the CLELD items can help subject matter knowledge development. They confessed that difficulties with scientific terminology are overcome when using the CLELD+LEA model. This was attributed to the focus placed on new words. The increased exposures and production of new vocabulary facilitated the elaboration and clarification of new terminology.

Classroom interaction data demonstrate that when the teacher uses the CLELD model, this affects positively content learning. Clarity was achieved by informing students of the lessons' objectives. Prior learning was activated successfully allowing students to recall prior knowledge, i.e. 'The diameter is two times the radius' (extract 25). This enabled the creation of connections with new knowledge. Differentiated instruction provided opportunities to all the children to show comprehension of concepts, i.e. by showing concepts using their hands (extract 27).

Variety raised students' participation. It was achieved by varying modes of presentation. Students responded positively to the experiments by reaching conclusions. For instance, they found that atmospheric pressure is applied to 'all' directions (extract 29). Students also followed demonstrations carried out by the teacher. They reported observations, answered questions, i.e. about the area of a shape: 'two times seven' (extract 30). A variety of questions were employed by the teacher which elicited correct content-related answers most of the times, i.e. 'public houses' (extract 31). A variety of classroom climates were used in the classroom. For instance, children worked in groups and reported answers such as 'The air has weight' (extract 38).

Task orientation allowed learners to focus on the target content. Lessons reflected curriculum features, while activities matched the lesson's goals, e.g. children put the words of an equation in the correct order in order to form the equation. A student produced: 'circumference', 'equals', 'eeh diameter', 'times three point fourteen' (extract 40). Objectives considered various levels of cognitive complexity. Data show that the learners

responded positively to the activities. For instance, they applied knowledge to find the area of a circle, e.g. the correct answer, ‘three hundred fourteen’, was given in extract 42. Students employed both lower and higher order thinking skills. Thus, learning could be more effective. Appropriate instructional models, such as experiments, allowed students to reach conclusions, e.g. ‘atmospheric pressure’ is ‘low’ under the bag (extract 45). Students were involved in meaningful goal-oriented activities and they had the chance to produce target knowledge. This was sometimes done through L1, e.g. ‘vamvaki’ – cotton (extract 47). However, the teacher scaffolded learning by restating in L2, e.g. ‘cotton’.

Engagement in the learning process key behaviour attracted students’ interest. Games promoted active involvement. They allowed opportunities to the children to report content-related answers (e.g. atmospheric pressure applies ‘great forces’, extract 49). Students used learning strategies to access content. For example, they got information from pictures (e.g. ‘high pressure’ on the sea, extract 50). Cooperative work helped children to use the new terms (e.g. ‘overpopulation’, extract 51). Guided practice provided opportunities to the learners to apply new knowledge (e.g. they calculated the circumference, extract 52). Effort reinforcement motivated students to participate and produce content-related answers (e.g. the climate in Brazil is ‘tropical’, extract 53). The provision of feedback informed students about the correctness of their answer. Reviewing new content allowed students to produce new terms: ‘atmospheric pressure’ (extract 56).

Medium-to-high success rate activated the students’ involvement and encouraged them to interact with new content. Lessons were sequenced based on prior learning. This allowed the learner to make connections between prior and new learning. Transition was planned in manageable steps. Students responded positively to the activities of each step by making observations (e.g. ‘In both cases the inside pressure is reduced’, extract 62). Instruction produced moderate-to-high success rate. Children were able to deal effectively with the activities (e.g. ‘We divided 282.6 by 3.14’, extract 64).

3. CLIL leads to better language proficiency in the area of L2 vocabulary knowledge, as compared to traditional learning through L1. However, the use of the CLELD model in CLIL instruction leads to better language proficiency as compared to CLELD without Language Enhancement Activities (LEA).

The data demonstrate that the use of the CLELD model with LEA in the CLIL class allows CLIL to lead to better language proficiency in the area of L2 vocabulary knowledge as

compared to CLIL+CLELD without LEA or traditional learning through L1. There are significant differences in L2 vocabulary acquisition for pupils attending CLIL classes following the CLELD model with LEA as compared to pupils in CLELD without LEA.

Analysis of the Geography, Science and Maths vocabulary test scores revealed a significant Treatment X Time interaction ( $p=.000$ ) favouring the CLIL+CLELD with LEA group. This shows that the pupils of the CLELD with LEA group made more progress in L2 vocabulary development than their counterparts. Examination of vocabulary scores of the participants attending the first school revealed consistency of scores achieved by the three groups in the three different subjects. Statistical comparison of pre- post- and delayed vocabulary tests among the children of the three groups showed a significant Treatment by Time interaction favouring the CLELD with LEA group in the two Geography, the two Science and the two Maths experiments. Comparison of high achievers' performance among the three different methods showed more vocabulary gains for students attending the CLELD+CLELD with LEA classes.

Analysis of student questionnaires revealed that the majority of participants in the CLELD with LEA classes (92%) believe that CLIL+CLELD with LEA had a positive impact on L2 development to a considerable or great extent, as compared to 53.2% of their counterparts in CLIL+CLELD without LEA classes.

Teachers reported in the interviews that although CLIL+CLELD is beneficial for L2 vocabulary development, even without LEA. The benefits greatly increase with the use of LEA as they draw the students' attention to new vocabulary and provide further practice.

Classroom interaction data demonstrate that CLELD with LEA lessons provided opportunities to the students to encounter target vocabulary repeatedly through language enhancement activities, which attracted the learners' interest and promoted participation and therefore production of the new words.

4. Traditional learning seems to lead to better subject matter knowledge as compared to CLIL with CLELD without LEA. However, the use of the CLELD with LEA model in CLIL instruction leads to better subject matter knowledge as compared to CLIL with CLELD without LEA.

The data suggest that the use of the CLELD with LEA model in the CLIL classroom promotes subject matter learning to a greater extent than the CLELD without LEA.

Repeated measures analysis of variance of Treatment by Time revealed a significant impact of the CLELD with LEA method on Geography subject matter scores. The L1 group outperformed the CLIL+CLELD without LEA group. However, the students of the CLELD with LEA groups made more progress than the CLELD without LEA groups or the L1 groups in the Geography, Science and Maths experiments. High achievers in CLELD with LEA classes had similar gains with high-ability students in L1 classes in Science and Maths experiments. However, they outperformed their counterparts in CLELD without LEA classes. This finding suggests that LEA can enhance content learning by strengthening L2 learning. High performers had more gains in the CLIL+CLELD with LEA classes than their counterparts in CLELD without LEA or L1 classes in the Geography experiments.

The CLELD with LEA students of the first school participated in CLIL in three different subjects. Repeated measures analysis showed a significant impact of the CLELD with LEA model on the students' content learning in Geography, Science and Maths. The students' post-test scores were positively correlated. This shows consistency of scores.

Student questionnaires show that a higher percentage of students (73.6%) in the CLELD with LEA classes believe that CLIL promoted subject matter learning as compared to students in the CLELD-LEA classes (54.3%). This finding suggests that the CLELD model with LEA has a positive impact on students' content learning.

The teachers stated that learning content in CLIL classrooms cannot be as successful as learning through the mother tongue. They strongly believe that comparable results can only be obtained when the teacher uses the CLELD methodology with LEA in the CLIL class. Teachers agree that the use of the CLELD model with LEA is critical in developing content learning.

Classroom interaction data demonstrate that the CLELD model with LEA provided opportunities to the learners to activate learning processes while interacting with new content. Instructional variety promoted the students' involvement with new material. For instance, questions examined comprehension of new concepts (e.g. They 'destroy' the

environment, extract 67), or required higher order thinking skills. For example, the students provided explanations about various phenomena. Children gave content-oriented answers (e.g. 'It deformed', extract 68). Task orientation allowed children to get involved with new learning. For instance, the use of appropriate instructional model, such as problem solving, encouraged pupils to find answers to content-oriented problems (e.g. 'They move cars' with 'alcohol', extract 69). Guided practice, games and other teaching strategies gave the children opportunities to engage in the learning process. In this way, they showed that they learned new content. For instance, students reported content-related answers (e.g. 'three times three times three point fourteen', extract 71).

The data suggest that CLELD items related to content learning can enhance the students' subject-matter learning to a greater extent than when using the CLELD without LEA in the CLIL classroom.

#### 5. ELLs receiving CLIL instruction with the CLELD model have positive attitudes towards this approach.

Student questionnaires demonstrate that the students in the CLIL+CLELD-LEA classes felt that new vocabulary posed difficulties to a considerable or great extent (34.1%), unlike 9.1% of their counterparts in CLIL+CLELD+LEA classes who felt the same. This finding suggests that LEA eliminate difficulties in comprehending and processing new content which may be overloaded with difficult terminology.

The teachers expressed with certainty that the students in the CLELD+LEA classes exhibited higher levels of enthusiasm than the students in the CLELD-LEA classes. The teachers supported that the children had positive attitudes and they were anticipating the lessons.

Classroom interaction data displayed the students' positive attitudes towards learning in CLELD+LEA classes. Games and competitions, which are items included in the CLELD model, promoted the students' enthusiasm and raised participation. Students were called to report target vocabulary related to new material in order to gain points. They showed interest and were actively involved in the tasks.

#### 6. The elementary school teachers who use the CLELD model for lesson planning consider their teaching more effective than when not using it.

The data suggest that the teachers who implemented CLIL with the CLELD model consider their teaching more effective. Teachers stated in the interviews that the CLELD components are necessary for enhancing the students' content and language knowledge. They confirmed that the acquisition and learning principle allowed the pupils to learn content in meaningful situations, while also focusing on new vocabulary through interesting tasks such as language games.

The teachers averred that comprehensible input facilitated comprehension. Adjusting speech to the learners' level enabled learners to understand meanings. Exaggerated articulation helped teachers to attract students' attention to new language. Extra-linguistic information enhanced the transmission of messages. Non-linguistic representations helped the children to create connections between words and their visual images. They also facilitated clarification of word meaning and addressed several children's learning style. The L2 medium strategies made meanings more transparent and helped word retention. The L1 medium strategies served to clarify some vague points. CALL promoted interest and attracted the students' attention to target language.

Output production promoted L2 development. Questioning allowed students to retrieve, use and learn new language. Linguistic interaction allowed learners to clarify misconceptions. The teacher was able to see the students' difficulties and gave feedback. Low affective filter created a stress-free learning environment and promoted participation.

The teachers affirmed that the use of the CLELD items promoted subject-matter learning. The clarity key behaviour was essential to the successful outcomes. Stating the lessons' objectives attracted the students' attention to new content. Activating prior knowledge helped children to build new knowledge on prior learning, allowing more permanent learning. Differentiating teaching facilitated all the children to access new content.

According to the teachers, variety raised the learners' interest. The variety of teaching methods promoted the students' involvement. The various questions which were employed in teaching had a positive impact on various aspects of content learning, i.e. comprehension, analysis, synthesis and evaluation of knowledge. The variety of learning climates promoted the students' participation. Task orientation enhanced learning. Following the curriculum's aims and providing goal-oriented instruction enabled the children to focus their attention on the target content. Objectives considered various levels

of cognitive complexity. Learners did not only comprehend meanings but also reached conclusions regarding new knowledge, allowing deeper learning. Selecting the appropriate instructional model contributed to effective learning. For example, discovery learning allowed children to discover knowledge through experiments and draw conclusions. Meaningful activities motivated students to deal with tasks.

The teachers declared that the engagement of students in the learning process promoted successful results. Games attracted the learners' interests and raised participation of both high and low ability students. The use of learning strategies such as brainstorming and eliciting information from pictures, enabled learners to construct their own learning. Cooperative learning activated both high and low performers. Guided practice provided opportunities to the students to learn new content. Reinforcement motivated students. The assessment of progress allowed the teachers to spot problematic areas and provide feedback to the students who needed it.

Teachers reported that medium-to-high success rate promoted content learning. Sequencing lessons on prior learning enabled children to retain new material. Planning transition to new content in easy-to-grasp steps helped the children to learn new content. Last, spending time on high success activities gave opportunities to the pupils to experience success and achieve the objectives. Classroom interaction data showed that the students in the CLELD+LEA classes had more opportunities to retrieve and produce new vocabulary and therefore retain it. Moreover, children replied to content-oriented questions. The teacher was contented with the students' responses. Positive comments were heard, such as 'Thirty. Very good' (extract 73).

To sum up, data from teacher interviews and classroom interaction suggest that the teachers who used the CLELD model in CLIL classes consider their teaching more effective than when not using it, as they identified positive learning outcomes which resulted from each CLELD principle.

7. Language learning is interactive in nature. Language can develop simultaneously with knowledge and cognitive development. This development is highly influenced by prior and later learning associations as well as motivation and reinforcement.

Pre-test post-test comparisons demonstrate that CLIL learners develop their vocabulary and subject matter learning. Gains are greater when the CLIL teacher employs the CLELD

model with LEA in teaching. These results suggest that language development grows along content knowledge. Under appropriate conditions, i.e. using the CLELD items including LEA, can give rise to even greater benefits.

Student questionnaires reveal that the vast majority of CLIL students (96.6%) in the CLELD+LEA classes felt that they had improved their L2 English. A great percentage of the students (92%) believed that L2 vocabulary development had occurred to a considerable or great extent. Most of the children (94.3%) felt that their content knowledge had also improved. They felt that this happened at a considerable or great extent (73.6%), as compared to a small percentage of students (6.8%) who reported that their content knowledge had developed to a limited extent. These outcomes point to the learners' simultaneous development of language and content knowledge.

The teachers believe that the children in CLIL classes developed both their subject matter and language knowledge. As it was explained, the construction of new knowledge on prior learning influenced language learning positively. Moreover, reinforcement raised student participation and promoted language development. Raising students' motivation encouraged learners to retrieve and use new content which involved target language. These statements suggest that language development takes place along content-related learning while it is also influenced by other factors, such as links between prior and new learning, effort reinforcement and increased levels of the learner's motivation.

The data from classroom interaction suggest that language learning in CLIL classes takes place along content learning and cognitive development. Learners retrieved and produced target language while dealing with content-oriented meaningful tasks. For instance, a student reported: 'On the top of a mountain there is low atmospheric pressure' (extract 76, lines 5-6). This extract shows that the child learned the new content while at the same time produced the new term 'atmospheric pressure'.

Cognitive development was happening along the development of language. For example, pupils carried out the cognitive process of calculation to respond to a problem which included the new words: 'diameter' and 'circumference' (extract 77). The correct answer showed that the students learned the new words and also successfully carried out the equation. Children were involved in higher order thinking, i.e. providing explanations to content-oriented themes which involved the comprehension and use of new vocabulary.

Children drew content-oriented conclusions exhibiting comprehension of new vocabulary items. They compared experiments and synthesized conclusions using new vocabulary.

Connections between prior and later content and language learning seemed to have affected positively language learning. Children recalled prior learning, e.g. 'radius', 'diameter', and 'circumference' (extract 81, Maths lesson 2) and used it in the new lesson to solve problems. In this way, both content and language knowledge were promoted.

Reinforcement is another factor which contributed to language development, as it motivated learners to participate and respond to content-oriented questions which included the use of new terms. This suggests that pupils learned them. Increased motivation, which was created by interesting activities such as comprehension games, promoted students' involvement in the lesson and production of new language. Therefore, it had a positive influence on language learning.

The data collected point to the interactive nature of language learning, which appears to be much more complex than what has been stated in earlier theories which claim that language develops as a distinct system and in isolation from other learning sources (Chomsky, 1986). Language development co-occurs with content learning and it is affected by connections between prior and new knowledge, effort reinforcement and the level of the learner's motivation to carry out a task.

### ***7.2.2 Summary of findings***

A positive relationship has been found between CLELD and gains both in vocabulary and content knowledge. The pupils involved in CLIL with the CLELD+LEA model performed significantly better than their counterparts who were attending CLIL with CLELD without LEA classes. Both Likert-type questionnaires administered to participants and interviews from the teachers revealed that the students involved in CLIL might not have been able to yield the anticipated benefits without language enhancement activities. The students' questionnaires showed that the vast majority of the CLELD with LEA participants believe that they have improved their L2 vocabulary and content knowledge. Pupils in CLELD with LEA classes exhibited more positive attitudes and enthusiasm towards CLIL learning than the children in CLELD without LEA classes. Classroom discourse and interview data

support the above. Interviews revealed that the teachers who use the CLELD model consider their teaching more effective than when they do not follow the model. This is because they feel that learning becomes more interesting and the pupils' attention is drawn through the various educational games and activities.

### ***7.2.3 Overall conclusions from the study***

The aim of the present study was to develop a CLIL lesson delivery tool as a response to the need for mastering CLIL methodology in primary schools (Met in Cenoz & Genesee, 1998) which would help teachers to raise the academic performance of their LEP students. This was attempted by reviewing the pertinent studies. Data were gathered from pre- and post-tests related to content and L2 vocabulary knowledge from the experimental and control groups. Findings were triangulated with Likert-type questionnaires which provided more information on students' attitudes and opinions, interviews that presented the views of teachers, and classroom interaction data.

Collectively, research outcomes suggest that CLIL enables students to enhance their L2 proficiency as well as learn new content. To begin with, CLIL provides opportunities to see new language in meaningful context, which allows the creation of word associations. The value of L2 vocabulary learning in context has been illustrated in Georges Braque's quotation "I do not believe in things; I believe only in their relationship" (Rutherford, 1987: 1). On the pedagogic front, this could be given flesh through subject matter teaching through the medium of the L2, which provides rich and meaningful content, systematically organized and recycled. CLIL provides an abundance of word associations and connections between new and old knowledge which can facilitate retaining new knowledge.

CLIL facilitates students' L2 development as by allowing students to get involved actively in processing new vocabulary through meaningful tasks. As Coonan (2007) advocates, the more students in CLIL classes are actively involved in the learning process, "the greater the guarantee of success from the language point of view" (p.626).

During the process of learning, students interacted with the teacher and their peers in order to carry out tasks and get messages across (Vygotsky, 1986; Halliday, 1993). These interventions on the part of the teacher and more able peers appeared to scaffold learning,

thereby helping the learner to get explicit information that could be practised (New London Group, 1996).

Outcomes provide empirical weight for the various theories supporting CLIL teaching. CLIL lessons were based on meaning-oriented instruction which facilitated language acquisition as the language skills seemed to be developing through use, in a way similar to how a native language is acquired. In other words, pupils learned language by using it (Krashen, 1982). They listened, read, and produced language in purposeful tasks.

Findings show that meaningful input on its own may not be adequate for developing lexical accuracy in the target language. Learning can be enhanced by focusing attention on language features. The successful outcomes on L2 development in CLELD classes were due to the more direct study of L2 vocabulary, which was enriched with language enhancement activities and lexical elaboration. The classroom interaction extracts suggest that language-focused activities, such as those used in the extracts, encourage learners to use the target vocabulary in meaningful tasks. In this way, learners clarify the meanings of words and consolidate new vocabulary that has been encountered in the lesson. Therefore both acquisition and learning should be pursued in the CLIL class.

Students' L2 vocabulary development in the CLIL class can be enhanced when particular attention is paid to the new vocabulary, e.g. through language games, in order to increase the possibilities for their retention. As Redman & Gairns (1987) point out, "the words of a foreign tongue which we commit to memory are prisoners of war incessantly trying to escape, and it requires great vigilance to detain them; for unless our attention be continually directed towards them, and unless we master them frequently, they steal away into the forest and disperse" (p.301).

The data demonstrate the importance of providing comprehensible input through several teaching strategies (De Graaff et al., 2007). This enables successful communication of meanings and comprehension of target knowledge.

Output production pushes the CLIL learner to produce appropriate utterances and encourages the individual to make linguistic choices which are near the L2 norms and therefore promotes the acquisition of linguistic features. The production of comprehensible output seems to be a necessary mechanism of acquisition, providing

opportunities for meaningful use of language, testing out hypothesis about the L2 and moving from semantic to syntactic processing (Swain, 1995; De Bot, 1996).

Data illustrate that teacher-student interaction provides opportunities for extensive negotiation of meaning, which facilitate the provision of feedback to the learner. The negotiated modification of conversation enhances comprehension and therefore opens the way to language acquisition. Teacher-student exchanges are not meaningless. On the contrary, the teacher highlights ways of recontextualizing personal understanding, moving towards academic register. The teachers build on students' contributions but extend them at the same time by presenting new language which could later be used by the learners. Teachers and learners are seen as active co-constructors of meaning. Thus, interactions may positively affect the learners' performance (Gibbons, 2003). Content-based ESL learning presents language-in-context emphasizing the relationship between context, language and meaning.

The data show that low affective filter eliminates stress in the CLIL class, raises the learners' involvement and makes them more receptive to knowledge. Contemporary brain research affirms that learning occurs when learners do not experience boredom or anxiety (Jensen, 1998).

Content learning in the CLIL class seems to be positively affected by lesson clarity, instructional variety, task orientation, engagement in the learning process and moderate-to-high success rate. These key performance indicators seem to help reaping more benefits from the symbiosis of foreign language and content (Kaufman, 2004).

Lesson clarity is an important key behaviour as it allows all CLIL learners to access new content and focus on target aspects of new content. New learning is built on prior knowledge, allowing mental growth. Learners integrate new information into their already existing schemata and it thus becomes more permanent. The subject matter content can help making connections between new and prior knowledge (Piaget, 1962). A substantial body of evidence shows that activating prior content information plays a major role in second language learners' comprehension (Carell, 1987; Floyed & Carell, 1987).

Instructional variety enhances CLIL students' interest and participation. Relying on a single technique may be monotonous for the learners and lead to boredom. A lesson needs

to involve at least two different grouping structures in order to promote variety (Cuevas, 1984, Porter, 1986; DfEE, 1999, Echevarria et al., 2004; Coonan, 2007).

Task orientation is required in order to maximize CLIL students' time on-task. Task orientation is achieved by matching instruction with goal-oriented activities, setting objectives at various levels of cognitive complexity and selecting an appropriate instructional model which can enhance learning target knowledge.

Engagement in the learning process is necessary to keep CLIL students actively involved in the learning process. Promoting interest, encouraging students to use learning strategies, assigning cooperative work, providing guided practice, reinforcing effort, assessing progress and reviewing new knowledge allow students to get engaged in the learning process.

Moderate-to-high success rate allows CLIL learners to experience success. This key behaviour requires logical sequencing of lessons based on prior learning, planning transition to new material in manageable steps to promote comprehension, and providing instruction which produces moderate-to-high success rate (Borich, 2007).

The data suggest that developments in knowledge, linguistic performance and cognition seemed to occur simultaneously in the CLIL classroom (Segalovitz, 1997; Van de Craen et al., 2008). Language learning appears to be strongly connected with the construction of knowledge (Stohler, 2006). The tasks which were assigned in the CLIL with CLELD lessons required students to think in the foreign language, i.e. make comparisons, evaluate etc, and then produce content-related information through the L2. The processes which were activated promoted the above three domains. Students were led to the associative state of knowledge (Van de Craen, 2001) as they managed to use both cognitive and linguistic processes in order to carry out simple conversations. This reveals the relationship between language comprehension processes and cognitive processes (Hill, 1980). Noteworthy, language learning was heavily influenced by strengthening links between prior and new knowledge as well as increased motivation brought in the classroom by following the CLELD items (Van de Craen, 2001).

“The teaching of languages by means of teaching subject matter seems to be the only way to overcome the current language learning crisis as well as the answer to the demand for a

new multilingual European citizen” (Van de Craen, 2001: 218-219). The quality of teaching needs to make the most of what can be achieved in the CLIL class. The use of the CLELD lesson delivery tool can serve as the key that can raise the bar of students’ L2 proficiency and academic achievement in CLIL classes.

### **7.3 Implications of the CLELD and its application**

The findings from this study yield important implications for primary school settings, illustrating that content can be taught in concert with foreign language with positive outcomes on both aspects of learning when following the teaching model that has been developed in this study. Outcomes suggest that the tool can be a useful instrument in CLIL lesson planning, a self-assessment instrument used for professional development, and it can also be used in teacher training.

In order to have successful outcomes, the teacher needs to consider the following for effective L2 development in CLIL classes:

#### **7.3.1 L2 development**

##### **7.3.1.1. Pursuing both acquisition and learning**

Language acquisition is promoted through content oriented and task based learning. Tasks may include categorizing, comparing, finding similarities/differences, problem-solving and creative activities (Grabe & Stoller, 1997; Ellis, 2003; Keck et al., 2006). CLIL can be interesting for the learners as it can provide meaningful, goal-oriented, outcome-evaluated tasks.

Content-based language teaching can be more effective when it combines both meaningful communication related to the content and intentional language development (Pica, 2000). Langan (2003) suggests that “focused language instruction must be included in middle-school curriculum” (p.24) in order to increase language benefits in CLIL classes. Therefore, explicit language teaching in a CLIL environment may prove vital for the learners’ L2 development (Short, 1994).

Focusing on language in CLIL classes appears to enhance L2 vocabulary development. Therefore, the skills of the CLIL teacher need to be upgraded with regard to placing

emphasis on language (Snow, 1998). This will promote desired levels of language proficiency (Snow et al., 1989). Language-focus activities may include matching words with definitions and pictures, and reading the list of new vocabulary.

#### 7.3.1.2 Comprehensible input

Teachers in CLIL classes can promote language learning when providing comprehensible input. In the CLIL lessons of this study, language input was carefully prepared to be at, and just above, the proficiency of the learner. The provision of comprehensible input to L2 learners appeared to promote learning in CLIL programmes (Chaudron, 1983; Krashen, 1985).

Comprehensibility can be achieved by adjusting speech to learners' language level (speaking slowly but naturally and eliminating structurally complex sentences), using intonational enhancement in oral input, and extra-linguistic information (body language). Non-linguistic representations - realia and visual input can help pupils understand and clarify concepts. Visual aids, such as graphs and maps, appear to be useful in content-centered language instruction as they allow knowledge to be displayed simply and clearly (Short, 1994).

L2-based strategies (synonym, paraphrasing, repetition) and L1-based strategies (providing a word's equivalent and language switching) seem to be important for L2 vocabulary development. Research shows that repeated/recurring and multiple exposures to target L2 vocabulary seem to enhance L2 acquisition (Herman et al. 1987; Hwang & Nation, 1989; Rott, 1999; Schmitt & Carter, 2000; Nation, 2005; Kim, 2006). Robinson (2005), showcased the importance of repeated encounters with target new words in CLIL Geography and Science classrooms. Providing an example in L1 enables learners to relate unfamiliar L2 concepts to familiar L1 events. L1 can be used to encourage class participation, elicit background knowledge and experiences by transforming them into L2 (Lin, 2006), and help the teacher explain some difficult concepts more clearly. The use of native language can serve as "a practical pedagogical tool for providing access to academic content, allowing more effective interaction, and providing greater access to prior knowledge" (Thomas & Collier, 1997: 538). If the L2 students' mother tongue is not taken into account in academic learning teaching may ignore the main tool that ELLs have used to get to know the world around them (Lee, 2005). However, new understandings can be constructed on these prior understandings.

The use of CALL as a tool to present new material can enhance input comprehensibility (Mitchell, 1988; Met, 1994; Lin, 2006; Coonan, 2007; De Graaff et al., 2007; Gajo, 2007; Langer, 2007) and therefore help students easily overcome comprehension difficulties. This can be done either through visuals and typographical enhancement, which seem to facilitate content comprehension and L2 acquisition (Kessler & Quinn in Crandall, 1987; Met, 1994), or using repetition, simplified sentences, definitions of words, etc (Sharwood Smith, 1991; Chapelle, 1998). PowerPoint presentations can bring enormous visual support to language learning, serving as a constant visual reference to the reception of spoken language, thereby reinforcing understanding and reducing confusion (Emery, 2006: 67).

#### 7.3.1.3 Output production

Output can be an active component in the SLA process (Izumi, 2003). Learners need the opportunity for pushed output, as output opportunities stimulate language acquisition by forcing the learner to process language (Swain, 1985; Swain 1995). Immediate incorporation of a linguistic feature does not guarantee that this item will be incorporated into the learner's grammar (Chaudron, 1985). Output increases the possibility of retention by creating connections in memory (De Bot, 1996), allowing preliminary intake to turn into final intake, especially when the learner's attention is focused on what is to be learned (Schmidt, 1990).

The teacher needs to stimulate "the use of the target language" (De Graaff et al., 2007: 609). A functional focus on language through the use of questions can promote learners' oral production and enhance learning (Schleppegrell et al., 2004; Borich, 2007).

#### 7.3.1.4 Linguistic interaction

Interactional moves seem to promote comprehension (Pica et al., 1987). Interacting with the teacher appears to provide opportunities to negotiate meaning and thereby enhance foreign language proficiency. Teacher-student oral interaction can help the learner to build on everyday discourse in order to acquire scientific language (Gibbons, 2003). Language bridging could be translated as the zone of proximal development that helps the learners reach their potential area of development. Teacher-student interaction seems to lower the cognitive load helping individuals clarify concepts and meanings.

A wide range of feedback techniques may be used which can initiate negotiation of form. For instance, the CLIL teacher could use conversational modifications such as confirmation and comprehension checks. Semantically contingent responses such as recasting – reformulating students’ responses, could also be used (Lyster & Ranta, 1997).

#### 7.3.1.5 Keeping the affective filter down

The teacher needs to ensure that the affective filter is down and that learners do not feel anxious but relaxed and confident (Ellis, 1990). Using language games, such as word bingo, word anagrams and spelling games to lower affective filter, seems to be enjoyable for young learners as they create a positive and stress-free learning atmosphere, encouraging participation of all students (Uberman, 1998). Competitions provide children opportunities to communicate content or language information using the L2. Games raise participation, increase output production and most likely promote L2 vocabulary development (Larsen-Freeman, 2000; Xanthou, 2006).

The following principles need to be considered for effective content learning in CLIL classes:

### **7.3.2 Content learning**

#### 7.3.2.1 Clarity

Lesson clarity promotes subject matter learning. For this to be achieved, learners need to be informed of the objectives. Their prior knowledge should be activated through pictures and semantic webs, allowing new knowledge to be constructed on pre-existing schemata (Segalovitz, 1997; Echevarria et al., 2004).

Teaching needs to consider differentiated instruction in order to address all pupils’ learning styles and various proficiency levels (Segalovitz, 1997; Tomlinson & Allan, 2000).

#### 7.3.2.2 Instructional variety

The use of various instructional techniques, questions and classroom climates can raise student achievement in the CLIL class (Brophy & Good, 1986). Concerning the modes of presentation, the teacher can use presentations, questioning, or even allow independent investigation of the topic. Questions may be close, open or process. The classroom climates could be competitive, cooperative, or/and individualistic.

#### 7.3.2.3 Task orientation

The opportunities for learning are increased when more time is dedicated to the task of teaching an academic subject (Borich, 2007). Lessons need to reflect curriculum features, instruction should match goals, objectives should refer to various levels of cognitive complexity, i.e. both to lower-level and higher-level cognitive skills, and a proper instructional model should be used such as inquiry based learning in Science (Gibbons, 1998). Meaningful, goal-oriented activities need to be assigned such as identifying similarities and differences, and representing information in graphic or symbolic form.

#### 7.3.2.4 Engagement in the learning process

The teacher needs to keep students engaged in the learning process. Active participation is positively influenced by attracting students' interest through the use of comprehension and memory games which allow new information to be constantly recycled and used while simultaneously motivate students to participate (Segalovitz, 1997).

CLIL teaching needs to encourage the use of learning strategies by the students, including cognitive strategies (e.g. brainstorming), comprehension strategies (e.g. eliciting information and knowledge from pictures) and metacognitive strategies (e.g. identifying similarities and differences). The various learning strategies which are employed in the CLIL class (e.g. information gathering skills, organizing, categorizing, comparing, analyzing, predicting, identifying main ideas, inferring - Met, 1991) lead to rich content and language development. Cooperative learning is essential because during pair work learners assist one another in understanding the meaning of unknown words and find information to answer questions, exhibiting educationally important increases in performance (Xanthou 2005).

Guided practice through verbal or written exercises, effort reinforcement (Segalovitz, 1997), feedback provided to individuals and groups after having assessed performance through various activities (e.g. response boards prepared by groups, and content review - note taking in the form of semantic maps or pictures) are equally important (Short, 1994).

#### 7.3.2.5 Moderate-to-high success rate

The lessons of a CLIL unit need to be sequenced on a logical order considering prior learning. Each lesson needs to approach knowledge in manageable steps, namely the lesson should be broken down into small parts. Medium to high success rate needs to be ensured. Partial understanding is required to form the basis for the teacher to scaffold learning. When the learners understand the task higher achievement levels are reached (Slavin, 1991). It is desirable to allow learners to spend most of their time on tasks that allow almost complete understanding of material (Borich, 2007).

The CLELD model includes principles and strategies which have been shown to promote CLIL students' learning in both language and subject matter. Therefore it can be a valuable tool that can help teachers to raise the bar of students' achievement in the CLIL class.

## **CHAPTER 8: RECOMMENDATIONS, LIMITATIONS AND DIRECTIONS FOR FURTHER RESEARCH**

Implementation of the CLIL approach is expanding rapidly, taking many forms (Met, 1998; European Commission, 2005a). However, a CLIL lesson delivery model that could help teachers implement CLIL successfully in elementary school setting is absent (Tzvetkova & Kirilova, 2001; Van de Craen et al., 2007). Therefore, the current study aimed to develop a CLIL lesson delivery tool which could help teachers to promote students' L2 development and subject matter learning. This was attempted by reviewing studies in the area of L2 vocabulary development, L2 teaching, and effective subject matter teaching. Research review related to L2 development revealed five principles related to effective L2 teaching which could be used in the CLIL class: pursuing both acquisition and

learning, providing comprehensible input, promoting output production, promoting linguistic interaction and keeping the affective filter down. Research review related to subject matter teaching uncovered the importance of the following key behaviours: clarity, instructional variety, task orientation, engagement in the learning process and moderate-to-high success rate.

The effectiveness of the CLELD model in content and vocabulary learning in elementary school classes was investigated. It was also explored whether the CLIL students have positive attitudes towards this approach and whether the educators who use this model for lesson planning have a positive outlook on their lesson delivery. Finally, whether CLIL can contribute to linguistic theory was examined. A pre- post-test experimental research design was used to examine the academic effects of the CLELD model as compared to CLELD without Language Enhancement Activities and learning content through L1.

Likert-type questionnaires provided information about the students' views on the effectiveness of CLIL delivery in both cases. Discourse data shed more light on the processes leading to students' success. Interviews from the teachers who taught the CLIL lessons using both approaches gave more information. The data showed that the CLELD model can raise student achievement in the areas of L2 vocabulary acquisition and content learning. Development in these areas appears to be significantly better than in CLELD without LEA or learning content through L1 Greek. Students and teachers confirmed the above finding. In general, findings seem to indicate that, when properly implemented, i.e. following the CLELD strategies, CLIL can develop both language and content learning.

## **8.1 Recommendations**

The results of this study point to a number of recommendations for effective CLIL implementation. Several measures need to be taken in order to improve CLIL teaching.

### ***8.1.1 A CLIL training programme – Its components***

To begin with, there is a lack of pre-service preparation for future CLIL teachers in Cyprus. Therefore, a training corpus needs to be developed for initial and in-service teacher training (Hartiala, 2007). The new curriculum developed for foreign language teaching recommends that CLIL can facilitate the achievement of the curriculum's goals. It is suggested that it promotes foreign language learning without requiring more EFL teaching periods (Ministry of Education and Culture, 2010). A number of specialized

courses in teaching a non-language subject through a foreign language could be designed for student-teachers. Moreover, in-service training courses that combine subject and L2 need to be offered by the Pedagogical Institute. A mentoring programme for inexperienced CLIL teachers would prove helpful (Mehisto & Asser, 2007).

A CLIL training programme needs to emphasize the following regarding L2 learning:

#### 8.1.1.1 L2 Learning

##### 8.1.1.1.1 Placing emphasis on both meaningful, task-based learning and analytic teaching

Learners need to deal with purposeful tasks. In this framework, learners' talk is not produced as rehearsed practice. On the contrary, it creates conversational meanings. L2 learning takes place indirectly while carrying out the activity.

Language focused activities can promote L2 development in the CLIL class. Instructional intervention has been found to add more benefits on L2 vocabulary acquisition (Paribakht & Wesche, 1997; Xanthou, 2008). Therefore, pedagogical intervention in CLIL lessons seems to be necessary in promoting active processing of new vocabulary and active involvement with target word items (Mezynski, 1983, Coomber & Peet, 1993). Intervention techniques may include attention techniques signalling L2 words in texts (e.g. lexical elaboration either implicit, i.e. paraphrasing or explicit, i.e. providing definitions or synonyms – Kim 2006), recognition exercises of L2 words and their meanings (e.g. matching words with definition - informal requests for definitions – Robinson, 2005), manipulation exercises (e.g. changing grammatical category of word, e.g. from verb to noun), interpretation exercises (e.g. guessing games), and production exercises (e.g. production of target words in context, open-cloze exercises, picture labelling, answering questions, project preparation – Slamecka & Graf, 1978).

Harley (1993) recommends a principle to consider when applying analytic teaching. This is called 'the integration principle' which points out that analytic teaching or code-focused instruction needs to be "closely allied to content goals" (p.255). The researcher proposes the use of 'thematically organized picture dictionaries' (p.256), which could attract attention to specific language features. In addition, children can physically carry out the motions of target directional verbs which relate to the content which is taught.

Allocating time for lesson phases, such as a pre-task phase, task cycle, and language focus, may enhance language learning (Willis, 1996). The first phase may include an introduction to the topic and target vocabulary together with task instructions. It can involve brainstorming, mind-maps, matching phrases to pictures and classifying words. The task cycle may include carrying out the task and reporting results. It can involve sorting, categorizing, comparing, finding similarities/differences, problem-solving (hypothesizing, finding alternatives, evaluating) and creative tasks. Language focus refers to analysis and language practice of new words. It involves completing phrases, matching word to definition, gapped transcripts, computer games etc.

A functional focus on language can enhance learning through content-based instruction (Schleppegrell et al., 2004). Such linguistic analysis could involve answering questions beginning with ‘what’, ‘who’ and ‘how’. A functional linguistic approach is also advocated by Mohan and Beckett (2001), who support pursuing language development along with meaningful communication about content. This could be succeeded through teacher scaffolding involving recasting or reformulating students’ utterances.

#### *8.1.1.1.2 Providing comprehensible input*

Modified input seems to be an aid to comprehension (Kelch, 1985). Therefore, adjusting speech to learners’ level, i.e. by eliminating syntactically complex sentences, enables teacher-student communication.

Exaggerated articulation can help primary school CLIL learners to “understand new concepts” (Xanthou, 2006: 54). The positive impact of intonational enhancement in oral input on L2 proficiency has been shown by White (1996).

Extralinguistic cues enable learners to guess the meaning of new vocabulary without inhibiting the provision of L2 input. They can therefore contribute to language learning (Wong-Fillmore, 1985).

Visual representations, such as pictures, help students to associate words with their meanings. They also reduce the need to depend on written texts (Short, 1994). Illustrations, pictures from textbooks, newspaper photographs, vocabulary previews, and graphic organizers seem to be effective means for teaching target vocabulary items to

middle school Social Science CLIL classes, assisting retention of both vocabulary and content concepts (Short, 1994).

L2 medium strategies can be used successfully in the CLIL class. The adaptation of input material to just beyond the learners' expected level using "synonyms, descriptions, translations of difficult words", "simple structured sentences", "paraphrasing" appears to be a characteristic of effective CLIL teaching performance (De Graaff et al., 2007: 613). Repetition of new L2 vocabulary seems to increase the students' exposure to the target language and thereby increases the possibilities of learning, using and retaining the word. Research has shown that repetition is a characteristic of successful immersion classes (Wong-Fillmore, 1985).

The students' native language can be effectively employed by teachers to enhance comprehension or explain an activity (Lucas & Katz, 1994). The researchers report that native language use may serve as "a practical pedagogical tool for providing access to academic content, allowing more effective interaction, and providing greater access to prior knowledge" (p.538). L1 support may contribute to content area development as well as retrieval of the students' knowledge and experience. Students' native languages can be employed in the CLIL class to check comprehension, explain an activity, provide an instruction and interact socially. Students used their native language to assist one another, tutor other students, ask/answer questions, use bilingual dictionaries, write in native language and interact socially (ibid: 551).

CLIL teachers need to use bilingual pedagogies to enable learners to access linguistic discourses by building on their indigenous cultural and linguistic resources (Lin, 2006). The researcher used data collected by Johnson (1983) who audiotaped teacher talk in CLIL classes. It was shown that the lexico-grammatical elements of L2 Science discourse (e.g. "this is called Kinetic theory" – Lin, 2006: 301) was done through a rich L1 semantic context involving familiar lifeworld examples.

CALL can be employed in the CLIL lesson in order to enhance input comprehensibility. Active learning behaviour occurs when multimedia programmes are used, involving pictures and video clips to present definitions (Chun and Plass; 1996).

PowerPoint slides can provide comprehensible input. New vocabulary can be accompanied by pictures and be typographically enhanced, e.g. boldfacing, colouring

(Kessler & Quinn in Crandall, 1987 – Science through L2). This enhances comprehension (Met, 1994).

#### *8.1.1.1.3 Promoting output production*

The teacher needs to encourage “the use of the target language” by pushing output production (De Graaff et al., 2007: 609). Opportunities for output production encourage students to use new vocabulary in meaningful situations.

Output production serves a metalinguistic function. Learners reflect upon their language use and so they internalize linguistic knowledge. Reflecting on language produced in order to give meaningful output has positive outcomes on language learning (Donato, 1994; Swain, 1995). Output is likely to draw attention to problems and prompts learners to do something about those problems, such as search for alternative means of expressing a message and modify it according to the feedback received. Learners are enabled to assess the limitations of their interlanguage capability through monitoring during production while examining the pairing of communicative intention and the output.

Output results in improved performance if certain conditions are met, e.g. when output production serves a purpose (Izumi et al., 1999). The experimental group, in their study, prepared an essay, read a model essay, underlined parts of the sentences they considered to be important for reproduction, and then wrote on the same topic once again. This group performed better than the control group which was not allowed to think or write about the topic beforehand.

Questioning promotes learners’ oral production by stimulating them to produce target words (Sclpepegrell et al., 2004). Similarly, prompting stimulates oral production of new vocabulary (Swain, 1985).

#### *8.1.1.1.4 Promoting linguistic interaction*

Opportunities for interaction are vital for L2 development in CLIL classrooms (Echevarria et al. 2004). Interaction enhances comprehension and most likely increases L2 vocabulary acquisition (Ellis et al., 1994; Mackey, 1999). For instance, comprehension checks serve to confirm whether the speaker’s own preceding utterance was understood by the message receiver/s (Pica & Doughty, 1985a). Moreover, interaction between the teacher and the students helps the learners to grasp key concepts and attain the lesson’s goals (Coonan, 2007).

CLIL teachers need to seek elaborated responses from learners throughout discussion. Various techniques could be used to elicit extended answers which go beyond ‘yes’ or ‘no’ answers. Teachers may ask learners to expand on their responses by saying: ‘Would you like to tell us more about that?’. More sentences can be prompted by using ‘What else...?’. Alternatively, the teacher may pause to allow learners to process the language. Calling on other learners to expand on a student’s response could also be used.

CLIL learners get involved in meaningful discussions related to content areas while simultaneously developing their L2 proficiency. Interaction can lead learners from everyday discourse to academic language (Gibbons, 2003). Repeating, rephrasing, and extending student responses seems to be a successful practice in CLIL classes (Short, 1994). The teacher can build on students’ contributions, and extend them by presenting new language which could later be used by the learners. In this way, attention is drawn to key lexis. Recasts seem to facilitate understanding and provide corrective feedback and as they are produced after what the student has said, they are semantically built upon it. As a result, the learner is able to understand the message sent by the teacher. Snow (1986) affirms that semantically contingent speech is a facilitating factor in L2 development. In this context students seem to be active participants in the co-construction of language and curriculum knowledge. Collaborative interactions between teacher and students enable language learning. The teacher recontextualizes the learners’ experiences and the events they are talking about in a way that fits the broader pedagogic objectives of the curriculum. In this sense, the teacher’s discourse seems to act as the linguistic bridge between the learners’ current language abilities and the standards set in the curriculum, thereby helping learners to enter Vygotsky’s zone of proximal development.

As far as reactions to students’ errors are concerned, Vigil & Oller (1976) point out that while too much correction or negative affective feedback may stop production by the L2 learner, on the other hand, few corrections may result in persistence of common errors.

#### 8.1.1.1.5 Keeping the affective filter down

Games create a relaxing learning atmosphere and can raise participation in the CLIL class. Involvement is maximized; Even learners with poor linguistic background have the opportunity to report answers recycling new vocabulary (Larsen, 2000; Xanthou, 2006).

Language games may include noughts and crosses with new vocabulary (e.g. using target words placed in nine boxes in three rows in meaningful phrases). The aim is to obtain a row of three symbols which are the same in a vertical, horizontal or diagonal line. Word bingo can help pupils revise new vocabulary as they search for the word they hear in order to delete it and therefore they link the phonological with the morphological aspect of a word. Word anagrams and spelling games, where children guess the letters of a word, may also provide opportunities for learning the form of a word (Coomber & Peet 1993).

A CLIL training programme needs to emphasize the following regarding subject matter learning:

#### 8.1.1.2 Subject matter learning

##### 8.1.1.2.1 Clarity

Lesson clarity needs to be pursued in the CLIL class. This can be achieved by informing learners of the objectives, building on prior knowledge and providing differentiated instruction. To begin with, the lesson's objective needs to be communicated in a clear manner (Borich 2007). This could be done using vocabulary at the level of the students. Some examples of tasks that students are expected to perform successfully after the lesson could be provided.

Building on background knowledge can promote learning as it allows the creation of links between past learning and new concepts (Marzano et al., 2001). CLIL teachers need to make clear connections between target knowledge and basic concepts, vocabulary, and already taught material. Integrating new learning with the student's prior knowledge allows learning to occur. Previous learning can also be activated through maps, charts and graphic organizers (Blachowicz and Fisher, 2000; Echevarria et al, 2004) when reviewing prior lessons. Students have more opportunities to learn and remember new terms when they are placed in a rich contextual environment. Key vocabulary can be taught through meaningful ways. These may include: word sorts, concept definition maps, and vocabulary games (Echevarria et al., 2004: 51). A word-sort activity allows students to categorize words according to meaning. This task may take the form of a List-Group-Label activity. First, learners brainstorm words related to a topic, then place the words into categories, and a label is determined for each category. Concept definition maps is a graphic which is used to present complex concepts. For instance, aspects of a concept

could be grouped and arrows may start from a concept providing information on the various aspects of the concept.

Cues, questions, and advance organizers are techniques which activate students' prior knowledge and allow the creation of connections. Questions can be used effectively not only after but even before a learning task such as reading, listening or watching a demonstration.

Differentiated instruction can help the students to digest information each in his/her own way (Christian, 2006; Koutselini-Ioannidou, 2006). Teaching needs to address the students' various learning styles, i.e. visual, auditory, kinesthetic. For instance, kinesthetic activity involves physical movement which is linked with particular knowledge, e.g. in a Maths class, radius can be shown using one arm, diameter can be shown with both arms outstretched while circumference can be shown having both arms form a circle.

The teacher could reteach those learners who need one more demonstration, exempt students who know a reading chapter and make use of computer programmes and texts. Tomlinson and Allan (2000) present the following criteria regarding content differentiation: "a variety of materials other than the standard text, various support mechanisms e.g. reading buddies, organizers, study guides" (p.144). Gap-filling exercises can be prepared addressing the various proficiency levels of the class. For instance, more than one version of the same text can be prepared having different amount of words deleted. Children can choose themselves which version they would like to have. Fast finishers can prepare gap-filling exercises to complete at a later revision stage of the course.

In order to achieve process differentiation, the teacher can provide activities which necessitate that the students should do something with the knowledge and use "higher-level tasks for all learners (e.g., application, elaboration, providing evidence, synthesis) to provide appropriate challenge". Activities need to "involve all learners in both critical and creative thinking". Similarly, the teacher should also vary tasks by students' interests (Tomlinson & Allan, 2000: 144-145).

Product differentiation can be provided by encouraging students to show what they have learned in several ways, such as creating a puppet show and writing a letter or creating product assignments containing the required target lexis and structure. Various resources

can be used for product production, and product assignments may include various degrees of difficulty. Tomlinson and Allan (ibid) suggest that the teacher should refer to the following criteria when considering product differentiation: “allow for a wide range of product alternatives (e.g., oral, visual, kinesthetic, musical, spatial, creative, practical)” and “product assignments *may* differ based on individual (or group) readiness, learning needs, and interest” (p. 145).

#### *8.1.1.2,2 Instructional variety*

Instructional variety can promote CLIL students’ learning. The teacher can vary the modes of presentation in order to promote variety, e.g. use lecturing, question and answer techniques and various grouping styles to enhance the students’ interest (Echevarria et al., 2004; Coonan, 2007).

Variety can be created by using different types of questions such as “fact questions, process questions, convergent questions, divergent questions” (Borich, 2006: 10). Various types of questions can help children to interact with the content, make observations, show understanding and move to critical thinking. Linguistic analysis can be performed through what-who-how questions (Schleppegrell et al., 2004).

A combination of competitive, cooperative, and individualistic climates can also promote variety and seems to raise the learners’ interest in lesson delivery (Short, 1994; Echevarria et al., 2004).

#### *8.1.1.2.3 Task orientation*

Task orientation needs to be employed in the CLIL class in order to enhance content learning. This can be achieved by using lesson plans which adhere to the objectives outlined in the curriculum. Moreover, instruction should follow the lesson’s goals in order to increase the time spent on goal-oriented tasks.

Task orientation is achieved when objectives correspond to various levels of cognitive complexity: knowledge, comprehension, application, analysis, synthesis, evaluation. Borich (2007) outlines some action verbs describing the learning outcomes at the various levels. At the knowledge level, students need to be able to “define, list, recall, describe, match, recite, identify, name, select, label, outline, state” (p.94). At the comprehension level, students are expected to “estimate, infer, defend, explain, paraphrase..., predict...,

generalize, summarize” (p.94). At the application level, students should “change, modify, relate, compute, operate, solve, demonstrate, organize, transfer, develop, prepare, use” (p.95). Objectives at the analysis level anticipate that learners should “relate, diagram, infer..., subdivide” (p.95). At the synthesis level, students are required to “categorize, create, formulate..., design (an experiment and solve a problem)..., produce” (p.96). Objectives at the evaluation level require learners to “appraise, criticize, justify, compare, defend, support, contrast, judge” (p.96).

Selecting an appropriate instructional model can also enhance task orientation in the CLIL class. Both direct and indirect strategies can be selected for the accomplishment of the CLIL lesson’s objectives. Direct instruction includes “presenting material in small steps” (Borich, 2007: 234). Content needs to be structured in meaningful ways, e.g. moving from simple to complex or from general to specific. Guided student practice is important in direct instruction. Students’ responses need to be elicited in a nonevaluative atmosphere. Guided practice may include prompting, that is providing hints in order to stimulate students to produce correct responses. Modeling can be used by the teacher in order to demonstrate what they are required to do. Thus learners are enabled to understand complex explanations. Feedback and correctives is another strategy in direct instruction. Students are likely to engage actively in the learning process when most of the students’ responses are “correct, quick, and firm” (ibid: 242). The quick pace of correct responses eliminates irrelevant comments and distractions. Allowing independent practice is another strategy in the direct instruction model.

Indirect strategies include inquiry and problem solving. Teaching Science through an inquiry-based, problem-solving approach allows students opportunities to define problems, form hypotheses, collect and analyze data and reach generalizations relating the hypothesis to the data. The concepts of Science are developed through the thinking processes of observing, comparing, predicting, inferring, and finding relationships (Kessler & Quinn in Crandall, 1987). Engaging L2 learners in hands-on investigation facilitates language development. Gibbons’s (1998) study demonstrates the importance of “learning by doing” (p.103) in the Science CLIL class, particularly for ESL learners since concrete experiences help them comprehend language as the teacher has the opportunity to build on these experiences.

Several meaningful, goal-oriented activities could be employed in the CLIL class in order to promote task orientation. For instance, the learner could be called to identify similarities and differences (Glynn & Takahashi, 1998) or generate and test hypotheses (Marzano et al., 2001).

#### *8.1.1.2.4 Engagement in the learning process*

Students' interest needs to be promoted in order to engage them in the learning process. Using educational games in the CLIL class is one way to achieve this aim (Council of Europe, 2001). Most listening tasks can be turned into memory games and general knowledge quizzes: 'True or False?' (Willis, 1996: 122).

Furthermore, the teacher needs to encourage the use of comprehension strategies by asking questions related to pictures, tables, titles, words in bold, in order to help the learner understand meanings (De Graaff et al., 2007).

Students can be encouraged to identify similarities and differences between concepts or topics and then represent them in graphic or symbolic form. Venn diagrams can be used to compare while comparison matrix can be used to group or classify things into categories or bubbles. Analogies can be used to illustrate relationships, e.g. "Circumference is to circle as perimeter is to..." (Marzano et al., 2001).

Strategies need to be taught through explicit instruction. Teachers should provide scaffolding throughout strategy use by the children. Echevarria et al. (2004) present a variety of approaches which could be used by teachers when teaching strategies in a sheltered class. These include: mnemonics (i.e. memorizing using acronyms), strategies such as note-taking and underlining which help learners retain information, graphic organizers representing key concepts, and new words serving to organize information. Barton et al. (2002) suggest the use of graphic organizers such as Venn diagrams, timelines, and semantic maps when learning Maths and Science could be prepared by the students in order to make "verbal and visual word associations" (p.26). Comprehension strategies may enhance the comprehension of text, e.g. predicting, self-questioning, and summarizing.

Cooperative learning has been found to be an effective instructional strategy in the CLIL classroom (Crandall, 1993) as it "encourages students to interact; ...they share their

insights, test hypotheses, and jointly construct knowledge” (p.117). Thus, it can be used for promoting the students’ engagement in the learning process. Student-student interaction encourages the students’ active participation and interdependence of learners. Task specialization and learning materials encourage the creation of an end product which is based on learners’ cooperation. Assigning roles not only promotes communication among group members but also helps carrying out the task. A teacher who wants to establish a cooperative task structure should “specify the goal of the activity, structure the task, teach and evaluate the collaborative process, monitor group performance, and debrief” (Borich, 2007: 175). Goal specification could involve a written or oral report, listing, etc. Active involvement can be promoted when division of labour is required and group progress is charted on individually assigned tasks (Johnson and Johnson, 1996).

Language development can be enhanced through the use of cooperative learning in the CLIL class which takes place between learners of different linguistic levels who work together on the same task (Moss, 1992). CLIL students can give and receive help with academic terms and concepts (Jacob et al., 1996). Collaborative Strategic Reading (CSR), for example, is one method of simultaneously teaching academic content and language skills to students which could be used to promote learning in the CLIL class. Learners work collaboratively to clarify subject matter texts. Social interaction is assumed to facilitate cognitive development. CSR forces learners to assist one another in applying four reading strategies to comprehend the reading text. First, students predict what they are going to read, they identify and elicit difficult words while reading, they get the gist by stating the most important idea, and finally summarize what they have learned (Palinscar & Brown, 1984).

CLIL students need to be allowed to practise with hands-on materials in order to be able to link concrete experiences to abstract concepts (Echevarria et al. 2004). Opportunities for applying new knowledge in meaningful ways are important in CLIL classes, e.g. drawing up a semantic map, demonstrating relationships among concepts, etc. These concrete experiences encourage the learners to apply new information in a personally logical way. Hence, abstract concepts are made concrete.

Reinforcing effort can enhance engagement in the learning process and probably achievement (Mortimore, 1991). Several types of rewards can cause a desirable response. Some external rewards aiming to improve desirable behaviors are: “verbal or written

praise, smile, a head nod, special privileges (for example, visit to the learning centre, library, etc.), ... extra points toward grade, “smiley face” stickers on assignments, note to parents on top of a test or paper, ...special recognitions and certificates (for example, “good conduct award”, “neatest”, “hardest worker, etc.)” (Marzano et al., 2001: 207). Internal rewards aim to eliminate the possibility of relying on extrinsic rewards for learning and behaving.

Assessing progress and providing feedback can engage CLIL students in the learning process. Research attests to the importance of feedback in learning (Sammons et al., 1995; Countryman & Schroeder, 1996, Marzano et al., 2001; Borich, 2007). It seems important to provide students with feedback related to the achievement of certain levels of knowledge and skills. This could be done using rubrics which relate to a particular topic. Specific feedback is better than general, so rubrics could focus on certain aspects of knowledge and skill.

Performance can be assessed through oral presentations, quizzes, homework, act, written exercises, research papers. The teacher can pursue whole class reporting, individual work and group responses through activities such as thumbs up/down, response boards prepared by each group separately. The teacher may use comments such as ‘That’s a good try’ etc. Feedback needs to be specific. Therefore, rubrics can be prepared showing the level of performance (Hattie, 1992; Countryman & Schroeder, 1996; McLaughlin & Vogt, 1996; Marzano et al., 2001; Echevarria et al., 2004). This kind of activities assists the teacher to assess, review and give feedback. Information can be obtained related to difficulties with language and content concepts requiring re-teaching.

Reviewing new content and language knowledge, summarizing and notetaking can keep the CLIL student engaged in the learning process. Effective learning in CLIL classes appears to occur when key vocabulary and key content concepts are reviewed (Echevarria et al., 2004). Reviewing content could be done with an informal outline where indentations serve to outline more subordinate ideas (Marzano et al., 2001). Semantic webbing and drawings can also be used. Notes help in reviewing content (Carrier & Titus, 1981).

A straightforward way of using notes is to hand teacher-prepared notes to students. In this way, students are provided with the most significant information. Simultaneously, students

are exposed to the way notes should be taken. A number of notetaking formats can be used. For instance, in the “informal outline” case (Marzano et al., 2001: 46) major ideas are demonstrated using indentations to outline more subordinate ideas. In the “webbing” (ibid: 46) format case, large and smaller circles are used to demonstrate the degree of importance of some elements while lines are used to indicate relationships between ideas.

#### *8.1.1.2.5 Medium-to-high success rate*

The CLIL teacher needs to ensure a medium-to-high success rate (Borich 2007). Sequencing lessons based on prior learning can enhance content learning. Therefore, the teacher needs to organize a CLIL unit and each lesson of the unit in a way that tasks are built on prior learning in order to facilitate the learning processes.

CLIL lessons should be broken down into small parts. Thus, activities need to be given in a step-by-step manner and pacing should match the students’ level. This process promotes student participation and understanding.

Instruction needs to produce moderate-to-high success rate. Therefore, activities need to be carefully designed so as to give opportunities to the students to spend most of their time on activities which allow success.

Finally, conferences need to be organized by EFL inspectors in order to present CLIL theory and methodology. Demonstration lessons based on the CLELD model also need to be carried out by EFL counsellors.

#### *8.1.2 **Development of teaching materials***

Teaching materials that follow the CLIL model developed in this study need to develop. EFL counsellors may need to prepare audiovisual aids for the teacher, such as PowerPoint presentations, a teacher’s guide including aims and objectives for each unit, appropriate activities, and textbooks for the students. Exchange of expertise between teachers needs to be encouraged in order to develop a bank of suitable teaching materials. State funding may need to be considered regarding the preparation and development of appropriate teaching materials as many teachers might point to the lack of resources and show reluctance to undertake the responsibility for teaching in CLIL classes.

### ***8.1.3 Continuity of CLIL teaching***

Continuity in the CLIL learning process needs to be ensured in order to maximize academic benefits. The drop in delayed vocabulary post-test scores which was shown in both CLIL experimental groups (CLIL+CLELD+LEA and CLIL+CLELD-LEA) could be attributed to the fact that the lessons stopped after the treatment. Subjects were tested after three months. Therefore, language was not recycled after the post-tests. Learners need continuous exposure to CLIL in order to enhance L2 development that can grow along subject matter learning and have long-lasting benefits.

### **8.2 Limitations of the study**

The study has limitations which may point to directions for further research. To begin with, the experiments took place in twelve 6<sup>th</sup> grade classes of five urban primary schools in Cyprus. The relatively small sample employed in the study, imposes limitations upon the interpretations, endangering the generalizability of findings as it cannot provide any conclusive evidence of the effectiveness of this approach in terms of both language and content development. Although the data demonstrate a positive effect of the CLELD on the students' L2 vocabulary and content knowledge, it seems reasonable to suggest that the findings require replication with a larger sample. Larger studies involving bigger samples can compensate for this study's limitations. So, the same research could be conducted involving more pupils of all three EFL levels as well as more teachers in order to enhance the validity of the results. Moreover, CLIL could be implemented using as content areas subjects other than Geography, Science and Maths, such as Physical Education, Home Economics and Music in order to generalize results as well as to investigate, in which case students have more positive experiences and more academic gains. This kind of research design is likely to safeguard the generalizability of findings.

The duration of CLIL implementation in this study is short, in that it occurred over about one-month period of CLIL instruction for each experiment. Clearly, both space and time triangulations are required to ensure the validity of the outcomes. In order to achieve that, further comparative research is required across specific populations, e.g. the various EFL proficiency levels in primary schools, rural schools, secondary settings etc, and over longer periods of treatment in order to explore the impact of CLELD on L2 development and content learning.

The experiments of the current study took place in urban primary schools in Cyprus. The participants had a fair level of fluency in English and faced few problems in decoding oral and written discourse and following instructions. This is likely due to the fact that the majority of the students attend private EFL classes. CLIL with the CLELD model with LEA has not yet been implemented and tested in rural schools. This issue remains to be explored in the future. Therefore, before leaping to any far-reaching conclusions, caution must be applied.

The experimental group which was exposed to CLIL with CLELD involving Language Enhancement Activities was provided with a multiple treatment called LEA which is an important part of the CLELD model. There was not a clear independent variable between the experimental groups which were exposed to CLELD with LEA and to CLELD without LEA. Language enhancement was provided through analytic teaching, language games, and visual enhancement with PowerPoint presentations. However, this is a situation which usually happens in real classroom settings, that is a number of variables usually vary between teaching in two different classes, while some variables cannot always be controlled. For example, unexpected comments by students may lead to further clarifications in one class, or even in matched settings with similarly trained teachers, one teacher's specific competences, abilities and attitudes may make the difference.

The post-tests administered in this study examine the subjects' immediate performance in subject matter knowledge. However, a delayed test can examine whether content learning is retained or atrophied over time. Re-testing participants in the years to come is likely to shed light on the long-term benefits of CLIL.

The vocabulary tests examined the students' recall of word meanings but not their ability to use the new words which they encountered in CLIL lessons in speaking and writing. Therefore, the same experimental research could be carried out for a longer time in order to explore the experimental group's oral and written discourse level (productive skills) in relation to that of the students involved in CLIL with CLELD without LEA classes and those who were taught the content subject in L1.

The teachers who taught the CLIL+CLELD with LEA and CLIL+CLELD without LEA lessons were all qualified subject matter teachers. Three of them had an MA in Applied Linguistics or TESOL while the fourth had an MA in Education from a British University.

All teachers had a long EFL teaching experience ranging from 10 to 17 years. The teachers were selected for their enthusiasm in EFL teaching and high teaching performance. This ensured that they would manage to implement CLIL+CLELD successfully. Therefore, if a subject matter teacher without EFL teaching knowledge or an EFL teacher who ignores subject matter teaching pedagogy had implemented CLIL+CLELD+LEA, it is not guaranteed that the same results would have been obtained.

The teachers who taught the CLIL+CLELD with LEA and CLIL+CLELD without LEA lessons were offered a very short training which consisted of four meetings which took place on an individual basis. In these meetings, the researcher outlined the principles included in the CLELD model, presented the aims of the lessons and described the activities included in the lessons. However, this training cannot be considered to be efficient. Clearly, further training would ensure more effective implementation.

In this study, parental involvement was not considered in order to control outside classroom influences on students' learning. However, the involvement of parents in the CLIL programmes could contribute to their success (Cloud et al., 2000; Mehisto and Asser, 2007). The CLIL class may need to be open to parents. CLIL teachers should be open to dialogue and parents should be informed about the learning processes as invited to the CLIL class. Parent participation could inform decision making related to CLIL implementation and thus have an impact on learning outcomes.

Finally, the participants in the CLELD experimental groups seemed to be remarkably engaged in learning; to what extent this was because of the structure provided by CLIL lessons and to what extent it was due to the teachers' high expectations is a topic for future investigation. Moreover, although the subjects of the three groups had an almost homogeneous background as well as the same hours of formal instruction, variables which could affect educational achievement, such as habits, student motivation, cognitive learning style, and personality (Furnham, 1995) as well as personal exposure to other language learning environments, were not controlled in the present study. Certainly, more rigorous research in the area of CLIL methodology is required to corroborate and enhance the present findings and to fill in gaps.

With all of the limitations of this study acknowledged, it would be reasonable to assume that CLIL constitutes the introduction of a new era in education – one in which a holistic

way of learning is encouraged. The more carefully it is designed and planned the merrier the benefits that will be reaped. CLELD could guide learning towards this direction.

Avenues for future research are next discussed.

### **8.3 Directions for further research**

The current research raises a number of issues requiring further investigation. To begin with, empirical evidence on the impact of CLIL implementation following the CLELD performance guidelines is still slim. Research needs to ascertain the long-term impact of CLIL with lesson delivery model on learners' vocabulary development and general L2 language attainment as well as content knowledge. Re-testing participants in the years to come can examine whether learning is retained and is likely to shed light on the long-term benefits of CLIL with CLELD. Added to this, further research could show the influence on L2 development from out-of-school learning sources (Sylvén, 2004) as compared to language development through CLIL with CLELD. The process of how vocabulary knowledge is built in CLIL classrooms is also an important issue which merits greater consideration (Robinson, 2005).

This study examined only the impact of language enhancement with visual input through PowerPoint presentations, games and analytic language teaching on learners' L2 vocabulary development. Clearly, more research is required to uncover the effect of all the key features of CLELD related to language and content knowledge enhancement, on L2 vocabulary development and subject matter learning. Testing the effectiveness of each separate variable included in the CLELD instrument experimentally could demonstrate its impact on language and content learning.

For instance, a vexing issue is to examine whether language modifications and simplifications deprive learners of crucial input. Using simple sentences in oral or written input may deprive learners of crucial input. Oversimplification could turn out to cause vagueness as to the exact meanings and over-elaboration may have no positive effects (Lynch, 1988). If this is the case, then the learner may face more difficulties when being exposed to language modifications. Further research is required on this issue.

Output production may not always succeed in drawing the learners' attention to the target forms. Further research is therefore required to identify effective processes of output production in CLIL teaching (Bigelow, 2000). Further research is also required that would demonstrate the exact correlation between output production and L2 acquisition.

Another line of investigation that needs to be pursued by researchers is the role of oral discourse taking place in the content-based foreign language classroom both between teacher and learners and between learner and learner. How teacher-student discourse can best promote L2 development also needs to be pursued. Gibbons (2003) urges the need for "analyzing linguistically the mechanisms through which teachers mediate the language of their students and the linguistic demands of the school curriculum" (p.268). Scaffolding processes should be thoroughly examined in order to show the most successful paths for achieving both language and content development. Some possible directions could be how to make input comprehensible, the role of recasting/rephrasing, how to modify students' output etc.

The effect of active participation in interaction on language acquisition needs to be explored. Further research is likely to shed more light on the exact impact of participating versus observing interaction in L2 vocabulary acquisition (Pica, 1992; Loschky, 1994; Ellis et al., 1994). Moreover, further investigation is needed to examine types of interaction strategies which can further enhance vocabulary acquisition in the primary school CLIL class (Lyster, 1998a; Carpenter et al., 2006). Research is also required to uncover the long-term effect of low affective filter on L2 vocabulary acquisition.

Further study is required on the impact of CLELD on various aspects of foreign language development as language learning is much more than just vocabulary. Hence, it is tempting to examine the potential benefits of this lesson delivery tool on grammar acquisition and L2 phonology and also whether students have gains in listening comprehension and reading (receptive skills) as well as in writing and speaking (productive skills), thereby enhancing their English language proficiency.

This study has assessed vocabulary knowledge in isolation in order to reach objective results regarding the receptive knowledge that has been obtained (Read, 2004). Therefore, future research could investigate the impact of CLIL with the CLELD instrument on

learners' pragmatic competence, i.e. the ability to use new vocabulary in various speech acts such as requests (Austin, 1962).

Assessment in CLIL is an area which needs to be explored. CLIL assessment procedures need to be developed (Snow, 1998). Relying only on traditional assessment tools, such as paper and pencil tests, may not be sufficient to see the complete picture of the CLIL learner. Further alternative ways of assessment, such as the use of portfolio, should be considered. Moreover, the role of language in CLIL assessment needs to be explored. The impact of code-switching and the role of language errors in students' assessment scores also need to be investigated.

The CLELD tool could be further developed as an evaluation instrument for CLIL teacher performance. It would be desirable to examine the validation and reliability of the CLELD instrument in order to confirm its effectiveness and use as a teacher observation instrument for supervisors and principals who would like to assess CLIL instruction in the primary school.

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## APPENDICES

### APPENDIX I

#### a. Permission for the study



ΚΥΠΡΙΑΚΗ ΔΗΜΟΚΡΑΤΙΑ  
ΥΠΟΥΡΓΕΙΟ  
ΠΑΙΔΕΙΑΣ ΚΑΙ ΠΟΛΙΤΙΣΜΟΥ

ΔΙΕΥΘΥΝΣΗ  
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26 Οκτωβρίου, 2007

Κυρία Μαρία Ξάνθου  
Βοηθό Διευθύντρια  
Δημοτικό Σχολείο Πάφου ΙΑ΄  
Μεσσηνίας 2<sup>η</sup>  
8035 Πάφος

**Θέμα: Άδεια για εφαρμογή εκπαιδευτικού προγράμματος σε δημοτικά σχολεία των επαρχιών Λεμεσού και Πάφου**

Αναφέρομαι στις σχετικές με το πιο πάνω θέμα επιστολές σας, με ημερομηνίες 24 Σεπτεμβρίου και 10 Οκτωβρίου 2007, και σας πληροφορώ ότι εγκρίνεται το αίτημά σας για την εφαρμογή του εκπαιδευτικού προγράμματος CLIL (*Content and Language Integrated Learning*) στα τέσσερα δημοτικά σχολεία των επαρχιών Λεμεσού και Πάφου που αναφέρονται στην επιστολή σας, την παρούσα σχολική χρονιά 2007-2008.

2. Νοείται, βέβαια, ότι πρέπει να εξασφαλιστεί η άδεια των διευθυντών/διευθυντριών

**Class:**.....

**Subject:**.....

**PART I: LANGUAGE**

**b. Parental permission for participating in CLIL**

**Topic: Students' participation in CLIL**

Dear parents,

Your children will have the opportunity to participate in a CLIL program (Content and Language Integrated Learning) which aims at developing English as a foreign language through the medium of subject matter teaching (e.g. Geography). The European Union supports CLIL provision as part of a multilingual education. CLIL has been implemented in various developed countries of the world such as the U.S.A., Canada, Norway, Finland, Luxemburg, Germany etc.

Your children will be taught one unit of Geography/Science/Maths in English. Assessment will examine students' knowledge both in Geography/Science/Maths and in English, as well as students' attitudes towards CLIL.

The CLIL programme is monitored by the University of Cyprus. Permission for carrying out the programme has been obtained by the Ministry of Education and Culture.

I am looking forward to your cooperation.

The EFL teacher of your children.

.....

I.....parent/guardian of

.....of the 6<sup>th</sup> grade of the .....Primary School

approve/do not approve the participation of my child in the CLIL program.

Signature

.....

## APPENDIX II

### **The Content and Language Lesson Delivery Model for Elementary classes (C.L.E.L.D.)**

#### **A. Pursuing both acquisition and learning**

##### 1. Task-based or experiential teaching

Meaningful, goal-oriented, outcome-evaluated tasks considering a real-world relationship  
Tasks: sorting, categorizing, comparing, finding similarities/differences, problem-solving (hypothesizing, finding alternatives, evaluating), creative tasks.

##### 2. Analytic teaching

Language-focus activities: completing phrases, matching word with definition, computer games, production exercises (produce target words in contexts, open-cloze exercises, picture labelling, answering questions).

#### **B. Provide comprehensible input**

### 1. Adjusting speech to learners' level

slowly but naturally, morphosyntactic simplifications, repetition and paraphrasing

### 2. Exaggerated articulation

intonational enhancement in oral input

### 3. Extra-linguistic information

body language, gestures

### 4. Providing multiple, non-linguistic representations

Realia, visuals, diagrams, hands-on activities, graphs, maps, tables, Venn diagrams, timelines, multimedia, video clips, graphic representations

### 5. L2 medium strategies

examples, definitions, synonyms, paraphrase, repetitions or partial self repetitions, explanations, contrasts with similar items, clue-giving: suggesting an associated concept

### 6. L1 medium strategies

pupil supplies L1 equivalent, the teacher provides translation, language switching, interpretation in L1 that is the problematic area is the only L2 heard (Ti simeni 'degrees?'), use L1 to retrieve students' experiences and knowledge, introduce key L2 terms through L1 discourse

### 7. CALL

present audio, visual, and written materials

typographical enhancement in written input: boldfacing, colouring, underlining, circling.

## **C. Output production**

### 1. Stimulating production of target language

Seek explanation, reports, answers to questions, responses to oral and written tasks

## **D. Interaction**

### 1. Conversational modifications

confirmation checks following previous speaker's utterance, comprehension checks ('Do you understand?'), and clarification requests ('What do you mean by...?'), clarification markers 'huh', 'what'), elicitation of a reformulation from learners metalinguistic clues that is giving information about the correct form of the learner's utterance, allowing students to finish the teacher's utterance

### 2. Semantically contingent responses

semantically contingent responses - protracted language events: recasting (reformulating students' meanings in registrally suitable ways - repeating and expanding)

## **E. Keeping the affective filter down**

### 1. Language games

word bingo, guessing games involving target vocabulary and miming, word anagrams, spelling games

## **PART II: CONTENT**

## **A. Lesson clarity**

### 1. Inform learners of the objectives

### 2. Build on prior knowledge

Check for task-relevant prior learning world knowledge, use pictures, photographs, picture and sentence matching, semantic webs, word wall  
provide advance organizer (structured overview of topics)

### 3. Provide differentiated instruction

Consider various types of learning styles  
Process differentiation (activities at various levels of difficulty, self-access corners)

## **B. Instructional variety**

### 1. Vary modes of presentation

Teacher presentations, questioning, discussion, allowing independent practice  
Use various grouping styles: individual work, partners- pair work, triads, small groups of four or five, cooperative learning groups (goal specification: listing and grouping), whole-groups.

### 2. Use various types of questions

direct questions e.g. 'What does X mean?', lower-order questions, e.g. 'What was the...?', fact questions requiring recall of information, closed questions, e.g. 'What is the function of...?', open questions requiring more than one correct answer, e.g. 'How ...?', process questions (analyze, synthesize, problem-solve, create, judge).

### 3. Create various classroom climates

competitive, cooperative, or/and individualistic

## **C. Task orientation**

### 1. Lesson plans reflect curriculum features

### 2. Match goals with instruction

### 3. Objectives consider various levels of cognitive complexity

Refer both to lower-level and higher-level cognitive skills: knowledge, e.g. list, recall, describe, match, identify, name, comprehension e.g. estimate, explain, predict, summarize, application, e.g. change, relate, compute, solve, demonstrate, prepare, use, analysis e.g. diagram, subdivide, synthesis, e.g. categorize, create, design, produce, and evaluation, e.g. criticize, justify, compare, defend, support, contrast, judge

### 4. Select appropriate instructional model

- direct instruction (for achieving knowledge and comprehension objectives)
- indirect (form hypotheses, provide explanations about observations, get involved in classroom dialogue, deal with problem-solving and individual projects)  
Some forms of indirect instruction include:
  - concept learning (demonstration of examples and non examples)
  - inquiry learning (problem identification, hypothesis formation, brainstorming of

- solutions, investigation: data collection and analysis, discussion, forming conclusions, reaching generalizations)
- problem solving (using an advance organizer: identifying problem, stating objectives, collecting data, interpreting, and forming conclusions).

#### 5. Assign meaningful, goal-oriented activities

Activities may include: identifying similarities and differences, representing information in graphic or symbolic form, e.g. Venn diagram, generating and testing hypotheses

### **D. Engagement in the learning process**

#### 1. Promote interest – Games

Content comprehension games: memory games, e.g. football, true-false quizzes

#### 2. Encourage the use of learning strategies

Cognitive strategies (brainstorming, peer tutoring, semantic maps - to illustrate connections between prior and new knowledge, notetaking, and underlining)

Comprehension strategies (eliciting knowledge from pictures, predicting and summarizing through webbing, using gestures/own words to describe)

Metacognitive strategies (monitoring one's thinking, being aware of the learning process, reflecting, identifying similarities and differences - completing graphic organizers - Venn diagrams to compare)

#### 3. Assign cooperative work

#### 4. Provide guided practice

Handouts, questions, verbal or written exercises stimulating the use of L2

#### 5. Reinforce effort and provide recognition

Rubrics following effort and achievement for groups and individuals, abstract rewards, stickers, certificates

#### 6. Assess progress and provide feedback

To individuals, groups whole class including reading aloud, smiles, nods, talking with groups or giving answer keys, showing slides etc.

Assessing performance: oral presentations, quizzes, act, written exercises, responses through activities such as thumbs up/down, response boards prepared by each group

Peer feedback

#### 7. Review new content and language knowledge, Summarizing, Notetaking

Drawing up semantic maps, showing pictures for concepts, completing sentences/ taking notes about what they have learned.

### **E. Moderate-to-high success rate**

#### 1. Sequence lessons based on prior learning

The lessons of a unit are arranged in a logical order so as to achieve the unit's aims.

#### 2. Plan transition to new material in manageable steps

Lesson should be divided into small pieces.

3. Instruction produces moderate-to-high success rate

Spend about 60% to 70% of time on tasks that allow almost complete understanding of material.

**APPENDIX III  
QUESTIONNAIRE FOR THE CHILDREN (English version)**

Name .....Class.....School.....

**Can you report about your experience with CLIL?**

1=very limited, 2=limited, 3=fair, 4=considerable, 5=great

**Do you believe that CLIL improved your English?**

Yes

No

To what extent has CLIL improved your

English vocabulary?

1 2 3 4 5

Speaking

1 2 3 4 5

Writing

1 2 3 4 5

**How useful did you find the following in a CLIL lesson?**

LA1	Learn English through interesting topics of Geography/Science/Maths	1	2	3	4	5
LA2	Focus on new English words e.g. matching words with definitions etc	1	2	3	4	5
<b>The teacher should</b>						
LB1	talk slowly	1	2	3	4	5
LB2	exaggerate – pronounce loudly the new words	1	2	3	4	5
LB3	show with gestures the meaning of new words (uses hands)	1	2	3	4	5
LB4	show realia, pictures, maps etc. to help children understand the meaning of new words	1	2	3	4	5
LB5	repeat new words or give explanations in the L2	1	2	3	4	5
LB6	provide explanations in Greek	1	2	3	4	5
LB7	use technology, e.g. PowerPoint presentations to present new material and help children see, hear and read something new	1	2	3	4	5
LE	use language games such as anagrams, hangman, bingo to help students learn new words	1	2	3	4	5

**Do you believe that CLIL helped you to learn the subject matter Geography/Science/Maths)?**

Yes

No

To what extent has CLIL improved your subject matter knowledge?

Geography	1	2	3	4	5
Science	1	2	3	4	5
Maths	1	2	3	4	5

**How useful did you find the following in a CLIL lesson?**

I would like to

C1.1	hear what we are going to learn, at the beginning of the lesson	1	2	3	4	5
C1.2.1/C5.1	listen to what we have learned so far	1	2	3	4	5
C1.2.2	see in an advance organizer what we are going to learn	1	2	3	4	5
C1.3	get involved in a variety of activities, e.g. repeating a phrase tapping rhythmically, miming an action, standing up if a sentence is true etc	1	2	3	4	5
C2.3.1/C4.3	cooperate with my classmates in order to find some answers	1	2	3	4	5
C2.3.2	compete in games	1	2	3	4	5
C2.3.3	work individually	1	2	3	4	5

C3.5	find similarities and differences between topics, prepare a diagram, form hypotheses and find solutions to problems	1	2	3	4	5
C4.1	learn Geography, Science, Maths through memory games such as ‘Who wants to be a millionaire?’, tennis, football etc where each team that reports a correct answer, wins points	1	2	3	4	5
C4.2	find information from pictures, the title etc	1	2	3	4	5
C2.3.1/C4.3	cooperate with my classmates in order to find some answers	1	2	3	4	5
C4.4	practise with exercises on handouts or orally	1	2	3	4	5
C4.5/C4.6	get prizes when I complete correctly the tasks or accomplish something, e.g. stars, stickers, diplomas etc	1	2	3	4	5
C4.7	take notes of what we have learned at the end of the lesson	1	2	3	4	5
C5.3	deal with difficult, neither too difficult nor too easy activities and easy tasks in order to experience success	1	2	3	4	5

**What is really difficult for you as a CLIL student?**

a	the new words	1	2	3	4	5
b	too much information	1	2	3	4	5

**I prefer to have CLIL lessons with**

Geography	1	2	3	4	5
Science	1	2	3	4	5
Maths	1	2	3	4	5

**Questionnaire to the children (Greek version)**

**Ερωτηματολόγιο σε παιδιά**

Όνομα ..... Τάξη.....Σχολείο.....

**Μπορείς να αναφέρεις τις εμπειρίες σου από το CLIL;**

**1=πολύ λίγο, 2=λίγο, 3=μέτρια, 4=πολύ, 5=πάρα πολύ**

**Πιστεύεις ότι με το CLIL βελτίωσες τα Αγγλικά σου; (Κύκλωσε ΝΑΙ ή ΟΧΙ)**

Ναι

Οχι

Σε ποιο βαθμό πιστεύεις ότι αναπτύχθηκε

το αγγλικό σου λεξιλόγιο;	1	2	3	4	5
ο προφορικός λόγος	1	2	3	4	5
η γραπτή έκφραση	1	2	3	4	5

	<b>Πόσο χρήσιμα βρίσκεις τα πιο κάτω σε ένα μάθημα CLIL;</b>					
LA1	Να μαθαίνω Αγγλικά με ενδιαφέροντα θέματα της Γεωγραφίας, της Επιστήμης και των Μαθηματικών.	1	2	3	4	5
LA2	Να κάνω δραστηριότητες με τις νέες λέξεις π.χ. αντιστοιχίσεις μεταξύ της λέξης και του σωστού ορισμού	1	2	3	4	5
LB1	Η δασκάλα να μιλά αργά	1	2	3	4	5
LB2	Να τονίζει τις άγνωστες λέξεις	1	2	3	4	5
LB3	Να δείχνει με χειρονομίες το νόημα των λέξεων	1	2	3	4	5
LB4	Να δείχνει αντικείμενα, εικόνες, χάρτες για να καταλάβουν τα παιδιά το νόημα των νέων λέξεων	1	2	3	4	5
LB5	Να επαναλαμβάνει κάποιες λέξεις	1	2	3	4	5
LB6	Να μας εξηγά και στα Ελληνικά	1	2	3	4	5
LB7	Να χρησιμοποιεί την τεχνολογία π.χ. PowerPoint presentations, για να δούμε, ν' ακούσουμε ή να διαβάσουμε κάτι καινούριο.	1	2	3	4	5
LE	Να μαθαίνω τις νέες αγγλικές λέξεις με παιχνίδια όπως αναγραμματισμοί, κρεμάλα, Bingo.	1	2	3	4	5
	<b>Πιστεύεις ότι το CLIL σε βοήθησε να μάθεις πολλά πράγματα στη Γεωγραφία /Επιστήμη /Μαθηματικά; (κύκλωσε ΝΑΙ ή ΟΧΙ)</b>					
	<b>Ναι</b>					
	<b>Όχι</b>					
	<b>Αν ναι σε ποιο βαθμό;</b>					
	Γεωγραφία	1	2	3	4	5
	Επιστήμη	1	2	3	4	5
	Μαθηματικά	1	2	3	4	5
	<b>Πόσο χρήσιμα βρίσκεις τα πιο κάτω σε ένα μάθημα CLIL;</b>					
C1.1	Να μας λέει η δασκάλα στην αρχή του μαθήματος τι θα μάθουμε	1	2	3	4	5
	Να μας λέει σε συντομία τι μάθαμε σε προηγούμενα μαθήματα.	1	2	3	4	5
C1.2.1/C5.1						
C1.2.2	Να μας δείχνει σε σχεδιάγραμμα τι θα μάθουμε	1	2	3	4	5
C1.3	Να έχει ποικιλία δραστηριοτήτων όπως: να πούμε προτάσεις χτυπώντας παλαμάκια ρυθμικά, δραστηριότητες όπου πρέπει να κινηθούμε π.χ. να μιμηθούμε κάτι ή να σηκωθούμε αν η πρόταση είναι σωστή)	1	2	3	4	5
C2.3.1/C4.3	Να συνεργάζομαι με συμμαθητές μου για να βρω απαντήσεις	1	2	3	4	5
C2.3	Να ανταγωνιζόμαστε σε παιχνίδια	1	2	3	4	5
C2.3	Να έχουμε ευκαιρία να εργαστούμε και μόνοι	1	2	3	4	5

C3.5	μας. Να βρίσκω ομοιότητες και διαφορές για θέματα που συζητούμε και να ετοιμάζω ένα Βέννειο διάγραμμα ή να κάνω υποθέσεις και να βρίσκω απαντήσεις σε προβλήματα	1	2	3	4	5
C4.1	Να μαθαίνω Γεωγραφία, Επιστήμη, Μαθηματικά με παιχνίδια μνήμης όπως τένις, ποδόσφαιρο, κλπ. όπου κάθε ομάδα που λέει μια σωστή απάντηση, κερδίζει πόντους.	1	2	3	4	5
C4.2	Να βρίσκω πληροφορίες από εικόνες, τον τίτλο κλπ.	1	2	3	4	5
C4.3/2.3	Να συνεργάζομαι με συμμαθητές μου για να βρω απαντήσεις	1	2	3	4	5
C4.4	Να κάνω εξάσκηση με ασκήσεις σε φυλλάδια ή προφορικά	1	2	3	4	5
C4.5/4.6	Να παίρνουμε διάφορα είδη βραβείων όταν κάνω σωστά κάποιες ασκήσεις ή καταφέρω κάτι π.χ. αστεράκια, αυτοκόλλητα, διπλώματα κλπ.	1	2	3	4	5
C4.7	Να παίρνω σημειώσεις στο τέλος του μαθήματος	1	2	3	4	5
C5.3	Να έχει άλλες ασκήσεις πιο δύσκολες, άλλες ούτε πολύ δύσκολες ούτε πολύ εύκολες και άλλες ευκολότερες ώστε να έχουμε όλοι επιτυχίες	1	2	3	4	5
	<b>Τι είναι πραγματικά δύσκολο για σένα σαν μαθητής CLIL;</b>					
<b>α</b>	Οι πολλές καινούριες λέξεις	1	2	3	4	5
<b>β</b>	Πολλές καινούριες πληροφορίες	1	2	3	4	5
	<b>Προτιμώ να κάνω CLIL με</b>					
	Γεωγραφία	1	2	3	4	5
	Επιστήμη	1	2	3	4	5
	Μαθηματικά	1	2	3	4	5

## APPENDIX IV

### TEACHERS' INTERVIEW

Describe your academic background

1. Does the use of the Content and Language integrated learning for Elementary classes Lesson Delivery Model contribute to English language learners' (ELLs) vocabulary development?
2. Does the use of the Content and Language integrated learning for Elementary classes Lesson Delivery Model promote subject matter learning of English language learners (ELLs) in the content areas of Social Studies, Science and Mathematics?
3. Did CLIL learners face difficulties with new vocabulary?
4. Did CLIL learners face difficulties with new content information?

5. Does CLIL lead to better language proficiency in the area of L2 vocabulary knowledge as compared to traditional learning through L1?
6. Are there significant differences in L2 vocabulary acquisition for pupils attending CLIL classes following the CLELD model versus pupils in CLELD non-language-enhanced classes?
7. Does CLIL lead to better subject matter knowledge as compared to traditional learning through L1?
8. Are there significant differences in subject matter learning for pupils attending CLIL classes following the CLELD model versus pupils in CLELD non-language-enhanced classes? (Geography, Science, Maths)
9. Do ELLs receiving CLIL instruction with the CLELD model have positive attitudes towards this approach?
10. Which group responded with more enthusiasm?
11. Do the elementary school teachers who use the CLELD model for lesson planning consider their teaching more effective than when not using it?
12. What is your opinion about the usefulness of the CLELD components in CLIL learning?

### **Part I: Language**

- LA1. Learn English through interesting topics of Geography, Science and Maths (Task-based learning)
- LA1.2 The teacher places emphasis on new vocabulary: underlining, colouring, matching words with definitions and pictures, etc (Analytic teaching)
- LB1. Adjusting speech to learners' level - The teacher speaks slowly
- LB2. Using exaggerated articulation- Highlighting target words
- LB3. Providing extra-linguistic information (gestures)
- LB4. Providing non-linguistic representations
- LB5. Using L2 medium strategies, i.e. repetition, paraphrase
- LB6. Using L1 medium strategies, i.e. translating in L1
- LB7. Using CALL, i.e. PowerPoint presentations to present new material
- LC Promoting output production
- LD Promoting linguistic interaction
- LE Low affective filter – Using content comprehension and language games

### **Part II: Content**

- CA.1 Clarity: Stating the objective
- CA.2 Activating prior knowledge

- CA.3 Differentiating teaching- Presenting variety of activities for all learning styles, e.g. rhyming and movement, Providing difficult and easier tasks
- CB.1 Varying modes of presentation
- CB.2 Using various types of questions
- CB.3 Creating a variety of learning climates - Allowing opportunities for working cooperatively, competitively and individually
- CC.1 Lesson plans should reflect curriculum features
- CC.2 Matching goals with instruction
- CC.3 Objectives need to consider various levels of cognitive complexity
- CC.4 Selecting appropriate instructional model
- CC.5 Task-based learning: Meaningful learning – activities
- CD.1 Engaging students in the learning process – Attracting interest through memory games
- CD.2 Encouraging the use of learning styles
- CD.3 Promoting cooperative learning
- CD.4 Providing guided practice
- CD.5 Providing reinforcement, i.e. giving prizes when attaining goals
- CD.6 Assessing progress and providing feedback
- CD.7 Reviewing – Taking notes at the end of the lesson
- CE.1 Sequencing lessons based on prior learning
- CE.2 Planning transition to new material in manageable steps
- CE.3 Providing instruction that produces moderate-to-high-success rate.

## **APPENDIX V**

### **TRANSCRIPT CODES AND EXPLANATIONS FOR CLASSROOM INTERACTION DATA**

T	teacher
S1	student
( )	speaker cannot be identified
Ss	several students speaking
(.)	short pause
((pause))	longer pause
(*), (**)	unintelligible (one star per syllabus)
=	latching
[ ]	several speakers speaking simultaneously
...	louder (for single words: capital letters)
((...))	gestures, actions
–	word started, but not finished
{ }	English translation of utterance in L1

(Wray, 1998: 200ff)

Maria Xanthou

## APPENDIX VI

### SUBJECT MATTER TESTS

#### 1. Subject Matter Test: Geography - Brazil

Name:.....Class:.....

1.



<http://z.about.com/d/Geography/1/0/x/K/samerica.jpg>

- a) Write on the map: Brazil, Brasilia, Rio de Janeiro, Sao Paulo, Argentina, Pacific Ocean, Atlantic Ocean
- b) Draw and write: the Amazon, Guiana Plateau, Brazilian Plateau, Mato Grosso Plateau, the Equator, and the Tropic of Capricorn

2. Match the phrases with the right words. The sentences refer to Brazil's climate

- |                                    |                 |
|------------------------------------|-----------------|
| 1. The climate in Brazil is        | a. cold         |
| 2. In Brazil it is ...all the year | b. Amazon basin |

3. It rains a lot in this area

- c. raining
- d. continental
- e. tropical
- f. Mato-Grosso Plateau
- g. dry
- h. centre
- i. Mediterranean

3. Match the productive resources with Brazil's products (Two for each stem)

1. The forests of Amazon give

(a)..... (b).....

2. Agriculture deals with

(a)..... (b).....

3. Farming deals with

(a)..... (b).....

4. Mineral wealth includes

(a)..... (b).....

5. The industries produce

(a)..... (b).....

6. Cyprus imports ... from Brazil

(a)..... (b).....

4. Complete

Brazilians love

(a) .....

(b) .....

(c) .....

5. Explain why Brazil faces problems (True-False)

- a) Only a few people have property. ....
- b) The Indians are dangerous. ....
- c) The Indians cut the forests to build houses ....

- d) Overpopulation in the cities .....
- e) There is unemployment .....
- f) Many people are homeless .....
- g) Brazil has a big external debt .....

6. Today, Brazil is developing. Explain why (True-False)

- a) Brazil produces electric energy .....
- b) Brazil produces solar energy .....
- c) They discovered diamonds in the Amazon .....
- d) They discovered oil in the Atlantic ocean .....
- e) They use alcohol to move cars .....
- f) They use caoutchouc to move cars .....
- g) They discovered all races in the Amazon .....

7. Complete

Most people live on the east side of Brazil because .....

.....

8. Choose the correct answer

If you visit Brazil in the winter what clothes will you take with you?

- a) swimming suit and waterproof
- b) swimming suit and short sleeves
- b) coat and scarf
- d) hat and map

9. The Amazon forests are destroyed. What will happen? Write 2 consequences:

- a).....
- b).....

10. Write two possible solutions/rules to stop the destruction of the Amazon forests.

- a).....
- b).....

## 2. Subject Matter Test: Science – Atmospheric Pressure

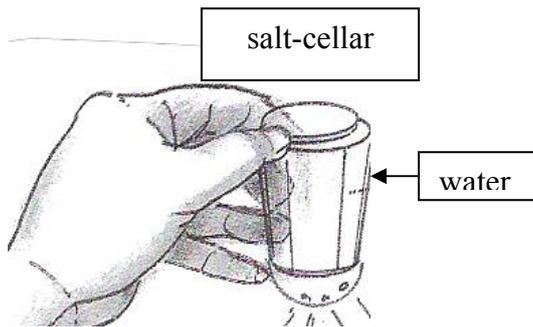
Name: ..... Class:.....School:.....

**1. True or False?**

- a) The air has weight. ....
- b) The pressure with which the air presses bodies within it is called atmospheric pressure. ....
- c) The air applies pressures to bodies from all directions. ....
- d) Atmospheric pressure is greater on the top of Troodos than on Limassol. ....
- e) We measure atmospheric pressure with barometers. ....

**2. What is wrong with the pictures?**

a)



.....  
 .....  
 .....  
 .....  
 .....

b)



.....  
 .....  
 .....  
 .....  
 .....

**3. Choose the correct answer**

- There is low atmospheric pressure in places where
  - a) fewer layers of air are pressing
  - b) the clouds decrease the density of air
  - c) there are many trees
  - d) there are inside pressures
- We don't feel the atmospheric pressure because
  - a) it is very small
  - b) there isn't pressure
  - c) it is neutralized by our inside pressure
  - d) we are strong
- Tom filled up a glass with water. He placed a cardboard on the end. Where must he turn the glass to make water pour down?
  - a) up
  - b) nowhere
  - c) down
  - d) on the side



**4. Read about Peter's experiment.**



Peter put some alcohol on a piece of cotton, lit it and threw it in the bottle.

When the flame was put out, Paul immediately put a balloon on the mouth of the bottle.

The balloon got in the bottle and was a little inflated.

Find the best explanation.

- a) The balloon got in the bottle because of its weight.
- b) The pressure in the bottle was reduced. So, the atmospheric pressure outside pushed the balloon in the bottle.
- c) The smoke of the flame warmed the balloon. It inflated and got bigger.
- d) There was greater pressure in the bottle. So, it attracted the balloon.

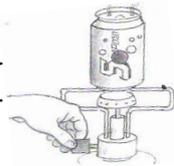
**5. Blow up two balloons. Put them on a scale. Prick one of the balloons with a pin. What will happen to the scale? Why?**

.....  
.....

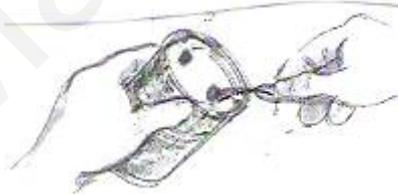


**6. Put little water in an empty tin. Warm the can. Close the holes. What will happen? Why?**

.....  
.....



**7. Fill in.**



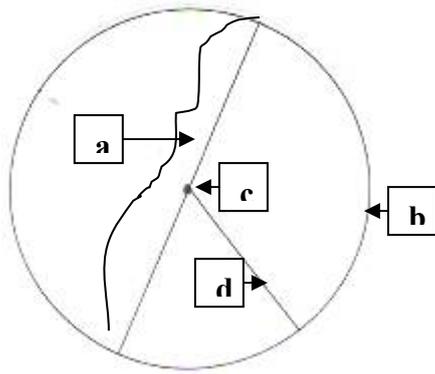
We open two holes on milk tin. The ..... comes in the tin and .....

Based on Kyprianou, Loizidou, Charalambous,, Matsikaris, & Ioannis (2000). First steps in Science. Grade 6. Assessment. Nicosia: Department of Curriculum Development – Primary Education.

**3. Subject Matter Test: Maths – Circle**

Name: ..... Class:.....School:.....

**1. Complete**



- a) .....
- b) .....
- c) .....
- d) .....

**2. Complete the table**

circle	radius	diameter (cm)
A	3,5	<input type="text"/>
B	<input type="text"/>	10

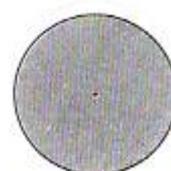
**3. Choose the correct answer**



3.1. The radius of the circle is ...

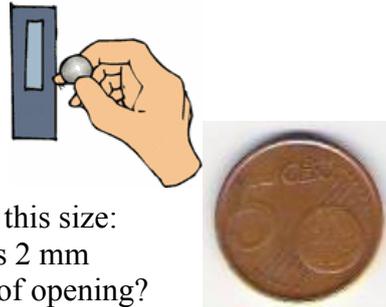
- a) 1,5 cm
- b) 2,5 cm
- c) 1 cm
- d) 3 cm

3.2 The diameter of the circle is ....



- a) 3 cm
- c) 1,5 cm

- b) 1 cm
- d) 2 cm



3.3 This is a coin machine. You can put coins of this size:  
The opening in which you can put the coins is 2 mm bigger than the coin size. What is the length of opening?

- a) 21 mm
- c) 23 mm
- b) 20 mm
- d) 19 mm

**4. Choose the correct answer**

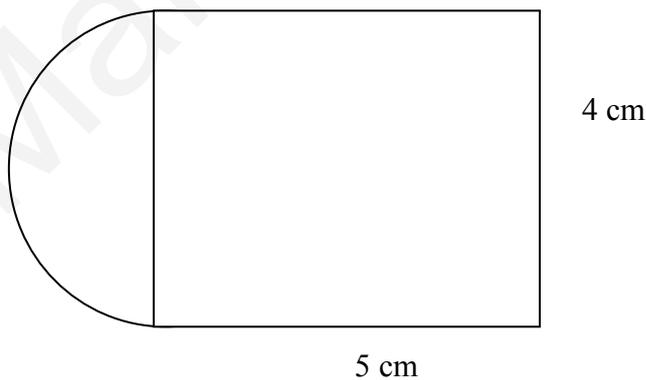
4.1 A circular plate has a 5 cm radius. How long is its circumference?

.....

4.2 The diameter of the wheel of a toy bike is 8 cm. How long is its circumference?

.....

4.3 What is the periphery of the following shape?

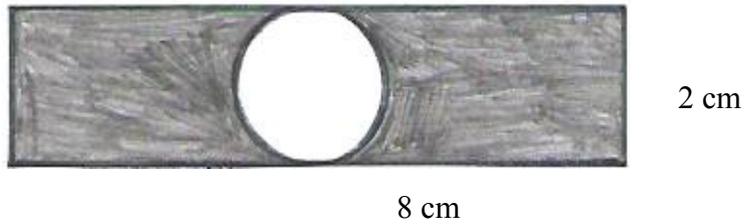


.....

4.4 A pizza has a 10 cm radius. Find its area.

.....  
4.5 A circle has a 6 cm diameter. Find the circle's area.

.....  
4.6 Find the area of the grey part of the shape.



4.7 Mrs Brown has a semicircle carpet. Its diameter is 4 m. What is its area?



## APPENDIX VII

### VOCABULARY TESTS

#### 1. Vocabulary Test: Geography

Name:..... Class:.....

population = .....  
 density = .....  
 environment = .....  
 Equator = .....  
 continent = .....  
 south = .....  
 east = .....  
 west = .....  
 north = .....  
 Capricorn = .....  
 city = .....  
 ocean = .....  
 overpopulated = .....  
 plain = .....  
 basin = .....  
 plateau = .....  
 flora = .....  
 fauna = .....  
 natural = .....  
 destruction = .....  
 efforts = .....  
 navigable = .....  
 rainfall = .....  
 biotope = .....  
 heat = .....  
 humidity = .....  
 mosquitoes = .....  
 transmit = .....  
 fever = .....  
 hut = .....  
 jungle = .....  
 map = .....  
 tropical = .....  
 forest = .....  
 species = .....  
 plants = .....  
 cypress = .....  
 almond tree = .....  
 reptile = .....  
 mammal = .....  
 information = .....  
 underground = .....  
 government = .....  
 exploit = .....  
 cultivate = .....  
 land = .....  
 climate = .....  
 resources = .....  
 industry = .....  
 agriculture = .....  
 farming = .....

mineral = .....  
 region = .....  
 develop = .....  
 wealth = .....  
 temperature = .....  
 product = .....  
 depend = .....  
 timber = .....  
 trunk = .....  
 barren = .....  
 cereals = .....  
 carob = .....  
 citrus = .....  
 tobacco = .....  
 sugar cane = .....  
 poultry = .....  
 ox = .....  
 frozen = .....  
 copper = .....  
 coal = .....  
 borrow = .....  
 debt = .....  
 hydroelectric = .....  
 textile = .....  
 convert = .....  
 public = .....  
 distribution = .....  
 discover = .....  
 habit = .....  
 resident = .....  
 plantation = .....  
 unequal = .....  
 unemployment = .....  
 homeless = .....  
 poverty = .....  
 neighbourhood = .....  
 illness = .....  
 undernourishment = .....  
 steal = .....  
 abandon = .....  
 import = .....  
 parade = .....  
 stadium = .....  
 coastal = .....  
 external = .....  
 consequences = .....  
 religion = .....  
 income = .....  
 protect = .....

## 2. Vocabulary Test: Science

Name: ..... Class: .....

straw = .....  
inflate = .....  
scale = .....  
weight = .....  
pressure = .....  
dough = .....  
neutralize = .....  
force = .....  
deform = .....  
prediction = .....  
steam = .....  
liquefy = .....  
reduce = .....  
experiment = .....  
direction = .....  
vapor = .....  
sequence = .....  
application = .....  
suction cup = .....  
separate = .....  
hook = .....  
immerse = .....  
cardboard = .....  
vessel = .....  
fasten = .....  
tube = .....  
peak = .....  
layer = .....  
lid = .....  
hammer = .....  
flow = .....  
boil = .....  
funnel = .....  
sip = .....  
quantity = .....  
blow = .....  
dropper = .....  
squeeze = .....  
exert = .....  
punch = .....  
pull = .....  
case = .....  
observe = .....  
candle = .....  
raise = .....  
remove = .....  
discuss = .....

release = .....  
escape = .....  
explanation = .....

### 3. Vocabulary Test: Maths

Name: ..... Class:.....

semicircle = .....  
centre = .....  
radius = .....  
diameter = .....  
circumference = .....  
line segment = .....  
join = .....  
pass = .....  
infinite = .....  
chart = .....  
equal = .....  
compass = .....  
medium = .....  
length = .....  
conclusion = .....  
square = .....  
coin = .....  
circular = .....  
object = .....  
measure = .....  
threat = .....  
dotted = .....  
wheel = .....  
distance = .....  
sprinkler = .....  
stake = .....  
outline = .....  
surface = .....  
equation = .....  
hurricane = .....  
rope = .....  
estimate = .....  
calculator = .....  
parallelogram = .....  
complete = .....  
similar = .....  
explain = .....  
solve = .....  
affect = .....  
decoration = .....  
discover = .....  
cup = .....  
tray = .....  
tambourine = .....  
cello tape = .....  
shape = .....  
investigate = .....

ancient = .....  
carpet = .....  
relation = .....

## APPENDIX VIII

### LESSON PLANS (lessons' objectives and activities)

#### 1. Lesson Plans for Geography

##### **Unit: Brazil**

Based on: Aspros, Savvas, & Efthimiou, George (1995). Geography. Grades 3-6. Teacher's Book, and Aspros, Savvas, & Efthimiou, George (2003). I get to know the world: Africa – America – Asia – Oceanis. Grade 6.

##### **Lesson 1**

##### Objectives

##### (a) Content

Students should be able to

-identify Brazil on the map and report its geographical relation to other continents and Cyprus

-identify on the map Brazil's nearby countries, capital, towns, nearby ocean, the Equator and the Tropic of Capricorn

-compare Brazil's population density with that of nearby countries and Cyprus.

-investigate Brazil's physical environment using the map

-observe and reproduce a drawing related to Brazil's physical environment, mime physical characteristics of the ground (psychomotor domain)

-compare Brazil's physical environment with that of Cyprus

##### (b) Language

Ask for and report information about Brazil's geographical position and population density

Listen for main ideas

Read and write about nearby countries, capital, nearby ocean, physical environment

New vocabulary: population, density, environment, Equator, continent, south, east, west, north, Capricorn, city, ocean, overpopulated, plain, basin, plateau, coastal, map, income

##### Activities

1. Attract students' attention. They look at pictures and guess the country they are going to study. Brainstorming follows.

2. Mention the content and relevant language objectives. Provide an advance organizer to illustrate new content.

3. Students recall prior knowledge e.g. the continents (locate Brazil in relation to other continents).
4. Task: Search the world's map in order to find the correct direction of the continents and Cyprus in relation to Brazil.
5. Task: Search the map (School World Atlas: pp.44-45) to find Brazil's nearby countries, capital, towns, nearby ocean, the Equator and the Tropic of Capricorn. They place these on an empty map (Students' handouts, activity 1).
6. Match the names of countries, towns, ocean etc. with the correct place on a map.
7. Play 'tennis' to review new content. Children are divided into two teams. They get one point for each nearby country, ocean and city they report. Pupils use their response boards in their groups. Feedback is provided.
8. Task: Study a chart illustrating medium density of population and annual head income, and compare Brazil with other countries.
9. Task: Study a map (SWA, p.44) to investigate Brazil's physical environment (Students' handouts, activity 2. They find the Amazon basin, 3 plateaus, plains). They gap fill a paragraph. Simple drawings are drawn to illustrate the meanings of words.
10. Some children come out in front of the class. They represent a mountain, a plain and a plateau.
11. Task: They compare with the physical environment of Cyprus.
12. Review new content: Brazil's geographical position, population density, and physical environment.
13. Review game - running race: children answer questions related to the physical environment of the country: a) It covers half Brazil: The Amazon basin, b) North of the country: Plateau...Guyana . They move one step towards the end for each correct response. Children use the response boards in their groups.
14. True/False statements: Students respond using the thumbs up/down technique: The Amazon basin is the smallest of the world (False).
15. Children get up when they hear a correct statement: There are plains near the ocean (True).
16. Pupils choose one sentence to gap-fill: a) There are ...plateaus in Brazil, b) The ...river crosses the ....
17. They match words with pictures: continent, Equator, plains, plateau, Tropic of Capricorn
18. Language focus: a) picture labeling: the teacher shows a drawing of Amazon basin and the students report what it represents b) word anagram: plains c) I spy a word beginning

with p: plateau d) spelling game: they guess the letters of the word ocean f) Play noughts and crosses: groups take turns to choose words from nine boxes and form sentences. The winner is the group that makes sentences for three continuous words g) Match words with definitions.

19. Read a list with new vocabulary

20. Enter information about Brazil's towns and physical environment in writing journals in diagrammatic form.

## **Lesson 2**

### Objectives

#### (a) Content

-find information about the Amazon basin – Amerindians

-examine the role of the Amazon: flora and fauna, explain how the climate affects the flora, fauna and life of people.

-compare flora and fauna of the Amazon basin with those found in Cyprus.

- find out about natural environment destruction, realize the negative impact of natural environment destruction and criticize destruction mentioning its consequences.

- realize the efforts put by the international community to save the forests of Amazon.

Express opinions on the topic (affective domain)

-find information about Brazil's climate, using maps

-compare with the Mediterranean climate

#### (b) Language

Ask and report information about the Amazon and Brazil's climate

Listen for main ideas and details

Read and write about environment destruction and efforts to save the forests

New vocabulary: flora, fauna, natural, destruction, efforts, protect, navigable, rainfall, biotope, heat, humidity, mosquitoes, transmit, fever, hut, jungle, tropical, forest, species, plants, cypress, almond tree, reptile, mammal, information, underground, government, exploit, cultivate, land, climate, region, develop, wealth, temperature, consequences

### Activities

1. Review vocabulary.

2. Attract students' attention. Show a picture of the Amazon forest. Brainstorming.

3. Mention the objectives.

4. The students recall prior knowledge e.g. locate Brazil on map. Ask: 'Have you ever seen a forest?'. Provide an advance organizer to illustrate new content.
5. Task: They read a text to find information about the Amazon basin (Students' handouts, lesson 2, Activity 3a). Then, they identify true or false statements. Children get up when they hear a correct statement.
6. Task: They read a text (in pairs) to find information about the Indians in the Amazon (Students' handouts, activity 3b).
7. Students examine the role of the Amazon. Task: they look at the SWA p.46 and pictures (map showing global distribution of forests, and pictures showing tropical forests and other plants) to find information about the flora of the basin: tropical forests, 55000 species of plants (Students' handouts, activity 4a).
8. Task: They compare with the flora found in Cyprus (Cypress, olive trees, almond trees)
9. Task: They look at pictures to report fauna (animals) found in the Amazon basin: amphibians, birds, mammals, reptiles (Students' handouts, activity 4b).
10. Task: They compare with fauna found in Cyprus (agrino, donkey, goat, rabbit)
11. They read a text (in pairs) about natural environment destruction in the basin and criticize its consequences. They gap fill a paragraph, unscrambling the target words (Students' handouts, activity 4c).
12. Think possible solutions to the problem of natural destruction. Then they read a related text. State whether some statements are true or false (Students' handouts, activity 4d).
13. Sing rhythmically: 'Create parks to protect flora and fauna'.
14. Oral review of material covered: flora, fauna, destruction of forests, ways to protect the forests. Groups respond on their boards.
15. Pupils study 3 maps: SWA p.2 (climate) and p.46 (temperature and rainfall in Brazil) to find information about Brazil's climate. They choose correct words to form sentences: The climate is tropical. It is hot with high temperatures and rainfalls (Students' handouts, activity 5). They compare with the climate in Cyprus (hot dry summer and cool winter)
16. Study a table showing temperature and rainfall in January and July and compare Brazil with Cyprus (In January it is colder in Cyprus than in Brazil, it rains much more in Brazil. In July it rains in Brazil but it doesn't rain in Cyprus).
17. Review game-football. Each team gets one point for each correct answer they provide related to Brazil's climate: a) In Brazil it is ...(hot) with high temperatures and rainfalls, b) The climate in Brazil is ...(tropical).

18. They choose one sentence to gap-fill: a) Most rain falls in the...(basin), b) It doesn't rain often in the ...(northeast) area of Brazil, so it is not ... (developed).
19. Review information about Brazil's climate, the Amazon basin, flora and fauna, natural environment destruction, and efforts to save the forests.
20. True/False statements: Students respond using the thumbs up/down technique: 'It never rains in the Amazon basin' (false).
21. Children get up when they hear a correct statement: 'People cut trees to build houses in the Amazon' (true).
22. Match new words with pictures: rainfall, biotope, humidity, navigable, reptile, cultivate, high temperature.
23. Language focus: a) pictictionary. The teacher makes a drawing on the board. Some clues are given for the word 'biotope' and students guess the word, b) I spy a word beginning with f (flora), c) picture labeling (natural environment destruction), d) word anagrams (fauna), e) spelling game (rainfall), f) match words with definitions (animals-fauna, plants-flora), g) bingo with the words: flora, Amazon, fauna, biotope, reptiles, heat, cut, build, create.
24. Read the list with the new vocabulary (the list includes vocabulary learned at previous lesson).
25. Enter information in writing journals: flora (tropical forests), fauna (birds etc), destruction (cut, burn), forest protection (parks).

### **Lesson 3**

#### Objectives

##### (a) Content

- identify productive resources of Brazil (forest wealth, agriculture, farming, minerals, industry)
- explain how minerals of the country enabled the development of industry.

##### (b) Language

Ask and report information about Brazil's productive resources

Listen for main ideas and details

Read and write about productive resources

Complete a Venn diagram comparing the products of Brazil, Cyprus, and Egypt

New vocabulary: resources, industry, agriculture, farming, mineral, product, depend, timber, trunk, barren, cereals, carob, citrus, tobacco, sugar cane, poultry, ox, frozen, copper, coal, borrow, debt, hydroelectric, textile, convert, external,

## Activities

1. Students recall prerequisite content knowledge (physical environment, climate, Amazon basin). Recall vocabulary.
2. Attract attention - Brainstorming about climate and products.
3. Report objectives. Provide an advance organizer to illustrate new content.
4. Children identify productive resources.  
They match pictures with words related to forest wealth: timber, caoutchouc (Students' handouts, activity 6a)
5. They name agricultural products, using a map (SWA, p.44). Students unscramble target words and write them under the right picture. They read a text (in pairs) to find out more information (Students' handouts, activity 6b).
6. They compare with agricultural products of Cyprus: cereals, olives, carobs, almonds, potatoes, citrus.
7. They arrange on a venn diagram products of Brazil, Cyprus, and Egypt. They identify similarities and differences.
8. They study a map (SWA, p.44-production) to find out where farming is developed in Brazil and identify farming products of the country. They look at some pictures and unscramble words (Students' handouts, activity 6c).
9. Students unscramble words related to Brazil's mineral wealth and write them under the correct picture (Students' handouts, activity 6d).
10. Review game- basketball. They report things related to forest wealth, agriculture, farming and mineral resources of Brazil.
11. They read a text to find out about borrowing money to finance industries, and Brazil's external debt, identify industrial products of Brazil, and explain why Brazil's industry is now developing. They delete wrong words from sentences (Students' handouts, activity 6e).
12. Sing rhythmically: 'Industries produce cars, textiles, tobacco, and caoutchouc'.
13. Miming the shape of products of Brazil (cars, aeroplanes, textiles).
14. Review new information about Brazil: productive resources (forest wealth, agriculture, farming, minerals, industry), development of industry (oil in Atlantic, alcohol to move cars, produce electric energy).
15. Match words with pictures: timber, tobacco, sugar cane, poultry, copper, textiles, oil.
16. Children choose one sentence to gap-fill related to Brazil's development: a) Brazil produces ....(electric) energy b) Brazil is developing because ...(produces electric energy, found oil in the Atlantic, uses alcohol to move cars).

17. Review game- bowling. They report industrial products. Children use the response boards in their groups.
18. True/False statements. Students respond using the thumbs up/down technique: ‘There is gold in Brazil’ (True).
19. Children stand up if a statement is true otherwise they remain in their seats: ‘There are many farms with cows’.
20. Language focus: a) picture labeling: oil, b) I spy a word beginning with d: diamonds, c) word anagrams: textile, d) spelling game: caoutchouc e) match words with definitions (Agriculture: growing plants, Mineral wealth: getting minerals from the earth).
21. Students read a list with the new vocabulary.
22. Children write about Brazil’s productive resources in writing journals.

#### **Lesson 4**

##### Objectives

##### (a) Content

The students will be able to

- name Brazil’s economic problems, Brazilians’ problems and
- identify the efforts of the government to face them

##### (b) Language

Ask and report information about Brazil’s economic problems

Listen for main ideas and details

Read and write about the problems and the efforts of the government to face them

New vocabulary: public, distribution, discover, habit, resident, plantation, unequal, unemployment, homeless, poverty, neighbourhood, illness, undernourishment, steal, abandon

##### Activities

1. Students recall prerequisite content knowledge (physical environment, products) and vocabulary.
2. Report objectives. Provide an advance organizer to illustrate the content to be covered.
3. Look at the map (p. 133) showing population distribution. They notice that population distribution is not the same everywhere in Brazil. They provide explanations.
4. Students first predict possible problems of overpopulation in the cities and then read a text to find out the reason of low standard of living and related problems. Children

underline problems they identify in the passage. They choose the correct words to form sentences (Students' handouts, activity 7a).

5. They read the second part of the above text to identify the government's efforts to face Brazil's problems. They read some sentences choosing the correct words (Students' handouts, activity 7b)

6. Children choose one sentence to gap-fill: a) Problem in the cities.... (overpopulation, unemployment, poverty), b) Some children don't have a ...(house).

7. Compare life in Brazil with standard of living in Cyprus.

8. Play bingo with words related to problems of Brazilians in the cities: unemployment, poverty, standard, protect, distribution, favelas, underpopulated, population, public.

9. Sing rhythmically: 'Big problems, overpopulation, unemployment, and external debt'.

10. Miming some concepts e.g. poverty.

11. Review information about Brazil's economic problems (external debt), other problems (overpopulation, unemployment, undernourishment, poverty, homeless), and efforts to face problems (Take capital to Brazilia, build public houses).

12. Children match words with pictures illustrating problems in Brazil: undernourishment, overpopulation in Sao Paolo, poverty.

13. Review main points. Play 'tennis' to review new content. Children are divided into two teams. They get one point for each correct answer they give related to Brazil's problems and efforts to save them. Pupils may use the response boards in their groups.

14. True/False statements: Students respond using the thumbs up/down technique: 'All the people in big towns of Brazil are rich' (false).

15. Children get up when they hear a correct statement: 'Some children do not have a bed' (true).

16. Language focus: a) picture labeling: favelas, poor neighbourhoods, b) I spy a word beginning with p: poverty, c) word anagrams: public, d) spelling game: unemployment, e) match words with definitions (unemployment: people can't find a job, undernourishment: people don't have food to eat).

17. Read a list with new vocabulary.

18. Enter information about Brazil's problems in writing journals accompanying words with drawings.

## **Lesson 5**

### Objectives

#### (a) Content

The students will be able to

- give information about the Brazilians' way of life
- identify relations between Brazil and Cyprus – What Cyprus imports from Brazil
- review content material covered.
- synthesize information.

#### (b) Language

Ask and report information about Brazilian's way of life and Brazil's relations with Cyprus

Listen for main ideas and details

Read and write about the way of life and imports

New vocabulary: import, parade, stadium, religion

### Activities

1. Students recall prerequisite content knowledge (Brazil's problems) and vocabulary.
2. Report objectives. Provide an advance organizer to illustrate the content to be covered.
3. Brainstorming about Brazilians' way of life and what Cyprus imports from Brazil.
4. Read a text (in pairs), look at pictures, and unscramble words in order to find out about the characteristics of Brazilians: carnival, dancing, music, football (Students' handouts, activity 7c).
5. Children say rhythmically a sentence related to the characteristics of Brazilians: Brazilians love football, dancing, music, and carnival.
6. They mime what Brazilians like (football, dancing).
7. They indicate relationships between Brazil and Cyprus (imports). They look at pictures and unscramble words (Students' handouts, activity 8).
8. Review information about Brazilians' way of life and what Cyprus imports from Brazil.
9. Play 'tennis' to review new content. Children are divided into two teams. They get one point for each correct answer related to Brazilians' way of life and what Cyprus imports from Brazil. Pupils may use the response boards in their groups. Feedback is provided.
10. True/False statements: Students respond using the thumbs up/down technique: 'Cyprus imports coffee from Brazil' (true).
11. Children get up when they hear a correct statement: 'Cyprus imports aeroplanes from Brazil' (false).

14. Language focus: a) picture labeling: carnival, b) I spy a word beginning with i: imports, c) picture labeling: show a cup of coffee. Children should say 'Cyprus imports coffee from Brazil', c) word anagrams: cocoa, d) spelling game: stadium, f) bingo: carnival, dancing, coffee, football, cocoa, sugar, music, stadium, Pele, g) match word with definition (It has got a brown colour. Cyprus imports it from Brazil: Coffee. The other words are 'wood' and 'chocolates').
15. Read the list with the new words.
16. Enter information about Brazilians' way of life and Brazil's relations with Cyprus in writing journals.
17. They solve a puzzle finding the key content words related to Brazil.
18. True/False game. Children get up when they hear a correct statement: Most people live in the centre of Brazil, Overpopulation and unemployment in the cities cause problems.
19. Pupils choose one sentence to gap-fill: a) Many people from Europe and Asia went to Brazil to find...(gold) and... (diamonds) and to plant ...(sugar cane),...(coffee),...(cotton),...(tea), and ...(caoutouc), b) The...(tropical forests) are in danger.
20. Play the game: 'Who wants to be a millionaire?' Children are divided into two groups. They take turns to answer multiple choice questions related to all the aspects of the country they have learned.
21. Prepare a brochure for travelers to Brazil. They work with the computer to draw a diagram on the Kidspiration programme.

## 2. Lesson Plans for Science

**Unit: Atmospheric pressure (based on the textbook: ‘First steps in Science’,  
Grade: 6, 1996, Ministry of Education and Culture, Department of  
Curriculum Development, Primary Education)**

**Based on:** Kyprianou, Kypros, Loizidou, Popi, Charalambous Pambos, Matsikaris, Giorgos, & Ioannis Yiannakis (1997). First steps in Science. Grade 6. Teacher’s book, and Kyprianou, Kypros, Loizidou, Popi, Charalambous Pambos, Matsikaris, Giorgos, & Ioannis Yiannakis (2000). First steps in Science. Grade 6. Worksheets.

### Lesson 1

**Time allocated: 2X40min**

#### Objectives

##### (a) Content

Students should be able to

-identify experimentally that

- a) the air has weight
- b) the air exercises pressure to all bodies within it
- c) reducing air from a certain space makes obvious the results of air pressure
- d) air pressure is exercised to all directions

-report that air pressure exercised to all bodies within it and to all directions, is called atmospheric pressure

-explain various applications of atmospheric pressure presented to them

-reproduce a drawing to illustrate the above knowledge (psychomotor domain)

##### (b) Language

Ask for and report information

Listen for main ideas

Read and write about atmospheric pressure

New vocabulary: straw, scale, pressure, dough, neutralize, force, deform, prediction, steam, liquefy, reduce, experiment, direction, vapor, sequence, application, suction cup, separate, hook, cardboard, candle, explanation, inflate, remove, discuss, blow, weight

#### Materials

For the groups: ball made of dough, 2 or 3 books or an encyclopedia, bowl of water, 2 glasses, 2 or 3 pieces of thick paper (15cmX15cm), newspapers, napkins

For the class: globe, materials for constructing a simple scale (straight straw, ruler made of wood, nail, 3 pieces of thread 30cm each, 4 equal pieces of cello tape, 2 same balloons, plasticine, 2 pieces of photocopy paper, an empty tin on which two small holes are made on the top, glass with little water, camping-gas, matches, 2 pieces of thick cloth.

### Activities

1. Attract students' attention. The students look at a model globe. They realize that there is air around the Earth, the air surrounds the Earth, and it has various layers.
2. Mention the content and relevant language objectives. Provide an advance organizer to illustrate the content to be covered: air properties-characteristics (air has got weight, it exercises pressures, reducing air from a space can cause deformation of object, air pressure is exercised to all directions), applications of atmospheric pressure.
3. Students recall prior knowledge: It is difficult to realize the existence of the air around us because we cannot see it, touch it, smell it, or taste it. The teacher asks : 'Have you ever seen its results?'. We realize its existence from its results; when the wind blows we feel it on our face, or we see that it moves the leaves or raises dust etc.
4. The teacher asks: 'Has the air got weight?'

The following experiment is demonstrated by the teacher:

A straw is placed horizontally using a nail on the top of a ruler held vertically. A 30 cm long thread is placed on each of its both sides with cello tape. A piece of cello tape is stuck at the end of the two pieces of thread. An empty balloon is stuck on the cello tape. A piece of thread is also stuck on the cello tape to tie the balloon later when it is inflated.

The scale is held horizontally. One of the balloons is inflated and tied with thread. The children observe that the scale is not balanced. They discuss and conclude that the air has weight.

5. Students carry out the following experiment to realize that the weight of bodies is a force exercising pressures. They place some heavy books over a ball of dough in the size of a tennis ball. They observe that the ball has changed its shape. They realize that the books with their weight have exercised pressures on the dough changing the shape of the ball.

6. Children are asked to say whether the pressures which are exercised on a body always cause its deformation. Students participate in/ observe a small experiment in order to find out the answer to the above problem.

The teacher carries out a demonstration in front of the class. Three children come in front of all the students. One of them is holding vertically with both hands a piece of paper. The second child is pressing the paper on one side which is finally torn and distorted. The

same activity is repeated but a third child is pressing the hand of the second child from the other side of the paper. The children observe that the paper is not torn as if no pressure had been exercised on it. A discussion follows to provide an explanation: The first time, the pressure is not neutralized while the second, the pressure which is exercised by the second child is neutralized by the pressure being exercised by the third child on the other side of the paper. So, the force which is exercised by pressure on a body may or may not deform the body.

7. The teacher asks: ‘Can the air deform with its weight the bodies within it?’

Children form hypotheses (since air has weight it should deform bodies, the air may weight little so it may not cause deformation of bodies, it may exercise pressures but may not cause deformations because the forces which cause the pressure are neutralized by other forces). Students deal with the next task to reach an answer.

8. Children watch an experiment. The teacher holds an aluminum tin with two small holes on one side. Students are told that there is air inside and around the tin. A problem is set: ‘What will happen if some air from the inside comes out?’. Students make predictions. The teacher asks how the air inside can get out. Some water is placed in the tin and the tin is placed on fire. As soon as the steam comes out, the teacher turns off the fire and closes the tin’s holes with plasticine, so the steam kicks out some of the tin’s air. The steam gets cold and is liquefied, so there is less air in the tin than before. Children observe that in one or two minutes the walls of the tin are deformed and the tin is crushed. An explanation is provided: The air with its weight is exercising forces on the tin from the inside and the outside. The forces are neutralized. There is a balance so the results of the atmospheric pressure are not obvious. By reducing part of the air from the inside, the pressure in the inside of the tin is reduced and the tin is deformed by the pressure exercised from the outside.

Children discuss and conclude that the air with its weight exercises pressure on the walls of the tin, and that the reduction of the air in the tin shows the results of the air pressure. The teacher mentions that the pressure exercised by the air with its weight is called atmospheric pressure.

9. Play ‘tennis’ to review new content. Children are divided into two teams. They get one point for each correct statement they report including the words weight and deform.

10. A problem is presented: ‘To which direction is the atmospheric pressure exercised?’. Pupils form hypotheses e.g. from the sides because the tin was pressed from the sides, ...from up moving downwards because the atmosphere is over the Earth. An experiment is carried out by the pupils to reach an answer (Students’ handouts, activity 1). The

experiment is carried out over a basin and the children take care not to put water on their books and desks. They fill up a glass with water. They place a piece of thick paper (15cmX15cm) on the glass and then turn it upside down over the basin. They turn the glass to all directions (right, left, up, down). They observe that the paper does not fall and the water is not spilt. They remove the paper and pour the water in the basin. Discussion follows. Some questions are set: Why didn't the paper fall?, Why wasn't the water poured?, Which pressure held the paper on the glass?. Children provide explanations e.g. The wet paper stuck on the glass..., Perhaps the air under the paper pressed the paper on the glass..., the atmospheric pressure pushed the paper.... 'To which direction did the atmospheric pressure push the paper?'... To all directions because the paper doesn't fall when the glass was turned up, down, left and right. Children are led to the conclusion that the atmospheric pressure is exercised to all directions (examples are provided: south, east, north, west, together with arrows).

11. Four children come out in front of the class. They represent air and they have to move to the correct direction.

12. Sing rhythmically: The air has weight, it exercises pressures to all directions.

13. Children match words related to air/atmospheric pressure experiments with pictures on the board: neutralized, all directions, reduce air, weight.

14. Children are given a handout (Students' handouts, activity 2) and are called to number the pictures in order to show the correct order with which the experiment with the tin was carried out.

15. They gap fill a paragraph. Two texts are given, one having more gaps: a) When the air in the tin is ...(warmed), it is ...(reduced). The...(pressure) outside is greater and it ...(deforms) the tin, b) The ...(air) exercises pressures on bodies.

16. Students look at some applications of the atmospheric pressure and they provide explanations (Students' handouts, activity 3) e.g.

a) When a suction cup is pressed on a wall, part of the air from the inside of the suction cup is released, and the atmospheric pressure presses the outside part of the suction cup holding it on the wall.

b) The pressure which is exercised by pushing one suction cup towards another one, dispels part of the air between the two suction cups and the atmospheric pressure which is exercised from the outside does not allow them to separate apart easily.

c) The flame coming from the cotton warms the air inside the bottle forcing part of it to leave the bottle. So, when the flame is extinguished, the atmospheric pressure presses the banana to get inside the bottle.

d) The suction cups on the octopus's tentacles act in the same way as the suction cups. When the octopus presses a suction cup on a rock, then the water under the suction cup is pushed out. The hydrostatic pressure of the water holds the suction cup on the rock. The octopus's suction cups work in the same way outside water. In this case, the air under the suction cup is pushed out and the suction cups are stuck on an object because of the atmospheric pressure of the air.

17. Reviewing information about air (characteristics with examples e.g., air has weight – the inflated balloon is heavier than the one that is not inflated, air exerts pressure which may or may not deform - children pushing a piece of paper, air reduction- warming an aluminum tin causes its deformation by the outside pressure, atmospheric pressure is exerted to all directions - covered glass filled with water turned to all directions). Applications are reported: the results of the atmospheric pressure become obvious when the air is reduced or pushed out from a certain space.

18. Review game - running race: children answer questions moving one step towards the end for each correct response: a) The pressure exerted by the air is called...(atmospheric), b) Tell us one application of atmospheric pressure, c) When the air pushes our body, it is not deformed because our inside pressure ...(neutralizes) the outside pressure. Children use the response boards in their groups.

19. True/False statements: Students respond using the thumbs up/down technique: 'The banana slips in the bottle because the air in the bottle warmed it' (false).

20. Children get up when they hear a correct statement: 'The suction cup stays on the wall because there is not much air under it. So, the outside pressure presses it' (true).

21. Language focus: a) pictorial: the teacher shows a target concept and the students report what it represents: atmospheric pressure, b) I spy a word beginning with d (deform/directions), c) picture labeling: The air has weight d) word anagrams: deform e) spelling game: pressure f) bingo: air, weight, reduce, deform, directions, suction cup, pressure, banana, octopus, g) match word with definition: atmospheric pressure can cause this when the inside pressure of an object is small - deformation ( the other words are neutralization, reduction, exercise).

22. Children read a list with the new vocabulary.

23. Enter information about atmospheric pressure in writing journals.

## **Lesson 2**

**Time allocated: 2X40min**

### Objectives

(a) Content

Students should be able to

-identify experimentally that

- a) the atmospheric pressure exercises great forces
- b) the higher we go, the greater is the reduction of atmospheric pressure

(b) Language

Ask and report information about atmospheric pressure

Listen for main ideas

Read and write about atmospheric pressure, and what happens when we go higher.

New vocabulary: raise, immerse, vessel, fasten, tube, peak, layer, lid, hammer, flow, exert, punch, pull, case, observe

### Materials

For the groups: plastic bag, 50 cm thread, glass or plastic 1L container, 2 elastic bands, testing pipe, straw, plasticine, matches, candle, glass with coloured water, 2 same balls of dough (tennis ball size), 4 or 5 books, small tin container with holes and plastic or metallic lid which closes, bowl of water

For the class: hammer, nail

### Activities

1. Attract students' attention. The students look at a model globe. They are challenged to talk about the atmospheric pressure.
2. Mention the content and relevant language objectives. Provide an advance organizer to illustrate the content to be covered: a) the atmospheric pressure exercises great forces, and b) the higher we go, the greater is the reduction of atmospheric pressure.
3. Pupils recall prior content knowledge: The air has weight, the air exercises pressures with its weight to the bodies within it to all directions, the air pressure is called atmospheric pressure, and the results of the atmospheric pressure become obvious when the air is reduced or pushed out from a certain space.
4. The teacher informs the students that they will find out how strong the forces exercised by the atmospheric pressure are. Pupils deal with Task 4 (Students' handouts, activity 4). They tie with thread the under part of a plastic bag and they turn it inside out so as to have the thread in the bag. They put the plastic bag in a vase made of plastic or glass and a child blows in the vase in order to force the bag to touch the inside walls of the vase. They fasten the bag on the end of the vase using elastic bands. They pull the thread and observe that it is impossible to pull the bag out of the vase. Then, they take out the elastic bands and the plastic bag and make holes on it using a pencil. They place the bag back and fasten

it with elastic bands. When they pull again they notice that the bag comes easily out of the vase.

Students are called to provide explanations. The teacher asks questions in order to focus pupils' attention on the fact that by pulling the thread in the first case, it seemed that there were two spaces with air in the vase: inside the bag and under the bag.

- In the first case, when we pulled the thread, what happened to the air under the bag? It became thinner, denser or stayed the same? (thinner because by pulling the space got bigger)
- What happened to the pressure exercised by the air which got thinner? (pressure is less)
- Where does the air exercise more pressure inside or under the bag? (inside the bag)
- Why do you think you couldn't pull the bag out of the vase? (because the air inside the bag was exercising greater pressure than the pressure of the thinner air underneath)
- Why did you pull easier the bag out of the vase in the second case? (because we made holes and the air pressure in the bag was the same as outside the bag)

Children are led to the conclusion that the atmospheric pressure can exercise great forces.

5. Students read the question of the second part of Task 4 (Students' handouts, activity 4). Does the air around us press our body? They discuss with the teacher and conclude that the air presses our body from the outside with great strength and that the inside pressure of our body neutralizes the atmospheric pressure so we don't feel it.

6. Play 'football' to review new content. Children are divided into two teams. They get one point for each correct answer: a) What can the atmospheric pressure exercise? (great forces), b) Why don't we feel the air pressure? (the inside pressure of our body neutralizes the atmospheric pressure). Feedback is provided.

7. Students carry out an experiment (Students' handout, activity 5). Each group has a test pipe and some drops of water. The pipe is closed with plasticine, through which a straw passes. One child of the group holds the upper part of the pipe, warming with a candle the under part for one minute. In this way, part of the air inside the pipe is pushed out through the straw because of dilation. The child turns the test pipe upside down by holding it from the upper part. The end of the straw is immersed in a glass with coloured water. Children report their observations:

- The water got in the straw.
- The water moved upwards and got in the test pipe.
- Water is running from the straw.

Discussion follows, evaluating evidence data:

- When we warmed the pipe, the water vapor pushed out part of the air in the pipe. The air in the pipe became thinner.
- When the end of the straw was immersed in water the outside pressure pushed the water of the glass to get in the straw where the pressure was lower.

8. The teacher asks whether the atmospheric pressure is the same everywhere or changes depending on the height e.g. Will a body which is in Limassol that has almost the same altitude with the level of the sea accept the same atmospheric pressure when transferred to a higher altitude e.g. on Troodos peak?

Students carry out an experiment (Students' handouts, activity 6.1) in order to understand that the higher we go, the less atmospheric pressure there is. They place one of two same balls which are made of dough under a book and the other under three or four books. Then, they raise the books and observe that the ball under the three or four books was pressed and deformed more than the other. They conclude that the greater the weight over a body, the greater the pressure exercised on it.

Students observe a picture and provide an explanation (activity 6.2). They discuss that in higher places such as the peak of a mountain, the atmospheric pressure is reduced because there are less layers of air pressing with their weight over the bodies. They conclude that the higher we go, the greater is the reduction of atmospheric pressure.

9. Groups try to find a way to force the water run out of a punctured container (Students' handouts, activity 7). Children immerse a punctured pot in a basin filled with water and observe that the water does not run out of the pot. A question is set: 'How can you make water run normally out of the pot without removing the lid?'

They make suggestions-hypotheses e.g., a hole has to be made in the lid.

The teacher uses a hammer and a nail to open a hole on the lids. Students observe that the water is now running and that the water flow is stopped each time they close with their finger the lid's hole.

Students are asked to provide explanations. A discussion follows leading to the conclusion that the hole in the lid allows the air to get in the pot so as to exercise normal atmospheric pressure and press the water out of the pot's holes.

10. Some children come out in front of the class. They represent atmospheric pressure.

11. Review information about air pressure (characteristics with examples): a) the atmospheric pressure exercises great forces, and b) the higher we go, the less pressure there is.

12. Sing rhythmically: The higher we go, the less pressure we can feel.

13. Children match words related to atmospheric pressure experiments with pictures: less layers of air, little atmospheric pressure, great atmospheric pressure.
14. They gap fill a paragraph. Two texts are given, one having more gaps: a) The atmospheric pressure exercises... (great forces) but the ...(higher) we go, the ...(less) pressure we can feel b) On the top of a mountain there is ...(little) atmospheric pressure.
15. Review game - running race: children answer questions moving one step towards the end for each correct response. Children use the response boards in their groups: a) (Remind the experiment with the water that cannot run out of the tin) The water is not running because ....(the outside pressure is pressing) b) If we open a hole the water can run because...(the outside pressure will force water to run).
16. True/False statements: Students respond using the thumbs up/down technique: 'Mr Brown is very strong because he doesn't feel the atmospheric pressure' (false).
17. Children get up when they hear a correct statement: 'When we drink a milkshake in Platres we accept less pressure than when we drink it in Paphos castle' (true).
18. Language focus: a) pictiary: the teacher draws a target concept and the students report what it represents (great atmospheric pressure) b) I spy a word beginning with l (layers) c) production exercise – picture labeling (the outside pressure pushed the water in the straw where the pressure was lower) d) word anagrams (tube) e) spelling game (force) f) bingo (raise, immerse, vessel, layer, tube, lid, hammer, flow, press) g) Gap fill with appropriate word (When we...the air in the bottle, it escapes and becomes thinner – warm. The other words are 'wash' and 'blow').
19. Read a list with the new vocabulary.
20. Enter information about atmospheric pressure in writing journals accompanying words with drawings.

### **Lesson 3**

**Time allocated: 2X40min**

#### Objectives

##### (a) Content

Students should be able to

- explain various phenomena caused by air pressure
- interpret real life applications related to atmospheric pressure
- construct a simple barometer and explain how it works
- reproduce a drawing of a barometer (psychomotor domain)
- express opinions about the importance of this knowledge (affective domain):

applications in the kitchen, predicting weather etc.

(b) Language

Listen for main ideas

Report applications of atmospheric pressure

Read and write about applications of atmospheric pressure

New vocabulary: boil, funnel, sip, quantity, dropper, squeeze, release, escape

Materials

For groups: funnel, piece of photocopy paper, aluminum foil, alcohol, cotton, dropper, two glasses (one filled up with water),

For the barometer: glass bottle, plasticine, plastic straw, paper (15X1,5cm), candle, matches, glue, jam vase, coloured water

For the class: a pair of tweezers, matches, cotton in alcohol, bottle, boiled clean egg, piece of thick cloth, balloon.

Activities

1. Attract students' attention. The teacher shows a 'magic' bottle and a boiled egg (without the shell) and asks the students: 'Can the egg get in the bottle?' (no because the bottle's mouth has a smaller diameter than the diameter of the egg). An unsuccessful effort to put the egg in the bottle is made and the teacher mentions there is a way to put the egg in the bottle without crushing it.

2. Mention the content and relevant language objectives. Provide an advance organizer to illustrate the content to be covered: a) explain various phenomena caused by air pressure, b) interpret real life applications related to atmospheric pressure, and c) construct a simple barometer and explain how it works.

3. The students recall prior content knowledge: a) It is difficult to realize the existence of the air around us because we cannot see it, touch it, smell it, or taste it. However we realize its existence from its results; when the wind blows we feel it on our face, or we see that it moves the leaves or raises dust etc, b) the atmospheric pressure exercises great forces c) the results of the atmospheric pressure are obvious in the cases where the air is reduced from a certain space, d) the higher we go, the greater is the reduction of atmospheric pressure.

4. Students observe an experiment with a bottle and an egg. The teacher uses a pair of tweezers to hold a piece of cotton on which some alcohol is poured. The cotton is lit and thrown in the bottle. As soon as the flame is put out, the egg is placed on the bottle's

mouth. Children observe that the egg is entering slowly in the bottle because the air in the bottle is warmed by the flame and part of it is pushed out, before the egg is placed on the bottle's mouth. So, there is lower pressure in the bottle and the atmospheric pressure pushes the egg inside. Students may ask: 'Why did this happen?'. They form hypotheses. They can understand the reason by carrying out the next task.

5. Pupils carry out an experiment (Students' handouts, activity 8.1). They hold a funnel downwards with their mouth on the narrow side and they close the other side with a piece of photocopy paper. The students sip while removing their hand from the piece of paper. They observe that the piece of paper is absorbed inside the funnel and is held for a while on the lips of the funnel. A discussion about the results follows and an explanation is provided: the inside pressure is reduced because the children sip the air from the funnel, so the atmospheric pressure pushes the piece of paper inside the funnel.

The students compare the results of the funnel and egg experiments. They report that just as the quantity of air in the funnel is reduced by sipping, the same happens to the quantity of air in the bottle by expelling the warm air. In both cases, the difference of air pressure is the cause of what happens.

The pupils are led to the conclusion that when part of the air in a certain space is reduced, then the air pressure in this space is also reduced and the result is that the atmospheric pressure is exercising greater pressure.

6. The teacher carries out a demonstration to help the children understand better the phenomena caused by differences in air pressure. A balloon is blown up. Its mouth is tied up loosely, and the balloon is pressed by the teacher's hand. The air comes out of the balloon. An explanation is given: that the air which is inside the balloon has more pressure than the air outside the balloon. So, the air in the balloon moves outside due to greater inside pressure to space which has less pressure.

7. Some children come out in front of the class. They represent how low and high atmospheric pressure react.

8. Sing rhythmically: When air is reduced, then pressure is reduced.

9. Students try to transfer some water from one glass to another using a dropper and discuss about how the dropper works (Students' handouts, activity 8.2): We press the plastic part of the dropper to push the air out. We immerse the dropper in a glass of water and release the plastic part. The dropper is filled with water. Discussion follows and children explain that the plastic part is pressed to push out the air. The little air in the dropper exercises little pressure. When the ending of the dropper is immersed in the water

and we stop pressing the plastic part, the atmospheric pressure pushes the water to enter the tube of the dropper.

11. Game: Children play basketball to review content related to differences in air pressure. Groups get points for correct answers: a) Which pressure was reduced? (funnel experiment) inside b) Where can you see more pressure if you press the balloon? (inside).

12. Children interpret real life applications related to the atmospheric pressure (Students' handouts, activity 9). Students provide explanations. They are expected to provide the following answers with the help of the teacher:

a) The juice box is deformed because when the boy keeps sipping air, the pressure in the box is reduced and the atmospheric pressure pushes the walls of the box inside.

b) The reason someone opens two holes on a tin, is to allow the air entering from one hole to exercise normal atmospheric pressure and push the milk from the other hole.

c) Big water containers have two holes for the same reason.

d) When a sucker is pressed on a table, the air under the sucker escapes, so the atmospheric pressure holds it tied on the table.

e) When a child starts sipping, the liquid level moves downwards. This reduces the air in the bottle and therefore its pressure. The reduced pressure cannot push the drink to the child's mouth.

f) The bottle is indented because the outside pressure is greater than the inside pressure.

13. Reviewing information about forces exercised by air pressure (we saw phenomena caused by atmospheric pressure, we saw real life applications, and we'll see how we can make a barometer).

14. The teacher reports that children can later make a barometer.

15. Play 'football' to review new content. Children are divided into two teams. They get one point for each correct answer: a) Why can't the boy sip? (low pressure) b) Why do we press the dropper? (Push the air out – little pressure inside and the water comes in)

16. Children match words related to forces exercised by atmospheric pressure with pictures: reduced pressure, atmospheric pressure pushes.

17. They gap fill a paragraph. Two texts are given, one having more gaps: a) Water vessels usually have ...(two) holes. ...(Atmospheric pressure) enters from ... (one hole) and ...(pushes) the water to ...(the other) b) The ...(atmospheric pressure) can help us to pour milk from a tin when we open ...(two) holes.

18. Review game – bowling: children answer questions knocking down one bottle for each correct response. Children use the response boards in their groups: a) The suction cup can lift a table because the ...(air) escapes, so the atmospheric pressure can hold it on the table

b) The bottle was filled up in Platres. Now, the girl is in Nicosia. It is deformed because the outside pressure is ... (pushing the bottle)

19. Game: Who wants to be a millionaire: Groups take turns to give answers to multiple choice questions.

21. Language focus: a) pictorial: the children look at a picture and say what it is: barometer b) I spy a word beginning with e (escape) c) picture labeling: they look at a picture and describe it: atmospheric pressure is pushing the egg in the bottle c) word anagrams: outside d) spelling game: dropper e) bingo: boil, dropper, funnel, quantity, explanation, release, escape, observe, sip f) Match words with definitions: It helps us to push air out and take water from a glass – dropper ( the other words are ‘funnel’ and ‘barometer’).

22. Read a list with the new vocabulary.

23. Enter information about what can be caused by atmospheric pressure in writing journals. Draw some applications.

24. The teacher shows how a barometer works. Extra activity: Children can make a simple barometer using a bottle, a plastic straw, plasticine, and cardboard (Students’ handouts, activity 10) illustrating changes of the atmospheric pressure which can happen any minute. When the atmospheric pressure is raised, then the water level in the straw is moving upwards.

### 3. Lesson Plans for Maths

**Unit: Circle (based on the textbook: ‘Mathematics’, Grade: 6, 2006, Ministry of Education and Culture, Pedagogical Institute, Department of Curriculum Development, Primary Education, by Pantziara, Marilena, & Alexandrou-Leonidou, Vasiliki (2006).**

#### **Lesson 1**

**Time allocated: 40min**

#### Objectives

##### (a) Content

Students should be able to

- identify the centre, radius, diameter, and circumference (periphery) of the circle
- identify the relation between the radius and the diameter of a circle
- reproduce a drawing to illustrate the above knowledge (psychomotor domain)

##### (b) Language

- speak about elements of the circle
- New vocabulary: centre, radius, diameter, circumference, line segment, join, pass, infinite, chart, equal, conclusion, circular, measure, wheel, complete, square

#### Activities

1. Attract students’ attention. Ask pupils to mention any circular objects they can see or have met.
2. The teacher mentions the content and relevant language objectives. Provide an advance organizer to illustrate the content to be covered: circle, its centre, radius, diameter, circumference, the relation between the radius and the diameter of a circle, and drawing a circle, its radius and diameter.
3. Recall prior knowledge:  
The teacher asks : ‘Have you seen the wheel of a bike? What has it got? (Radii)
4. The teacher asks children to work with task A (Maths- Students’ handouts, Lesson 1, activity A). They use their ruler and compass to draw a line segment which joins the centre of the circle with a point on the circle’s circumference. The teacher tells the students that this line segment is called the radius of the circle.
5. Students work with task B (Maths- Students’ handouts, Lesson 1, activity B). They use their ruler to draw a line segment which joins two points of the circle’s circumference, passing through the centre of the circle. The teacher tells the pupils that the line segment

joining two points of the circle's circumference, passing from the centre of the circle is called diameter of the circle.

6. Children work in pairs to answer the questions of task C (Maths-Students' handouts, Lesson 1, activity C): How many diameters has a circle got?, How many radii has a circle got?. The answer to both questions is 'too many, or infinite'.

7. Play 'tennis' to review new content. Children are divided into two teams. They get one point for each correct answer. Feedback is provided: a) Show the centre (in a circle), b) Show the circumference, c) Draw a radius, d) Draw a diameter

8. Pupils are allowed through inquiry learning to discover the relation between the radius and the diameter. They look at the radius and diameter they have drawn and hypothesize e.g. that the radius has half the length of the diameter. They are asked to deal with task D asking them to measure the radius and diameter of some circles, using their ruler (Maths-Students' handouts, Lesson 1, activity D). Then, they have to enter their measurements in a table. Pupils study the table and write their observations (Maths- Students' handouts, Lesson 1, activity E). They form the conclusion that the diameter of each circle is two times its radius. They reach the relevant generalization.

9. Children show the diameter using both of their hands and the radius, using one of their hands.

10. Sing rhythmically: Two times the radius gives the diameter.

11. Children match words with drawings illustrating the circle's centre, radius, diameter, circumference. They complete the equation:  $\text{diameter} = 2 \times \text{radius}$ .

12. Students gap fill a paragraph; Two texts are given, one having more gaps: a) The ...(radius) joins the centre of the circle and a point on the circle's circumference, b) The radius of a circle is a straight line drawn from the ... (centre) of the circle to any point on its ....(circumference).

13. The following points are reviewed: identifying the circle's centre, radius, diameter, circumference, and that the diameter is two times the radius.

14. Review information about the circle: centre, radius, diameter, circumference, relation between radius and diameter, draw a circle, a radius and a diameter.

15. Review game - running race: children answer questions moving one step towards the end for each correct response: a) The periphery of the circle is called ...(circumference), b) This line joins two points on the circle's circumference and passes through the centre ...(diameter). Children use the response boards in their groups to answer.

16. True/False statements: Students respond using the thumbs up/down technique: The radius is two times the diameter (false).

17. Children get up when they hear a correct statement: Two times the radius equals the diameter (true).
18. Pupils identify differences between the circle and the square. They place them on a venn diagram.
19. Language focus: a) pictorial: the students are shown a drawing and they say what it is (diameter), b) picture labelling (the diameter is two times the radius) c) I spy a word beginning with c...(circumference), d) word anagrams (radius) e) spelling game (centre), f) match words with definitions ( it joins two points of the circumference and passes through the centre of the circle - diameter, from the circle to the circumference – radius (the other word is centre), g) bingo: radius, diameter, circumference, centre, join, line segment, measure, pass, circular.
20. Children solve a circle crossword answering questions related to the parts of the circle.
21. Read the list of new words.
22. Draw a circle and enter information in writing journals in diagrammatic form accompanying words with pictures.

## **Lesson 2**

**Time allocated: 40min**

### Objectives

#### (a) Content

Students should be able to

- draw a circle using the compass
- draw a circle when given the radius or diameter (psychomotor domain)
- solve problems related to calculating the diameter

#### (b) Language

- Listen and read problems related to content
- Write and report answers
- New vocabulary: compass, length, coin, object, solve, decoration, relation, shape

### Activities

1. Attract students' attention. Show a compass and use it to draw a circle on the board.
2. The teacher mentions the content and relevant language objectives. Provide an advance organizer to illustrate the content to be covered: draw a circle using the compass, draw a circle when given the radius or diameter (psychomotor domain), solve problems related to calculating the diameter.

3. Recall prior knowledge: circle, centre, radius, diameter, circumference, the radius is half the length of the diameter.
4. The teacher asks children to work with task A (Maths – Students’ handouts, Lesson 2, activity A). They use their ruler and compass to draw two circles; the first should have a 3cm radius, while the second a 4cm diameter.
5. Students work with task B (Maths – Students’ handouts, Lesson 2, activity B). They have to solve a problem related to calculating the diameter: A parking meter will be set up in a parking place. People can put 20cent and 10 cent coins. The opening of the coin slot for each coin will be 2mm bigger than their diameter. Pupils have to help the machine designer to complete the table.
6. Children work in pairs to deal with task C (inquiry learning) (Maths – Students’ handouts, Lesson 2, activity C). : constructing circles in order to investigate the relation between the radius and the diameter: Use only your compass to draw the following shapes. Compare the length of the radius of the small circles to the radius of the big circle and write your observations. Pupils should reach the conclusion that the length of the radius of the small circles is half the length of the radius of the big circle. They reach the relevant generalization.
7. Children show the diameter using both of their hands and the radius, using one of their hands.
8. Pupils play ‘football’ to review new content. They are divided into two teams. They get one point for each correct answer: a) A circle has a 6 cm diameter. How can you draw it? (3 cm radius), b) A coin has a 10 mm radius. The opening of the coin slot is 3 mm bigger than the coin. How big is the opening? (23 mm).
9. Sing rhythmically: Radius plus radius gives the diameter.
10. Children match words related to the circle’s centre, radius, diameter and circumference with simple drawings.
11. Students gap fill a paragraph. Two texts are given, one having more gaps. Children choose which one to complete: a) We use a ...(compass) to draw a circle. If the circle has a ...(6 cm) diameter, then its radius is ...(3 cm), b) I use a ...(compass) to draw a circle.
12. Reviewing information about the circle.
13. The following points are reviewed: identifying the circle’s centre, radius, diameter, circumference, and that the diameter is two times the radius.
14. Review game - running race: children answer questions moving one step towards the end for each correct response. They use the response boards in their groups: a) Draw a

circle with a 10 cm diameter. How much did you open the compass? (5 cm), b) Draw a circle with a 3,5 cm radius. What is the diameter? (7 cm).

15. True/False statements: Students respond using the thumbs up/down technique: If the diameter is 11 cm, then the radius is 22 cm (false).

16. Children get up when they hear a correct statement: If the radius is 7 cm, then we can draw a circle with a 14 cm diameter (true).

17. Language focus: a) pictorial: the teacher shows a picture and the students report what it represents ( radius), b) picture labeling (the radius is half the diameter), c) I spy a word beginning with c...(circumference), d) word anagrams (diameter), e) spelling game (coin), f) bingo: radius, diameter, circumference, centre, compass, line segment, circle, coin, infinite, g) match word with definition: from the centre to the circumference - radius, it is two times the radius - diameter (the other word is 'centre').

19. Read the list of new words.

18. Enter information about the circle in writing journals accompanying words with pictures.

19. Extra activity. Children are given pieces of colourful papers and they are required to create decorations using circular shapes of different sizes.

### **Lesson 3**

**Time allocated: 40min**

#### Objectives

##### (a) Content

Students should be able to

- estimate the length of a circle
- discover number  $\pi$  after having estimated the circumference of circular objects
- calculate the length of circle circumference when they know the radius
- solve problems related to estimating the length of circle circumference

##### (b) Language

- Listen and read problems related to content
- Write and report answers
- New vocabulary: semicircle, thread, dotted, distance, equation, discover, cup, tray, tambourine, cello tape, ancient

### Activities

1. Attract students' attention. Show various circular objects. Ask children what we can do to find out their circumference.
2. Mention the content and relevant language objectives. Provide an advance organizer to illustrate the content to be covered: estimate the length of a circle, discover number  $\pi$  after having estimated the circumference of circular objects, solve problems related to calculating the length of circle circumference.
3. Students recall prior knowledge: circle, centre, radius, diameter, circumference, the radius is half the length of the diameter.
4. Children work in pairs and deal with task A(Maths-Students' handouts, Lesson 3, activity A) . They bring ten circular objects. They measure their circumference using a piece of thread, and their diameter using a ruler. Then, they write their measurements in a table. They form a conclusion.
5. Pupils look at the measurements of the previous task and write an equation related to the circle circumference (Circumference = Diameter X 3.14) (Maths-Students' handouts, Lesson 3, activity B)  
The teacher gives extra information that the ancient Greeks have studied the relation between the circumference and the diameter of a circle. The quotient of the circumference to the diameter is called 'pi' and is symbolized with ' $\pi$ '.
6. Extra activities: After having discovered the equation above, children solve problems related to calculating the length of circle circumference: a) Children use  $\pi$  to find the length of a dotted line which forms a circle with a 4cm radius, b) They calculate the circumference of a stadium which has two semicircle sides, with a 25 cm diameter, c) The diameters of the wheels of a bicycle are 25 cm and 110 cm. If the bike driver covers a 500m distance how many turns will each wheel do? (Maths-Students' handouts, Lesson 3, activities C.1, C.2, C.3)
7. Children show the diameter and circumference of a circle using their hands.
8. Sing rhythmically: Circle circumference equals 3.14 times the diameter.
9. Play 'basketball' to review new content. Children are divided into two teams. They get one point for each correct answer: a)  $C = \dots \times 3.14$  (diameter) b) If diameter is 2 cm, what is the circumference? (6,28)
10. Children put words in the correct place to form the equation: Circumference = diameter X 3.14.

11. They choose a paragraph to gap fill: a) A circle has a 2 cm diameter. Its circumference is ...cm (6.28 cm), b) A circle has a 2 cm radius. Its diameter is ...and its circumference is ...cm (12.56).
12. Review information about the circle circumference: finding the length of a circle, find the circumference, discover number  $\pi$ , solve problems (calculate circumference).
13. The following points are reviewed: identifying the circle's centre, radius, diameter, circumference equals 3.14 times the diameter.
14. Review game - running race: children answer questions moving one step towards the end for each correct response: a) The diameter is 1 cm. What is the circumference? (3.14 cm), b) The diameter is 10 cm. What is the circumference? (31.4 cm). Children use the response boards in their groups.
15. True/False statements: Students respond using the thumbs up/down technique: If the diameter is 3 cm, then the circumference is 6 cm (false)
16. Children get up when they hear a correct statement: If the radius is 1 cm, then the circumference is 6.28 cm (true).
17. Language focus: a) pictictionary: the children look at a picture and they report what it represents (circumference), b) picture labelling: the children form a sentence to describe a picture (the circumference) c) I spy a word beginning with t (thread), d) word anagrams (wheel), e) spelling game (circular) f) bingo: dotted, distance, tray, tambourine, ancient, discover, circle, cellotape, semicircle, g) match word with definition: 3.14 times the diameter – circumference (the other words are radius and diameter)
18. Enter information about the length of circle circumference in writing journals in diagrammatic form accompanying words with pictures.
19. Children work with some extra problems related to calculating the length of circle circumference: a) A circular plate has a 6 cm radius. What is its circumference? (37.68 cm), b) The circumference of a bus wheel is 282.6 cm. What is its diameter? (90 cm), c) The circumference of a circle is 172.7 cm. What is its diameter (55 cm), d) The radius of a circle is 1.5 cm. What is its circumference? (9.42 cm), e) The circumference of a bike wheel is 94.2 cm. What is its diameter? (30 cm).
19. Read the list of new words.

#### **Lesson 4**

**Time allocated: 40min**

#### Objectives

(a) Content

Students should be able to

- estimate the area of circular discs using squared paper
- investigate number  $\pi$ , after having estimated the area of circular objects
- construct an equation for calculating the area of a circle

(b) Language

- Listen and read problems related to content
- Write and report answers
- New vocabulary: sprinkler, stake, outline, surface, hurricane, rope, estimate, calculator, affect, investigate, carpet

### Activities

1. Attract students' attention. Show various circular objects. Ask children what we can do to find out their area.
2. Mention the content and relevant language objectives. Provide an advance organizer to illustrate the content to be covered: estimate the area of circles using squared paper, investigate number  $\pi$ , after having estimated the area of circular objects, formulate an equation for calculating the area of a circle.
3. Students recall prior knowledge: circle, centre, radius, diameter, the radius is half the length of the diameter, circumference is 3.14 times the diameter.
4. Pupils deal with task A (Maths-Students' handouts, Lesson 4, activity A).  
They draw the outline of circular objects on squared paper and estimate their area.
5. Children measure the radius of some circles and enter their measurements in a table (task B- Maths-Students' handouts, Lesson 3, activity B).  
They use the calculator to find the ratio between the area and the square of the radius. The table includes the objects and their radius, area of surface, radius x radius, area divided by the square of radius.
6. Pupils write an equation which links the area with the radius of a circle: The area of a circle can be found by multiplying pi ( $\pi = 3.14$ ) by the square of the radius: Area of circle =  $p \times (\text{radius} \times \text{radius}) = p \text{ radius}^2$  (Maths-Students' handouts, Lesson 3, activity C).
7. Children show the circumference and area of a circle using their hands.
8. Sing rhythmically: Circle area equals 3.14 times the square of radius.
9. Extra activities: After having discovered the equation above, children solve problems related to calculating the area of circles: a) The diameter of a circle is 90 cm. What is its area? (6358.5 cm), b) The area of a circular disc is 113.04 cm<sup>2</sup>. What is its radius? (6 cm), c) A grass sprinkler throws water to 1.5 m to all directions while it turns. What is the area

of the grass that it waters? ( $7.06 \text{ m}^2$ ), d) A pizza has a 30 cm diameter. What is its circumference? (94.2 cm) e) A dog is tied on a stake. The rope is 3 m long. He runs around the stake. How much area has he got? ( $28.26 \text{ m}^2$ ), f) A hurricane will hit a village at a 9 m radius. What is the affected area? ( $254.34 \text{ m}^2$ ), g) A semicircle carpet has a 2m diameter. What is its area? ( $1.57 \text{ m}^2$ ).

10. Play 'football' to review new content. Children are divided into two teams. They get one point for each correct answer: a) A circle has a 2 cm radius. What is its area? ( $12.56 \text{ cm}^2$ ) b) A circle has a 3 cm radius. What is its area? ( $28.26 \text{ cm}^2$ )

11. Children put words in the correct order to form an equation:  $\text{Area} = (\text{radius} \times \text{radius}) \times 3.14$ .

12. Review information about the circle: estimating the area of circular discs using squared paper, investigating number  $\pi$  after finding the area of circular objects, calculating the area of a circle.

13. Review information using a drawing: diameter, circumference, radius, centre of circle,  $\text{diameter} = 2 \times \text{radius}$ ,  $\text{circumference} = \text{diameter} \times 3.14$ ,  $\text{area} = (\text{radius} \times \text{radius}) \times 3.14$ .

14. Review game - running race: children answer questions moving one step towards the end for each correct response. Children use the response boards in their groups: a) radius is 5 cm. Area? ( $78.5 \text{ cm}^2$ ), b) radius = 10 cm. Area? ( $314 \text{ cm}^2$ ).

15. True/False statements: Students respond using the thumbs up/down technique: If the radius is 3 cm, then the area is  $280 \text{ cm}^2$  (false).

16. Children get up when they hear a correct statement: If the diameter is 2 cm, then the area is  $3.14 \text{ cm}^2$  (true).

17. Language focus: a) pictorial: the teacher shows a drawing and the students report what it represents (area), b) picture labeling: The area is 3.14 times the square of radius c) I spy a word beginning with s (square), d) word anagrams (equation), e) spelling game (calculator), f) bingo: sprinkler, outline, surface, square, hurricane, rope, calculator, affect, carpet, g) match word to definition: 3.14 times the square of radius – area (the other words are diameter and circumference).

18. Enter new information about the circle in writing journals in diagrammatic form accompanying words with pictures.

19. Read the list of new words.

## Lesson 5

**Time allocated: 40min**

### Objectives

#### (a) Content

Students should be able to

- estimate the area of circular discs using the area of parallelogram (method of Archimides)
- calculate the area of circular discs when they know the radius
- solve problems related to calculating the area of circle

#### (b) Language

- Listen and read problems related to content
- Write and report answers
- New vocabulary: parallelogram, similar, explain, medium

### Activities

1. Attract students' attention. Show a circular object and a parallelogram. Ask children to guess what we can do to find out their area. Ask children if there is a way to cut the circle and turn it into a parallelogram.
2. Mention the content and relevant language objectives. Provide an advance organizer to illustrate the content to be covered: estimate the area of circular discs using the area of parallelogram (method of Archimides), calculate the area of circular discs when we know the radius, solve problems related to calculating the area of circle.
3. Students recall prior knowledge: circle, centre, radius, diameter, the radius is half the length of the diameter, circumference is 3.14 times the diameter, the area is 3.14 times the square of radius.
4. Pupils deal with task A (Maths-Students' handouts, Lesson 5, activity A). They look at the circular basis of a bottle. They cut the circle into eight equal parts and place them one next to the other. They notice that they form a shape similar to the parallelogram.
5. Children deal with task B (Maths-Students' handouts, Lesson 5, activity B). They look at the pieces of a circle forming a shape similar to the parallelogram and complete the missing words in an equation: Area of circle = half circumference x radius. Then, they use number  $\pi$  in the equation: Area of circle =  $\pi$  x radius x radius.
6. Children deal with task C (Maths-Students' handouts, Lesson 5, activity C). They calculate the areas of circles when given the radius. They deduct the areas of smaller circles inside a bigger one.
7. Children show the area of a circle using their hands.

8. Sing rhythmically: Circle area equals 3.14 times the square of radius.
9. Extra activities: After having discovered the equation above, children solve problems related to calculating the area of circles. Children can choose which problems they can solve allowing differentiation: a) Find the area of a semicircle with a 3cm diameter (7.71 cm), b) Find the periphery of a shape that looks like a rectangle joined with a semicircle which has 2 cm diameter. Its other three sides are 3 cm, 3 cm, and 2 cm (11.14 cm) c) Find the periphery of a shape which is one fourth of a circle, with a 4 cm radius (14.28 cm), d) Find the area of a shape after deducting two semicircles with a 4 cm diameter from a rectangle which has 6 cm and 4 cm sides (11.44 cm<sup>2</sup>), e) Find the area of a shape after deducting a circle with a 1.5 cm radius, from a square having a 3 cm side (7.74 cm<sup>2</sup>).
10. Play 'bowling' to review new content. Children are divided into two teams. They get one point for each correct answer: a) The radius is 3 cm. What is the area? (28.26 cm<sup>2</sup>). b) The radius is 2 cm. What is the area? (12.56 cm<sup>2</sup>).
11. Children put words in the correct place in order to form the equation: Area=  $\pi \times$  (radius x radius)
12. The following points are reviewed: estimating the area of circular discs using the area of parallelogram, calculating the area of circular discs when we know the radius, solving problems – calculating the area of a circle.
13. A diagram is shown involving information about the circle: radius, diameter, circumference, the diameter is two times the radius, circumference = diameter X 3.14, area =  $\pi \times$  (radius X radius).
14. Review game - basketball: children answer questions moving one step towards the end for each correct response. Children use the response boards in their groups: a) The radius is 1 cm. What is the area? (3.14 cm<sup>2</sup>), b) The radius is 10 cm. What is the area? (31.4 cm<sup>2</sup>).
15. True/False statements: Students respond using the thumbs up/down technique: If the radius is 10 cm then the area is 3140 cm<sup>2</sup> (false).
16. Children get up when they hear a correct statement: If the area is 314 cm<sup>2</sup>, the radius is 10 cm (true).
17. Language focus: a) pictorial: the teacher shows a drawing and the students report what it represents (area), b) picture labeling (The area is  $\pi$  times the square of radius), c) I spy a word beginning with s (similar), d) word anagrams (parallelogram) e) spelling game (equal) f) bingo: radius, similar, solve, area, complete, line segment, equation, parallelogram, medium, g) match word with definition:  $\pi \times$  the square of radius – area (the other words are diameter and circumference).

18. Read the list of new vocabulary.

19. Enter information about circle area in writing journals in diagrammatic form accompanying words with drawings.

Maria Xanthou

**APPENDIX IX**  
**TEST BLUEPRINTS**

**1. Test Blueprint for Geography**

Objective	knowledge	comprehension	Application	Higher order thinking skills	Total	Percent
The students will...						
1. Identify on the map Brazil, capital, towns, nearby ocean, plateaus, river, nearby mountain, the Equator and the Tropic of Capricorn	1(q.1)				1	10%
2. Describe Brazil's climate	1(q.2)				1	10%
3. Match productive resources with products	1(q.3)					10%
4. Give examples illustrating the characteristics of Brazilians		1(q.4)			1	10%
5. Explain why Brazil faces problems				1(q.5)		10%
6. Support why Brazil is developing				1(q.6)		10%
7. Explain why people prefer the east regions				1(q.7)		10%
8. Solve a problem related to the climatic conditions			1(q.8)			10%
9. Judge the outcome of what will happen if the				1(q.9)		10%

forests keep being destroyed						
10. Suggest possible solutions to stop forest destruction				1(q.10)		10%
Total	3	1	1	5	10	
Percent	30%	10%	10%	50%		100%

## 2. Test Blueprint for Science

Objective	knowledge	comprehension	Application	Higher order thinking skills	Total	Percent
The students will...						
1. Identify and prove that the air has weight	1(q.1a)			1(q.5)	2	14.28%
2. Identify that the air exercises pressure to all bodies within it but the results are not always obvious because inside pressures neutralize the air pressure.				1(q.3.2)	1	7.14%
3. Explain that by reducing air from a certain space, the results of air pressure are made obvious.				4: q.2a, q.2b, q.4, q.6	4	28.57%
4. Identify that air pressure is carried out to all directions.	1(q.1c)	1(q.3.3)			2	14.28%

5. Report that air pressure is called atmospheric pressure.	1(q.1b)				1	7.14%
6. Identify that the higher we go, the greater is the reduction of atmospheric pressure.	1(q.1.d)				2	14.28%
7. Interpret/Justify real life applications related to atmospheric pressure.			1(q.7)		1	7.14%
8. Report that we measure atmospheric pressure with barometer.	1(q.1e)				1	7.14%
Total	4	3	1	6	14	
Percent	28.57%	21.42%	7.14%	42.80%		100%

### 3. Test Blueprint for Maths

Objective	knowledge	comprehension	Application	Higher order thinking skills	Total	Percent
The students will...						
1. Identify the centre, radius, diameter, and circumference of the circle	1(q.1.1, q.1.2, q.1.3, q.1.4)				4	25%

2. Calculate the radius and diameter of a circle (the radius is half the length of the diameter)	1 (q.2.1, q.2.2)		2	12.5%
3. Measure the radius and diameter of a circle.	1 (q.3.1, q.3.2)		2	12.5%
4. Solve a problem related to measuring the diameter		1 (q.3.3)	1	6.25%
5. Calculate the length of circle circumference when they know the radius or the diameter.	1 (q.4.2)	(q.4.1)	2	12.50%
6. Solve problems related to calculating the periphery of shapes (including circle circumference)		1 (q.4.3)	1	6.25%
7. Calculate the area of a circle when they know the radius or the diameter	1 (q.4.4)	1 (q.4.5)	2	12.50%
8. Solve problems related to calculating the area of circle		2 (q.4.6, q.4.7)	2	12.50%

Total	4	2	4	6	12
Percent	25%	12.50%	25%	37.50%	100%

Maria Xanthou

**APPENDIX X**  
**STUDENTS' HANDOUTS**

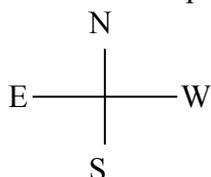
**1. Students' handouts for Geography**

**BRAZIL**

**1. Nearby countries and big towns**

**Look at the map** (School World Atlas- Παγκόσμιος Σχολικός Άτλαντας: pp.44-45)

Look at the map



- ◆ Find and name Brazil and its nearby countries (colour)
- ◆ Brasilia, Rio Janeiro, Sao Paulo
- ◆ The Atlantic and the Pacific oceans
- ◆ The Equator and the Tropic of Capricorn

## 2. Physical environment (SWA, p. 44)



◆ Fill in using: Amazon river, Amazonia, Amazon basin, biggest, Brazilian Plateau, Coastal plains, Guiana Plateau

1. The .....covers half Brazil. It is also called..... It is the .....basin of the world.
2. The .....is crossing the basin.
3. .... is on the north side of the country.
4. .... starts from Mato Grosso Plateau to the northeast part of the country.
5. There are ..... near the sea

### 3. The Amazon – Amazonia

#### Read the text (a) The Amazon basin

The Amazon is the second in length river in the world.

It is the biggest in quantity of water.

It springs from the mountain range of Andes in the region of Perou and after it runs through a distance of 6400 kilometres it is poured in the Atlantic Ocean.

During his long way it links with hundreds tributaries and thus becomes continuously bigger.

In the estuaries the river has width 96 kilometres and depth 52 metres.

The Amazon is navigable in all the length.

Big boats can travel from the ocean up to the westerner regions of Brazil

The bigger part of basin of Amazon is covered with tropical forests.

The heavy rainfall, the humidity and the tall temperature encourage the growth of vegetation.

The jungle of Amazon is one of the most important biotopes (βιότοπος) in the world (area where animals and plants grow).

More from the half species of animals and plants that exist in the earth live here.

Some regions of the jungle have not been explored completely.

People can't walk in the forest because there are tall plants, there are wild beasts, dangerous reptiles, crocodiles, and poisonous fish.

The forests of Amazon are important not only for Brazil but for all the world.

Amazon is the lung of the earth. The plants produce oxygen that is useful for the survival of people.

They are important because the pollution of the atmosphere is high.

The heat and the high humidity make the life of persons very difficult.

The mosquitos and the other insects transmit illnesses: yellow fever and malaria.

#### True or False?

- The Amazon is the second in length river of the world. ....
- It starts from Andes (Perou) to the Pacific Ocean. ....
- The biggest part of the Amazon basin is covered by plains. ....
- The Amazon is navigable (πλωτός). Big boats can travel ....
- There are many plants because of the heavy rainfall. ....
- The jungle of Amazon is one of the most important biotopes in the world .....
- It is easy to walk and see all the jungle .....
- The forests of Amazon are important because they produce much oxygen .....
- The heat and humidity make the life of persons very difficult .....
- Mosquitoes transmit green fever .....

## (b) Indians (Amerindians)

The only persons that live in the jungle of Amazon are two hundred thousands Indians. Their life is primitive. They live in huts made of palm trees' leaves and are nourished by the hunting, the fishing and the collection of wild fruits. The scientists believe that in the forest there are races of Indians that are not known to us.

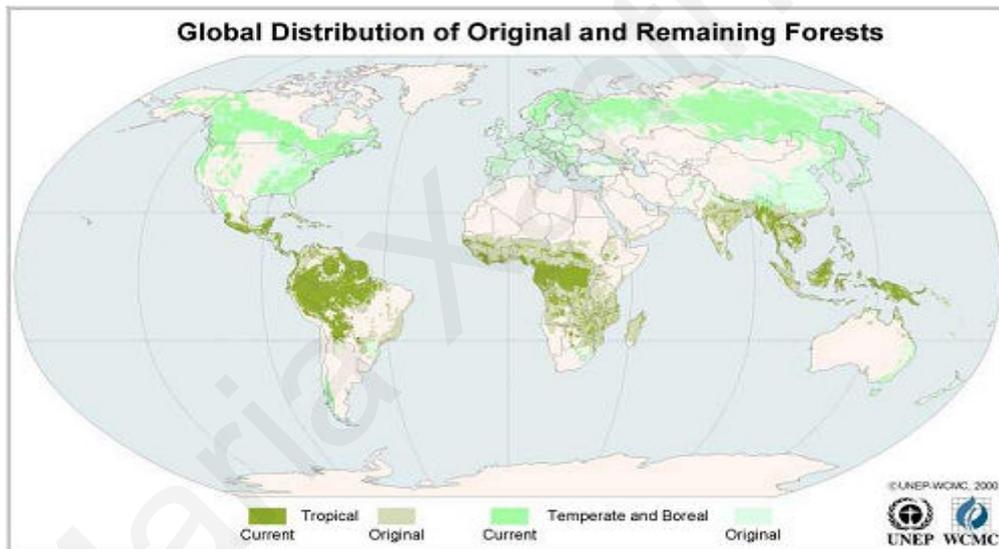
Choose the correct word:

1. In the Amazon jungle there are two/ten hundred thousands Indians.
2. People in the jungle live in caves/huts.
3. They eat fruits/hamburgers.
4. We don't know all the races/food of the Indians in the Amazon.

## 4. The role of the Amazon in the life of the country

### Flora and Fauna (Χλωρίδα και πανίδα)

#### ◆ (a) Flora (SWA 46)



<http://images.google.com/images?q=map+tropical+zones+flora&svnum=10&um=1&hl=el&lr=>

.Look at the map. What kind of flora is there in the Amazon?

Unscramble the words: rtoipacl froests

- ◆ .....
- ◆ Amazonia: 55,000 species of plants

#### ◆ (b) Fauna (match)

516 kinds of amphibians, 1622 birds, 467 reptiles, 428 mammals



- ◆ Go to [http://www.brazadv.com/brazil\\_tours/flora.asp](http://www.brazadv.com/brazil_tours/flora.asp)
- ◆ Go to [http://www.brazadv.com/brazil\\_tours/fauna.asp](http://www.brazadv.com/brazil_tours/fauna.asp)
- ◆ Search and find more information about flora and fauna in Brazil. Prepare a presentation

**(c) Natural environment destruction and its consequences**

Read the texts

The Amazon forest is in big danger

The government of Brazil exploits the natural wealth of the basin.

It encourages poor people to go and live there.

Thousands of trees and other plants are cut each year to cultivate land and build cities and factories.

They made streets of thousands of kilometres in the forest.

They destroy the forest to exploit the underground wealth.

The scientists say that in a few years only a small part of the forest will remain.

This is bad for the flora and fauna of and our lives.

Environmental and International organisations try to save the forests of the Amazon.

The United Nations try to convince the government of Brazil to restrict the exploitation of the forests.

The rich countries give money for the development of other areas of Brazil.

**Unscramble the words: cut, Amazon, streets, natural wealth, money, United Nations, underground**

**Fill in the missing words**

Brazilian government exploits the ..... of the basin.

They ..... trees to cultivate land and build houses.

They made long .....in the forest and try to find..... wealth.

In some years the..... will be smaller.

The ..... ask the government of Brazil to stop cutting the trees.

Rich countries offer .....to help other areas of Brazil to develop.

Go to [http://rainforests.mongabay.com/amazon/amazon\\_destruction.html](http://rainforests.mongabay.com/amazon/amazon_destruction.html)

Find causes of deforestation

How can we save the forests?

Tell others that the environment is important and how they can help to save rainforests.

Plant trees on land where forests have been cut down.

Tell people not to hurt the environment.

Create parks to protect rainforests and wild life.

Support companies that try to minimize damage to the environment (buy recycled products)

(Adapted by <http://kids.mongabay.com/elementary/601.html>)

**True or False?**

- Everyone must help to save the forests. ....
- We must cut forests to build houses. ....
- The governments must create parks to protect flora and fauna. ....
- We must buy toxic products ....

Maria Xanthou

## 5. Climate



<http://www.icsu-scope.org/downloadpubs/scope51/images/fig15.1.gif>

Look at the map (p.2-climate, 46-temperature, rainfall in Brazil)

Brazil is in the tropical/cold area of the earth.

The climate is cold/tropical.

It is hot/cold with low/high temperatures and rainfalls

The total quantity of rain that falls in the country in one year is between 2000 and 5000 mm (Cyprus 489mm).

Most rains fall in the Plateau Brazil/basin of Amazon and in the coastal areas.

It doesn't rain often in the north-east/west area of Brazil so it is not developed.

## 6. Economy of the country

Brazil has natural wealth but faces many economic problems (Which? Efforts to solve them)

There was no mineral wealth (oil, coal, natural gas) → stopped the industrial development

Forests, plains, mines → products

For many years economy depended on sugar, caoutchouc, gold, and coffee.

**Productive resources of the country**  
**The role of the Amazon in the economy of the country**

**(a) Forest wealth**

**Match the pictures with the sentences**

- a) The forests of Amazon give timber.
- b) They get caoutchouc from the trunks of caoutchouc trees. They take the juice to the factories and turn it into rubber.



<http://www.makoura-futon.ch/images/materiaux/caoutchouc.jpg>



<http://www.greenpeace.org.uk/files/images/migrated/MultimediaFiles/Live/Image/4465.jpg>

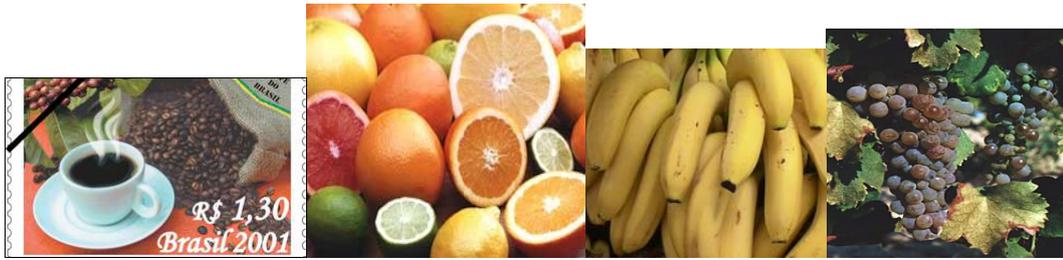
**(b) Agriculture**

**Look at the map SWA, p.44**

**Products**

**Unscramble: tbocaco, cttoon, sgure cnae, ceoffe, ctiurs furit, bnanasa, gareps**





Only 4% of the country is cultured.

The government allows the farmers to burn the forests to cultivate land.

They take rivers' water to water barren areas.

The biggest part is given to big enterprises (επιχειρήσεις).

The standard of living is one of the lowest in the world.

The country's wealth is in the hands of few people.

Main agricultural products: coffee, sugar cane, cotton, tobacco, citrus fruits, bananas, grapes etc.

Brazil is 'the country of coffee'.

There are plantations of coffee trees in the south-eastern coastal plains.

Brazil produces the 1/4 of all the coffee produced in the world.

Find information about coffee culture and production (καλλιέργεια καφεόδεντρου και παραγωγή καφέ)

### (c) Farming

Look at the map SWA. p.44

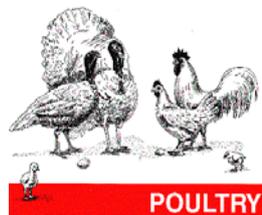
Delete

Farming is developed in central/south/east/west areas

Rich people have farms.

Brazil exports products in tins and frozen meats

Unscramble the words: wocs, ipsg, oagts, hspce, ptulory





.....

**(d) Mineral wealth**

1.iron 2.manganese 3. bauxite 4.copper 5.nickel 6.gold 7.diamonds



.....

<http://www.hobart.k12.in.us/ksms/PeriodicTable/About%20Graphics/manganese.jpg>  
[http://www.ojm.org/collection/collection\\_general/bigimages/handwashingcup.gif](http://www.ojm.org/collection/collection_general/bigimages/handwashingcup.gif)  
<http://www.l.rosendorffs.com/images/photos/pic-diamonds.jpg>  
<http://www.mii.org/Minerals/Minpics1/Bauxite.jpg>  
<http://www.advancedglobalmaterials.com/images/nickel-200.jpg>  
<http://www.taxfreegold.co.uk/images/1853brazil20000reisobv240.jpg>

There is no mineral wealth (oil, coal, natural gas)→ stopped the industrial development



.....

<http://images.google.com/images?svnum=10&hl=el&gbv=2&q=coal>  
<http://www.prisonplanet.com/images/october2005/121005oil.jpg>  
<http://www.naturalgas.org/environment/naturalgas.asp#greenhouse>

**(e) Industry**

The government borrowed money to finance the industries.

Brazil's *external debt* is more than 110 billion dollars.

Brazil solves the energy problem so industry is developing:

1. Discovery of oil near the Atlantic ocean (produces half of the oil needed)
2. The electric energy is produced by hydroelectric power stations near rivers
3. Use of alcohol as fuel for cars. Most Brazilian cars use alcohol which is produced from sugar cane

Which source of energy is better? (Oil: 77 000 000 tons, Electricity: 39 840 tons)

Today there are industries of manufacturing cars, aeroplanes, ships, machinery, textiles, chemical products, paper, caoutchouc, tobacco etc.



<http://www.power-technology.com/projects/ita/ita1.html>

<http://www.tristandc.com/images/oilrig8june06.JPG>

<http://www.nature.com/nature/journal/v444/n7120/images/444670a-i1.0.jpg>

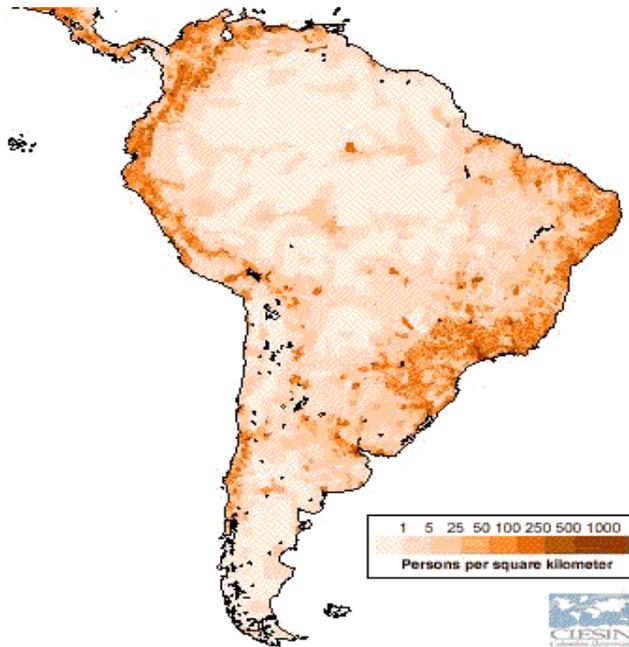
[http://newsimg.bbc.co.uk/media/images/41205000/jpg/\\_41205980\\_brazilcars2.jpg](http://newsimg.bbc.co.uk/media/images/41205000/jpg/_41205980_brazilcars2.jpg)

### Delete

- Brazil borrowed money/factories from other countries.
- Brazil's external debt is more than 110 billion/million dollars.
- Brazil produces electric/solar energy from hydroelectric power stations near rivers.
- Brazil discovered gold/oil in the Atlantic ocean.
- They use oil/alcohol to move cars, which they get from sugar cane.
- The industries produce silk/cars/aeroplanes/ships/clothing/chemical products/paper/caoutchouc/tobacco/spaceships

Maria Xanthopoulos

## 7. Way of life, habits, problems of residents



[http://eobglossary.gsfc.nasa.gov/Study/Location/Images/s\\_america.gif](http://eobglossary.gsfc.nasa.gov/Study/Location/Images/s_america.gif)

### (a) Problems of Brazilians.

What can they do?

There are three races: Indians, Europeans (Portuguese), Negros (from Africa) → mulattos

Population distribution is not the same everywhere.

Task 1: Look at the map (pb 133, SWA 44) and complete using: diamonds, Atlantic ocean, inside, Rio de Janeiro, Sao Paulo, Argentina, Bolivia, sugar cane, coffee, cotton, tea, gold

1. Most people live in ..... and.....  
Most people live near the .....ocean.
2. There are many people in these areas because of the plantations of ....., ....., and .....
3. The discovery of ..... and ..... in central-eastern Brazil in 1700 attracted many immigrants
4. Not many people live in the ..... of the country
5. Two other countries which are also under populated are.....and .....

### Read the text

There is unequal distribution of national wealth and low standard of living.  
In Brazil: very rich people have big farms and factories and very poor people work in the farms or businesses of the rich or are unemployed.  $\frac{1}{4}$  of the population lives in the rural areas. They work in plantations and they are poor.  
Many people are poor but there are also educated people with high standard of living.

Many people ( $\frac{3}{4}$  of the population) live in the cities (north and east).  
Government: 1. Took the capital from Rio to Brazilia (1960) 2. Gave free land in the area of the Amazon → to convince people move to the centre.  
Problems of the cities: overpopulation, unemployment, poverty (millions), homeless, illiterate Brazilians live in poor neighbourhoods ('favelas'): many people live together in poor houses, they suffer from illnesses and undernourishment (υποσιτισμός), many people leave their children → children sleep in the streets, under the trees, steal, work all day  
The government builds public houses, and protects abandoned children.

Task: Choose the correct words

- In Brazil there is unequal distribution of national wealth/caoutchouc.
- There is high/low standard of living.
- Many people live in the centre/north/east of Brazil.
- The government took the capital to Brazilia/Sao Paolo and gave free land in the Amazon area
- Problems of the cities ( $\frac{3}{4}$  of population lives there): overpopulation/ big parks/ unemployment, poverty/ homeless/ poor neighbourhoods/ illnesses/ undernourishment/ children in the streets, steal or work all day
- The government builds public zoos/houses and protects abandoned animals/children

**(b) What are the characteristics of Brazilians?**

<http://www.coollestspringbreak.com/image-files/rio-carnival.jpg>  
[http://image.guardian.co.uk/sys-images/Travel/Pix/pictures/2007/01/15/RioCarnival\\_460.jpg](http://image.guardian.co.uk/sys-images/Travel/Pix/pictures/2007/01/15/RioCarnival_460.jpg)

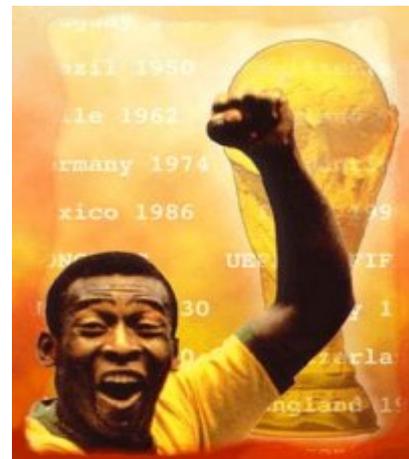


Task 1: Unscramble: crainavl, dnaicng, umisc, ftoabll  
Brazilians love ....., ....., ....., and .....

Brazilians organize festivals every year. The carnival of Rio de Janeiro is famous: thousands of tourists visit it to admire the colours, the floats (άρματα), thousands of Brazilians walk in a parade, dancing ‘samba’.

Task 2: Read and fill in the missing words  
Brazilians love sports. They prefer football. Thousands of people watch football matches. Some stadiums are the biggest in the world (Marakana in Rio de Janeiro). There are many famous Brazilian football players e.g. Pele is considered to be the best football player. Brazilians say that ‘football is religion’.

[http://upload.wikimedia.org/wikipedia/commons/thumb/4/46/Maracana\\_Stadium.jpg/250px-Maracana\\_Stadium.jpg](http://upload.wikimedia.org/wikipedia/commons/thumb/4/46/Maracana_Stadium.jpg/250px-Maracana_Stadium.jpg)  
<http://www.ece.uvic.ca/~pmotsheg/images/pele.jpg>



.....

.....

## 8. Relations between Cyprus and Brazil

Task:

Unscramble: Cfoefe, ococa, usagr. Then fill in the missing words.

[http://i45.photobucket.com/albums/f97/businessbunny/small\\_cup\\_of\\_coffee.jpg](http://i45.photobucket.com/albums/f97/businessbunny/small_cup_of_coffee.jpg)

<http://www.yumaedsupport.org/cocoa.6.jpg>

<http://ninecooks.typepad.com/photos/uncategorized/sugar.jpg>



Cyprus imports ....., ....., .....

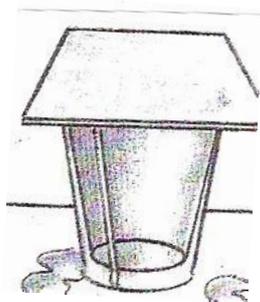
Maria Xanthopoulos

## 2. Students' handouts for Science

### ATMOSPHERIC PRESSURE (ΑΤΜΟΣΦΑΙΡΙΚΗ ΠΙΕΣΗ) PART A

#### 1. Problem: To which direction is the atmospheric pressure exercised?

- Follow the directions.



Fill a glass with water. Place a cardboard on the top.



Turn the glass upside down over a bowl. Do not move the cardboard.

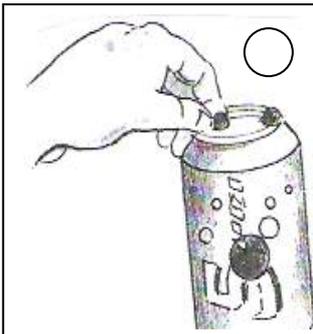


Turn the glass to all directions: right, left, up, down, always over the bowl.

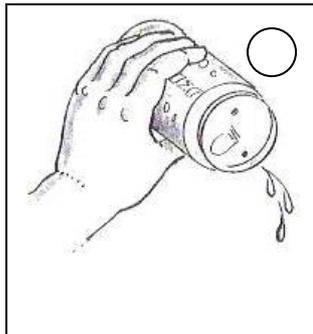
- Discuss in your group. Can you explain what happened?
- Write a conclusion

.....  
.....

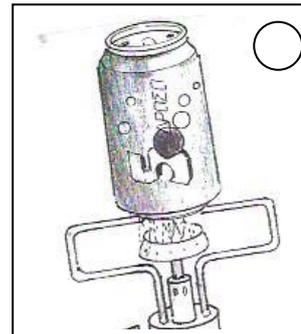
2. Number the pictures 1-9, to show the sequence followed for the tin experiment.



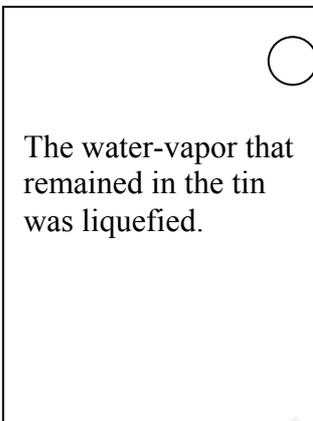
We closed the holes of the tin using plasticine.



We removed the drink from the tin.



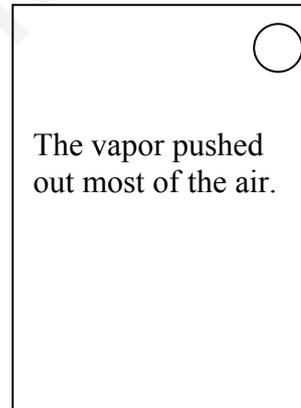
We warmed the tin on low fire.



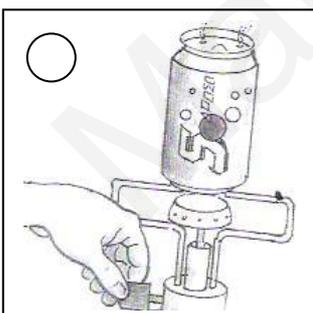
The water-vapor that remained in the tin was liquefied.



We poured some water in the tin.



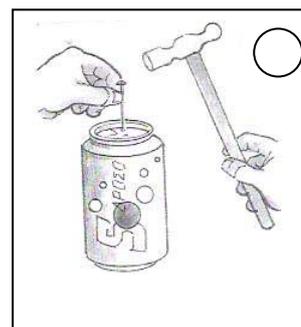
The vapor pushed out most of the air.



We turned off the fire.



The tin was deformed.



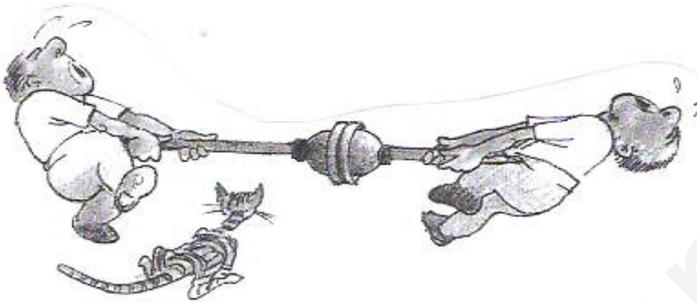
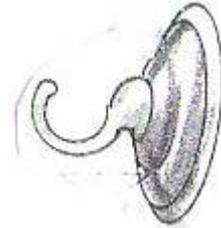
We opened two small holes on the top of the tin.

3.



The pictures show applications (εφαρμογές) of the atmospheric pressure. Discuss in your group and report how they happen.

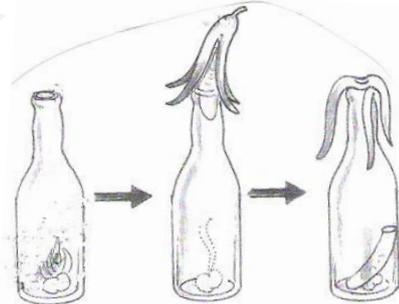
1. The hunger with suction cup (βεντούζα-κρεμαστάρι) is held on the wall without glue. How does this happen?



2. If we press two suction cups then they do not separate. Why does this happen?



3. We put some alcohol on a piece of cotton. We light the cotton and throw it in a bottle. When the flame is put out, we put one semi-peeled banana on the bottle's mouth. The banana falls in the bottle. How do you explain this?



4. The octopus hooks with its suction cups on the rocks and moves. When the suckers are hooked on our hand (either in the water or not), they stick there. Explain.



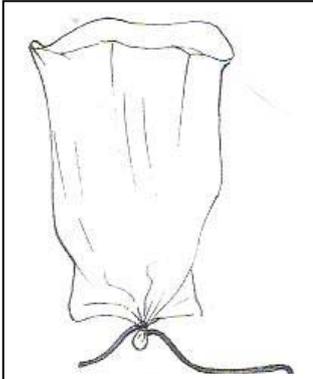
## PART B

4.

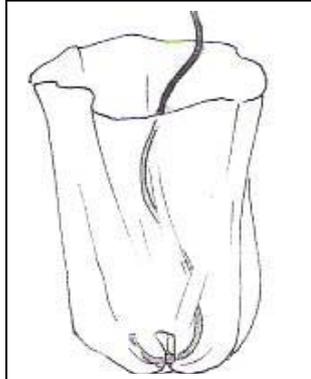
Follow

Materials  
- plastic bag  
- string or thread  
- vase made of glass  
- 2 elastic bands

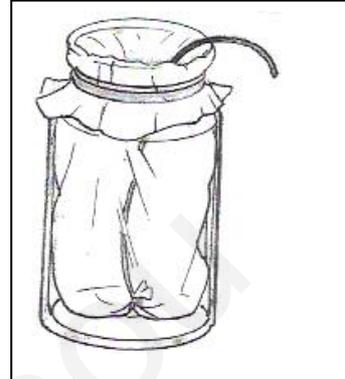
directions



Tie the under part of the plastic bag using the thread.

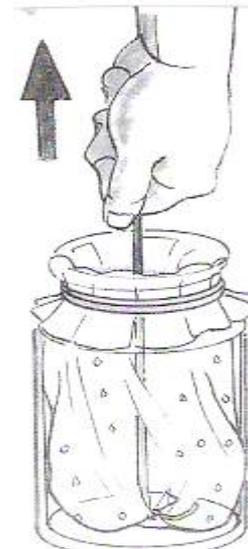


Turn the bag inside out and put the not and the thread in the bag.



Put the bag in the vessel. Blow in the bag. Fasten the bag on the vessel's mouth using the elastic bands.

- Pull the thread strongly. What do you observe?
- Remove the elastic bands and make holes in the bag using your pencil. Place the bag in the vessel and fasten. Pull again the thread. What do you observe?
- Discuss.
- Does the air around us press our body?

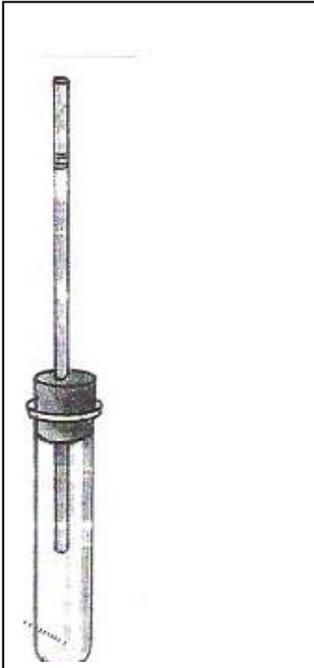


.....

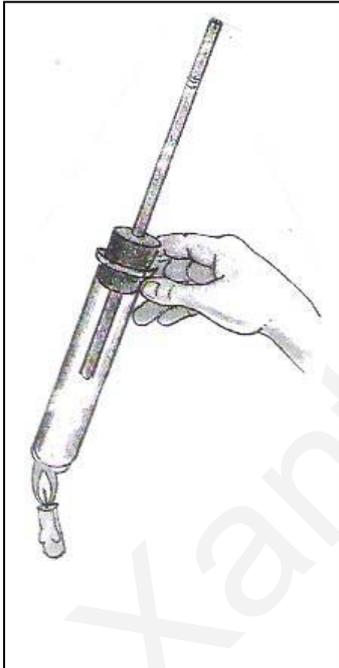
5. Follow the directions.

Materials

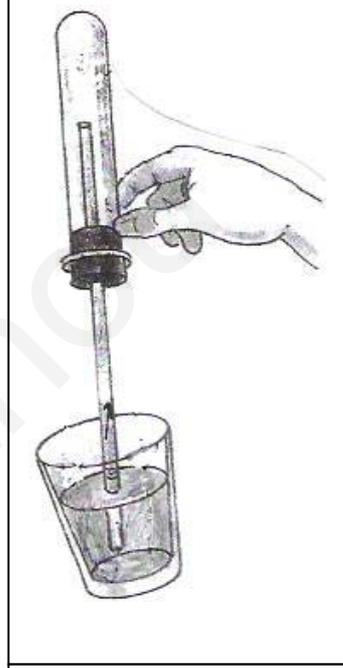
- testing tube with some drops of water
- candle and matches
- straw
- placticine
- glass with coloured water



Fasten the straw in the testing tube with plasticine.



A child holds the upper part of the tube and another child warms for one minute the under part of the pipe with a candle.



The first child turns the tube upside down and puts the end of the straw in the coloured water. Wait for a while.

- What do you observe?

.....  
.....

- Explain.

.....  
.....

6. Question: Does the atmospheric pressure reduce or increase

Task 1

- Materials
- two same balls of dough
  - 4 thick books

- A) Place one book over the ball of dough.
- b) Place three or four books over the other ball.
- c) Raise the books.

What do you observe?

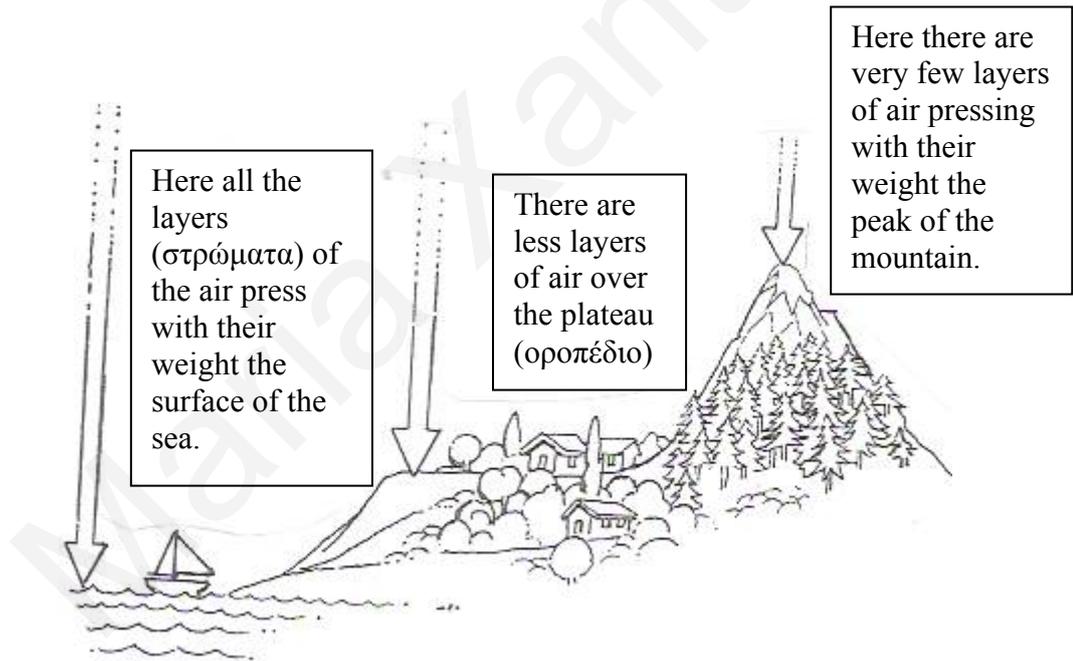
Complete:

The greater the weight over a body, the .....

.....

Task 2

- Look at the picture.

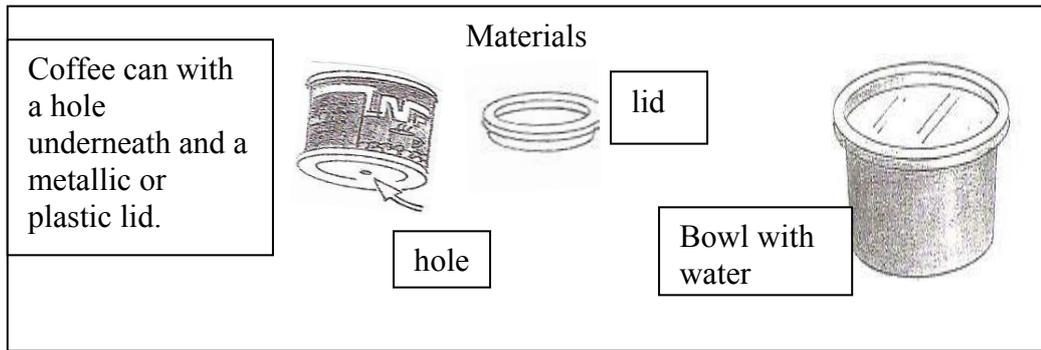


- Discuss and answer the question. Justify (δικαιολογήστε) your answer.

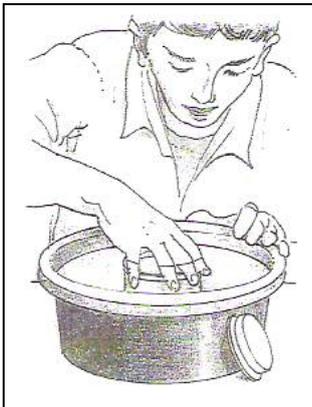
.....

.....

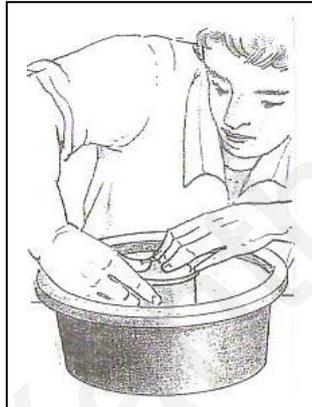
7.



- Follow the directions.



Immerse the can without its lid, in the bowl of water. Fill it up.



Close the can with the lid holding it in the water.



Take the can out of the water and keep it over the bowl.

Problem: How can water run without removing the lid?

- Discuss
- Explain

.....

.....

.....

.....

**PART C**

**8.**

**Task 1**

- Hold the piece of paper on the wide side of the funnel. Sip the air from the mouth of the funnel. What happened?



.....  
.....  
.....  
.....

Explain

.....  
.....  
.....  
.....

**Task 2**

- Transfer some water with your dropper from one glass to the other.

Discuss in your group how the dropper works.



9. Explain the following

Marios drunk his juice. He was sipping when the juice was over. The paper box is indented. Why?

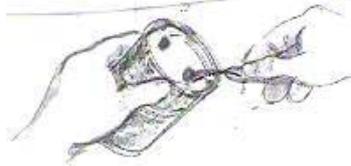
.....  
.....  
.....  
.....  
.....



1

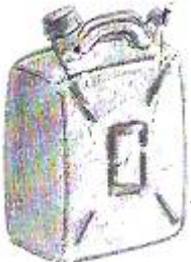
Mother opens two holes on the milk tin. Why?

.....  
.....  
.....



2

Why do water vessels usually have two holes? 3



.....

.....

.....

How can a funnel raise a table? 4



.....

.....

.....

Nicos closed the mouth of the bottle using placticine. Now, he is trying to drink. The drink doesn't reach his mouth. Why? 5



.....

.....

.....

When Maria was in Troodos she half-filled a bottle with water. When she went to Nicosia, the bottle was a little indented. Why? 6



.....

.....

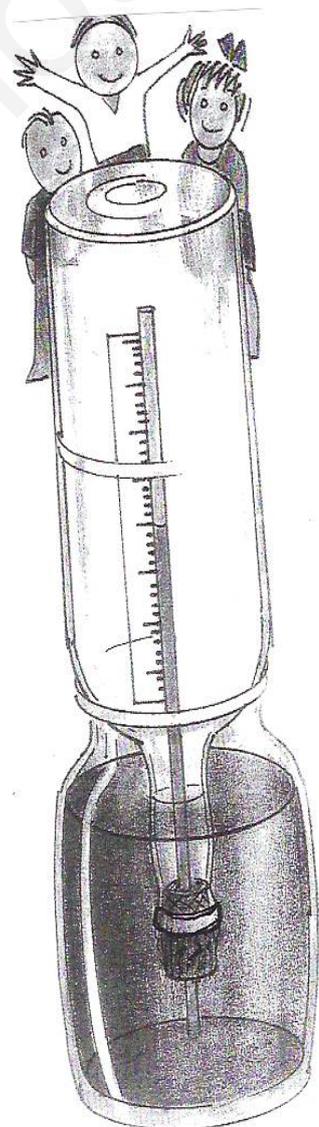
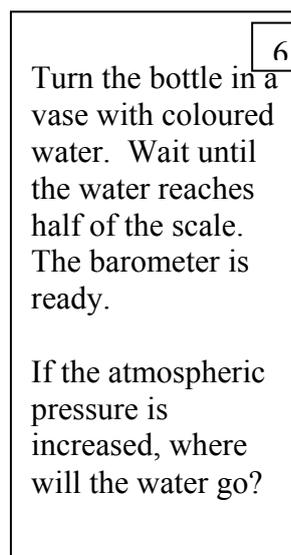
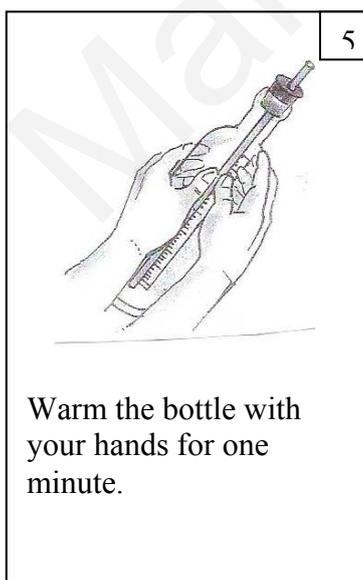
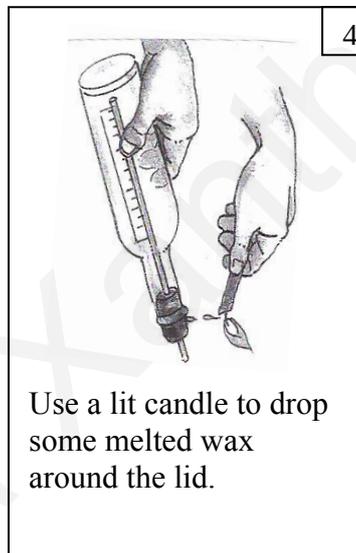
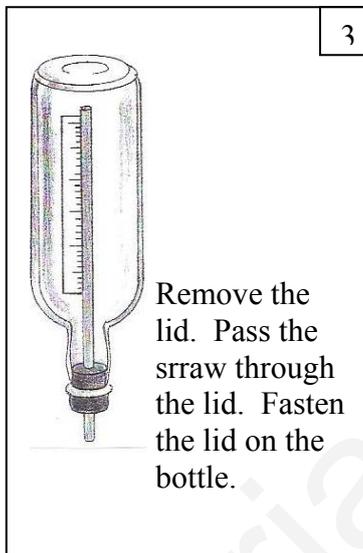
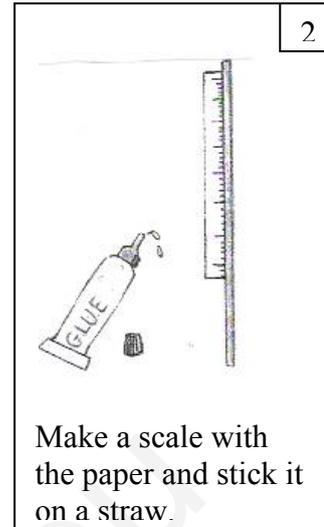
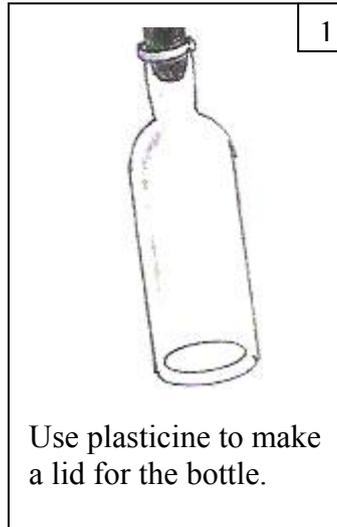
.....

Maria Xanthopoulos

10. Make a barometer

Materials

- bottle made of transparent glass (1/2 to 1 litre)
- plastic straw
- plasticine
- piece of paper (15 cm X1,5 cm)
- glue
- candle
- matches
- empty vase
- coloured water

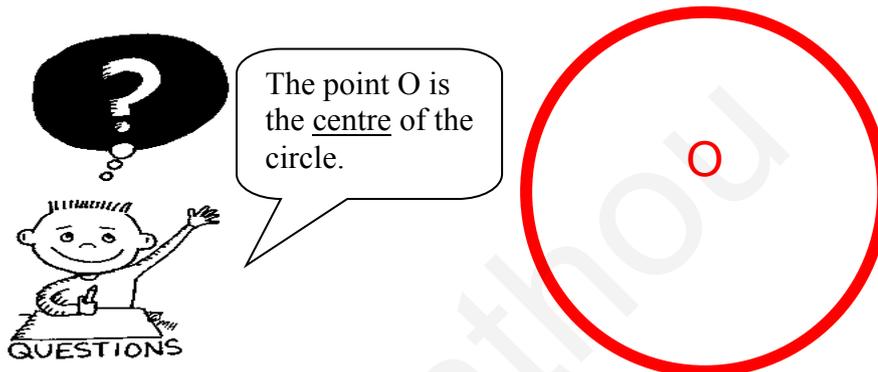


### 3. Students' handouts for Maths

## THE CIRCLE

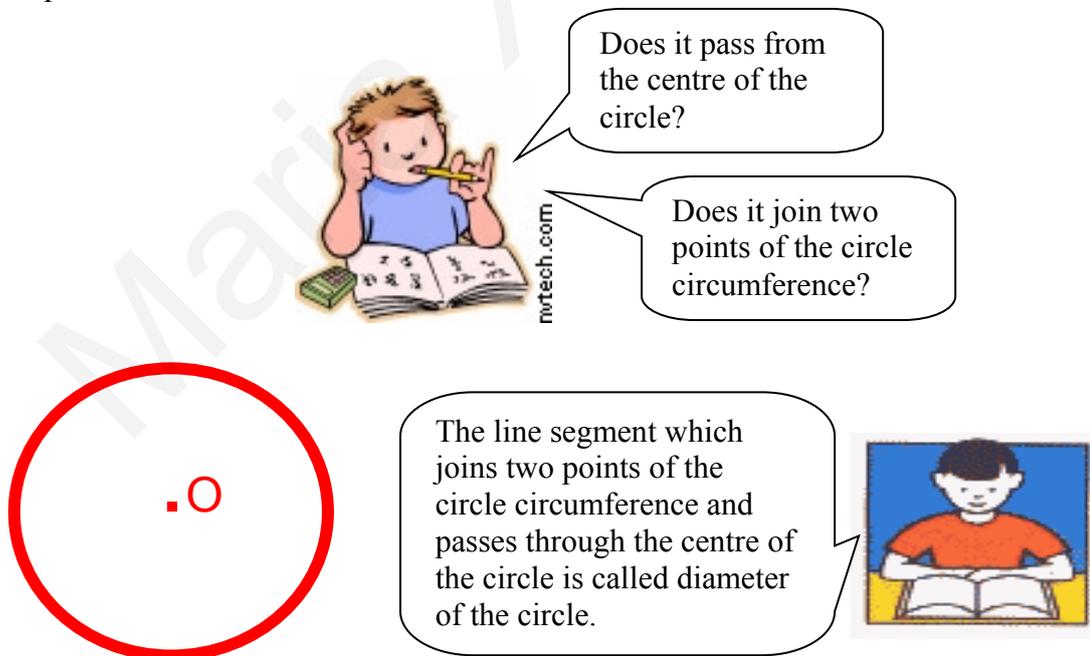
### Lesson 1

A. Use your ruler to draw a line segment (ευθύγραμμο τμήμα) which joins the centre (κέντρο) of the circle and a point (σημείο) on the circle periphery/circumference (περιφέρειας του κύκλου).



The line segment which joins the centre of the circle with one of the points of its circumference is called radius ( ακτίνα) of the circle.

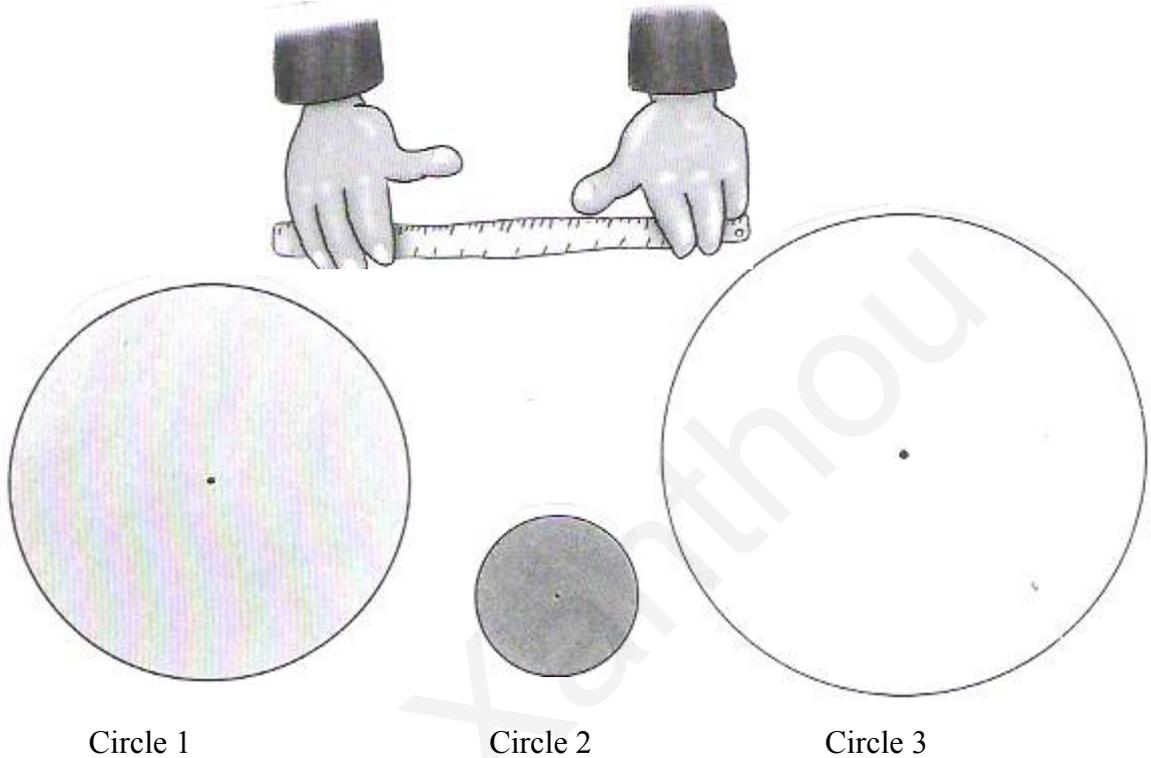
B. Use your ruler to draw a line segment which connects two points of the circle periphery and pass from the centre of the circle.



C. Answer the questions

1. How many diameters has a circle got? .....
2. How many radii has a circle got?.....

D. Measure the radius and the diameter of the circles using your ruler. Complete the chart.



Circle	Radius	Diameter (cm)
1		
2		
3		

E. Look at the table of task D and write your observations.

.....

.....



<http://www.mathgoodies.com/lessons/vol2/circumference.html>

## Lesson 2

A. Use your compass and your ruler to draw the circles.

1. Circle with radius 3cm
2. Circle with diameter 4cm.

B. A parking meter will be set up in a parking place. People can put 20cent and 10 cent coins. The opening of the coin slot for each coin will be 2mm bigger than their diameter. Help the machine designer to complete the table.

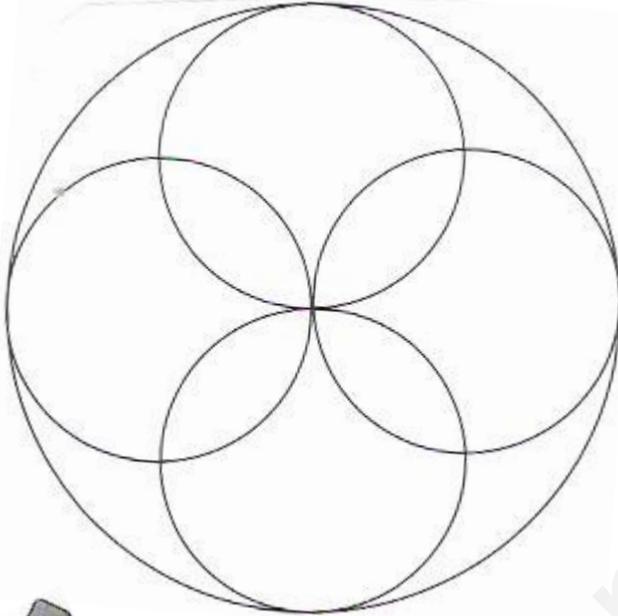
Coin  
20 c  
10 c

Length of opening

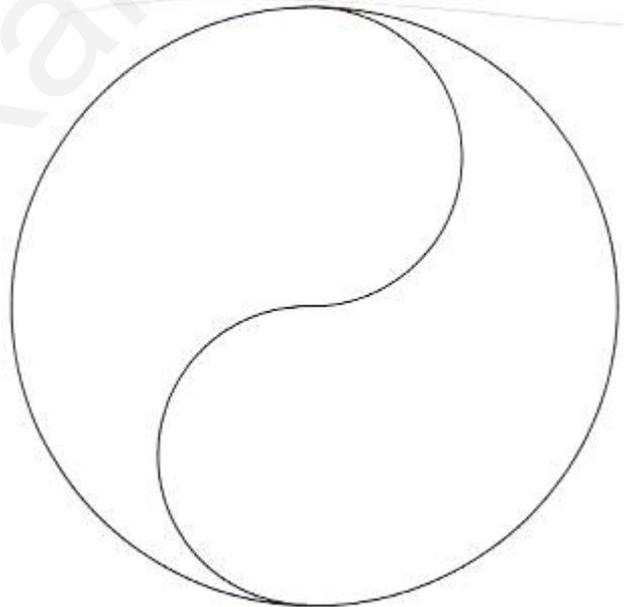


C. Use only your compass to draw the following shapes. Compare the length of the radius of the small circles to the radius of the big circle and write your observations.

1.



2.



.....  
.....  
.....  
.....

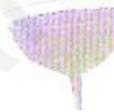


.....  
.....  
.....  
.....

### Lesson 3

A. Take ten circular objects. Measure their circumference using a piece of thread, and their diameter using your ruler. Write your measurements in the table.

Name of object	Length of circumference (mm) A	Length of diameter (mm) B	Circumference Diameter A: B
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			



B. Write one equation for the circle circumference.

Circumference = .....

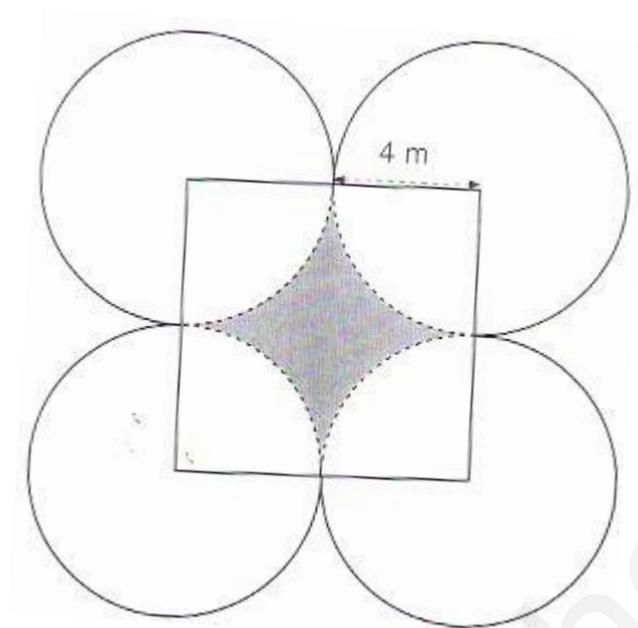
Do you know that....



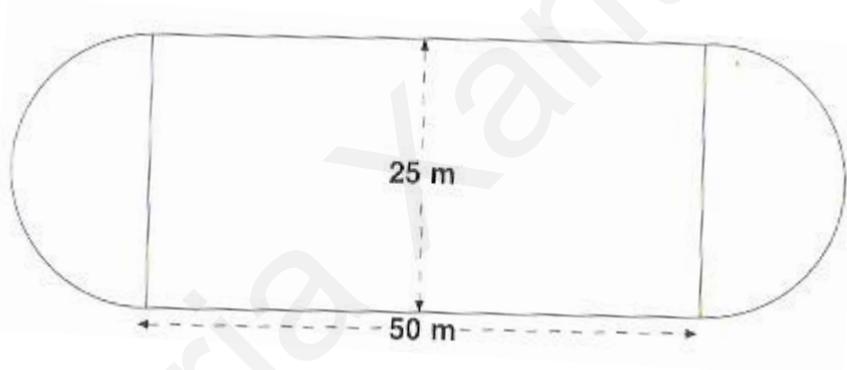
The ancient Greeks studied the relation between circumference and diameter. The ratio between the circumference and the diameter of a circle is called 'pi' and it is symbolized with  $\pi$ . It is  $22/7$  or around 3,14.

C. Solve the problems

1. Use  $\pi$  to find the length of the dotted line.



2. A stadium has the following shape. Its two sides are semicircle. Calculate the circumference of the stadium.



3. The diameters of the wheels of a bicycle are 25 cm and 110 cm. If the bike driver covers a 500 m distance, how many turns will each wheel do?

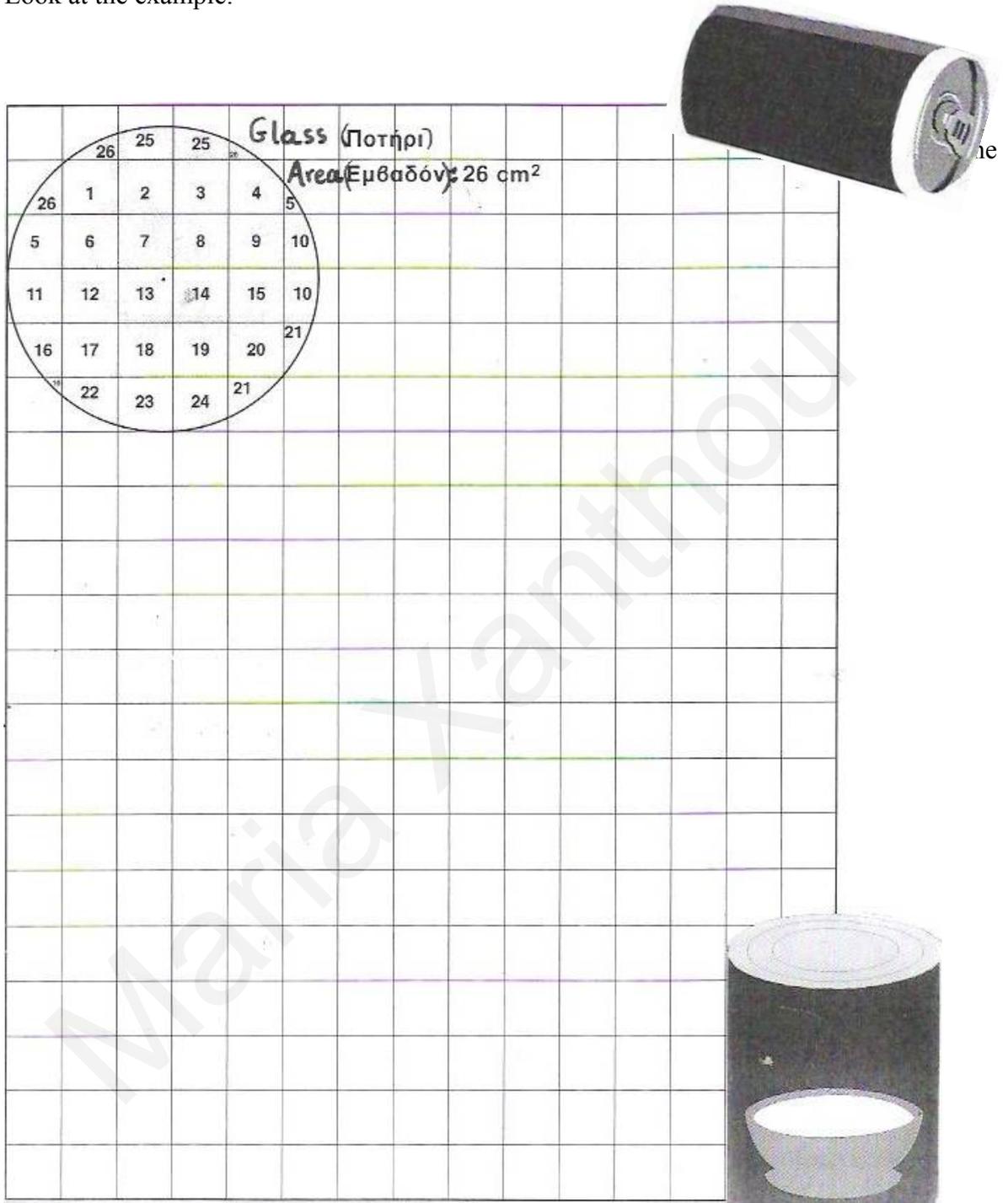


Extra activities (p. 160)

1. A circular plate has a 6cm radius. What is its circumference?
2. The circumference of a bus wheel is 282,6 cm. What is its diameter?
3. The circumference of a circle is 172,7 cm. What is its diameter?
4. The radius of a circle is 1,5 cm. What is its circumference?
5. The circumference of a bike wheel is 94,2 cm. What is its diameter?

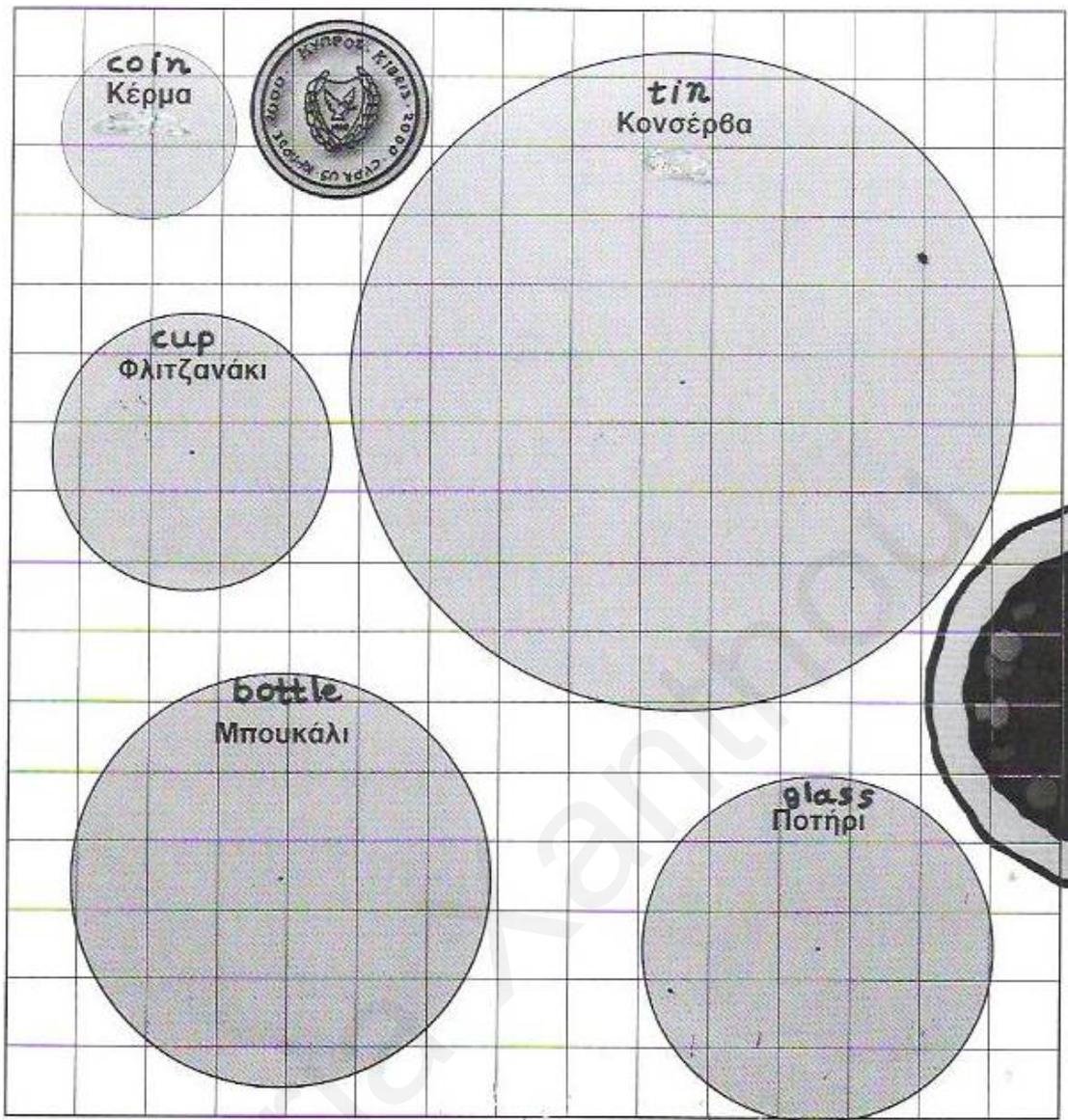
## Lesson 4

A. Draw the outline (περίγραμμα) of circular objects and calculate the area of their surface. Look at the example.



**Glass (Ποτήρι)**  
**Area (Εμβαδόν): 26 cm<sup>2</sup>**

B. Measure the radius of each circle and write your measurements in the table. Use the calculator to find the ratio between the area of the surface and the square of the radius.



Object	Radius (cm)	Area of surface (cm <sup>2</sup> )	Radius x Radius (cm <sup>2</sup> )	Area: (Radius x Radius)
		A	B	A:B
coin				
cup				
glass				
bottle				
tin				

C. Write an equation which connects the area and the radius of a circle.

.....

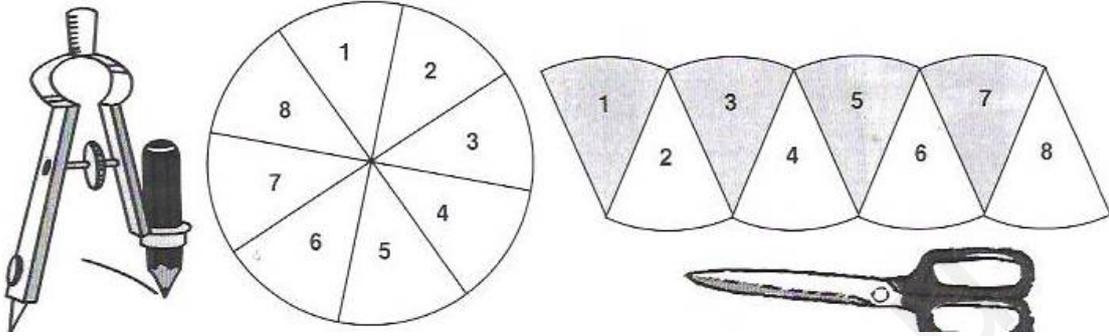
Extra activities – Solve the problems (p.161)

1. The diameter of a circle is 90 cm. What is its area?
2. The area of a circular disc is 113, 04. What is its radius?
3. A grass sprinkler throws water to 1,5 m to all directions while it turns. What is the area of the grass that it waters?
4. A pizza has a 30 cm diameter. What is its circumference?
5. A dog is tied (δεμένος) on a stake (πάσσαλος). The rope is 3m long. He runs round the stake. How much area has he got?
6. A hurricane (καταιγίδα) will hit a village at a 9cm radius. What is the affected area? (Πόση περιοχή θα επηρεαστεί;)
7. A semi circle carpet (ημικυκλικό χαλί) has a 2m diameter. What is its area?

**Lesson 5**

A. 1. You can see the base of a bottle in shape 1. Cut the circle in 8 equal parts and place them one next to the other like the example.

Shape 1



2. What is the area of shape 1? (about)

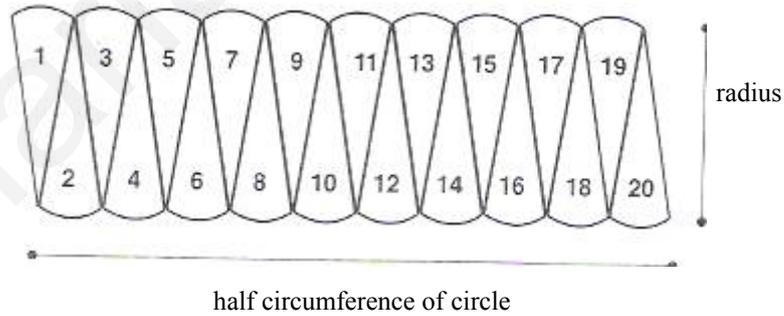
.....

3. How did you find it? Explain

.....  
 .....

B. 1. Look at the pieces of another circle. Complete the equation with the missing words.

Shape 2



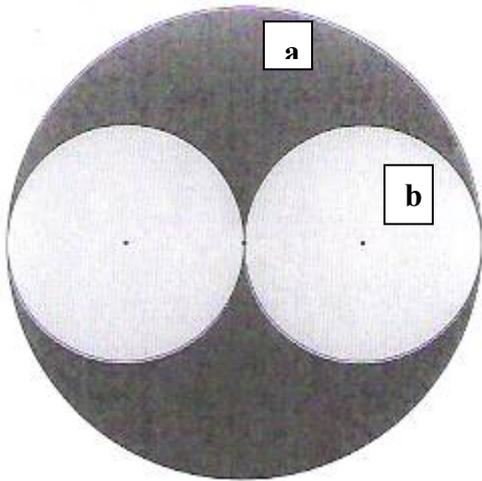
Area of circle (shape 2) = .

2. Use  $\pi$  in the following equation

Area of circle =  $\pi$  . .

C. Measure and find the area of the black, grey and white surfaces of the circles.

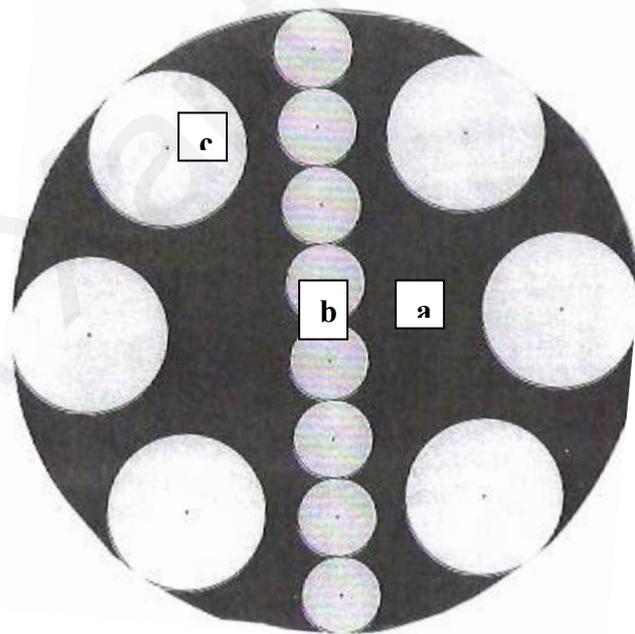
1.



a. black area =  
b. grey area =

2.

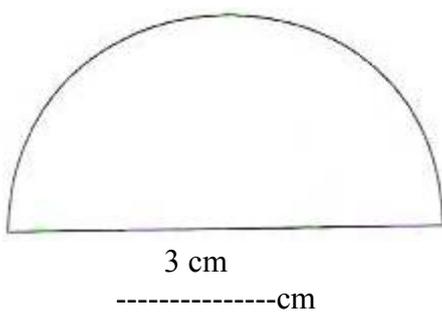
a. black area =  
b. grey area =  
c. white area =



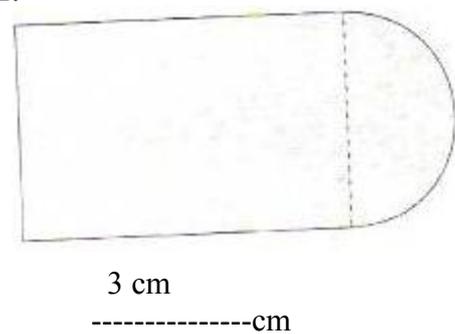
Extra activities (p.162)

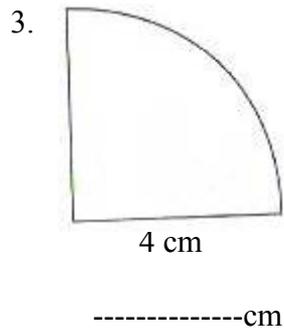
A. Find the periphery of the shapes

1.



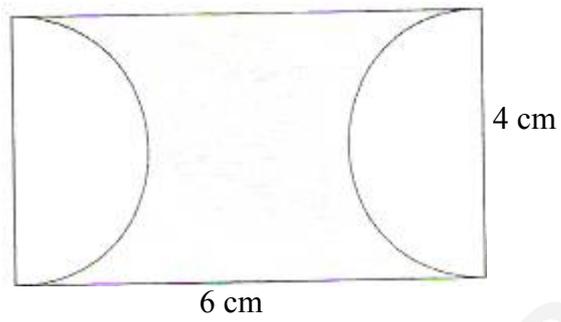
2.



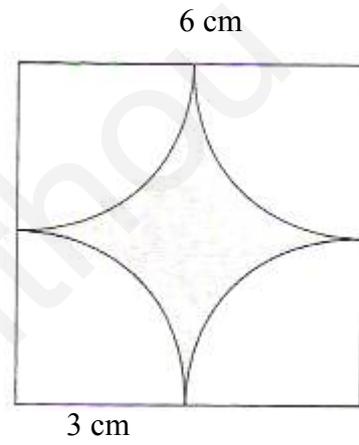


B. Find the area of the shapes

1.



2.



Maria Xanthopoulos

## APPENDIX XI

### POWERPOINT PRESENTATIONS DEVELOPED FOR THE CLELD LESSONS

#### 1. PowerPoint Presentations for Geography CLIL lessons with CLELD

**We are going to use...**

- ◆ Maps (in groups of 2 or 3)
- ◆ Handouts (2)
- ◆ Response boards (in groups)
- ◆ Notebooks (1)

Maria Xanthou 1

#### Brazil – Lesson 1



What do you know about Brazil? (brainstorming)



Maria Xanthou 2

**Brazil**  
Ask for and report information  
Listen for main ideas  
Read and write about Brazil

- geographical Position  
Γεωγραφική θέση
- population density  
Πυκνότητα πληθυσμού
- physical environment

nearby countries, capital, towns nearby ocean, Equator, Tropic of Capricorn

Maria Xanthou 3

**Where is Brazil?** (School World Atlas, 8-9)



- ◆ Look at the world map (χάρτης).
- ◆ Name the continents (ήππειροι).
- ◆ Europe, Asia, Africa, Australia, America, Antarctica
- ◆ Can you find Brazil?
- ◆ Brazil is in the south part of America

Maria Xanthou 4

**Geographical position**



North  
West — East  
South

Can you see Cyprus?

- ◆ Brazil is on the south west

5

Handout, p.1

**Nearby countries and big towns**

Look at the map (School World Atlas: p.55)



- ◆ Find Brazil
- ◆ Capital
- ◆ Brasilia (Cyprus - Nicosia), Rio Janeiro, Sao Paolo, Manaus
- ◆ The Atlantic and the Pacific oceans.
- ◆ The **Equator** (Ισημερινός) and the **Tropic of Capricorn** (Τροπικός του Αιγόκερω).

http://z.about.com/d/geography/1/0/a/Ksamerica.jpg

Maria Xanthou 6

## Nearby countries and big towns

(SWA, p. 55)



- Countries near Brazil: French Guyana, Suriname, Guyana, Venezuela, Colombia, Uruguay, Peru, Bolivia, Paraguay, Argentina
- ◆ Nearby ocean: Atlantic ocean

Maria Xanthou

7

## Match the words (countries, towns, ocean) with the correct places



- ◆ Venezuela,
- ◆ Argentina,
- ◆ Brasilia,
- ◆ Atlantic ocean

Maria Xanthou

8



## Lets play tennis



1 Countries near Brazil

2 Nearby ocean

3 Cities of Brazil



\* Use response boards – in teams



Maria Xanthou

9

## Brazil, nearby countries, and Cyprus (Look and compare)

	km <sup>2</sup>	Population (millions)	Medium density (person/km <sup>2</sup> )	Annual at head income (dollars)
Brazil	8 547 000	165,4	19	6 500
Argentina	2 780 000	36,6	13	12 900
Perou	1 280 000	35,2	20	4 550
Bolivia	1 098 000	8,1	7	2 600
Venezuela	912 000	23,7	26	6 200
Chile	756 000	15,0	20	10 100
Cyprus	9 251	0,7	81	13 230

- ◆ Bolivia, Argentina, and Brazil are under populated (αραιοκατοικημένες)
- ◆ Cyprus: overpopulated (πυκνοκατοικημένες)
- ◆ Cyprus: richer

Maria Xanthou

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## Physical environment (Morphology of ground)

Handout, p.2

SWA 54



- ◆ Look at the map. Find:
  - ◆ The Andes
  - ◆ 1. It covers half Brazil.
  - ◆ The Amazon basin (λεκανοπέδιο Αμαζονίου) An area crossed by river. There are mountains on two sides.
  - ◆ (Amazonia)– The biggest basin in the world.
  - ◆ 2. The Amazon river
  - ◆ Crossing the basin
  - ◆ 3. On the north:
    - ◆ Guiana Plateau (οροπέδιο - υψιπέδιο Γουιάνας): plain on a mountain
    - ◆ 4. Mato Grosso Plateau
    - ◆ Brazilian Plateau
  - ◆ 5. Near the sea:
    - ◆ Coastal plains
- ◆ Miming game : show the plateau /mountain/plain

Xanthou

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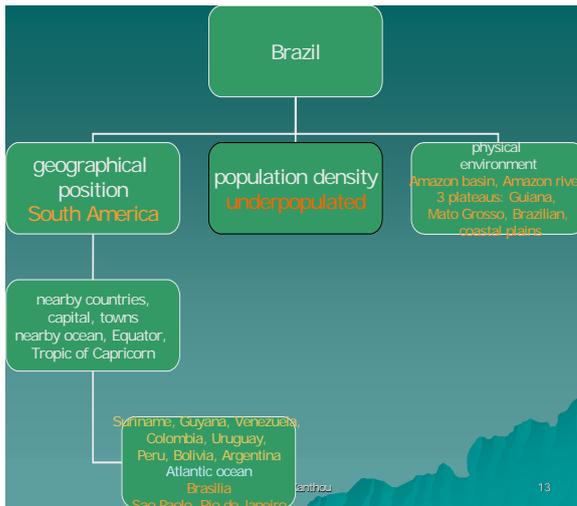
## Physical environment Compare to Cyprus



- ◆ There is a big mountain in the center. Its name is Trosos.
- ◆ There is also a mountain on the north side of the island too. Its name is Pentadakylos.
- ◆ There is a big plain on the east side. Its name is Mesaoria.

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## Lets race!

- It covers half Brazil: A..... b.....
- Amazon basin
- North of the country: Plateau G.....
- Plateau Guyana

Pupils use their response boards in their groups

Maria Xanthou

- True – False (thumbs up/down)
  - The Amazon basin is the smallest of the world
  - True – False (stand up if true)
  - There are plains near the ocean
- 15

- ### Gap-filling (choose one sentence)
- A. There are ..... plateaus in Brazil
  - B. The ..... river crosses the .....
- 16

- Match the words with the correct picture.  
continent, Equator, plains, plateau, Tropic of Capricorn

17

- On the west .....
- Amazon basin
- aiplns
- plains
- I spy a word beginning with p
- plateau
- o - - - n
- ocean

18

## Noughts and crosses

basin	plateau	Mato Grosso
Atlantic ocean	Brasilia	Rio de Janeiro
Brazil	Peru	Amazon

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## Match words with definitions

- ◆ 1. An area crossed by river.
- ◆ 2. Plain on a mountain
- ◆ A. Plateau
- ◆ B. mountain
- ◆ C. basin
- ◆ D. ocean

Maria Xanthou

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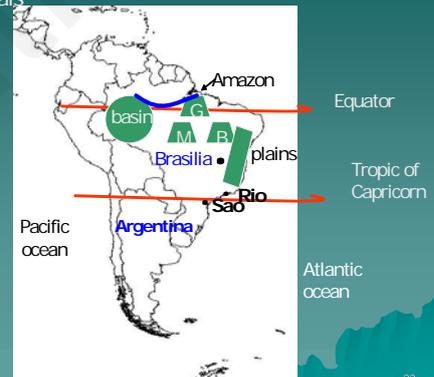
## new words

- ◆ map
- ◆ income
- ◆ coastal
- ◆ plateau
- ◆ basin
- ◆ plain
- ◆ overpopulated
- ◆ ocean
- ◆ city
- ◆ Capricorn
- ◆ north
- ◆ west
- ◆ east
- ◆ South
- ◆ continent
- ◆ Equator
- ◆ density
- ◆ population

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- ◆ Write about Brazil's nearby countries-towns-nearby ocean and physical environment in writing journals



22

## Lesson 2

What do you know about the Amazon forest? (brainstorming)

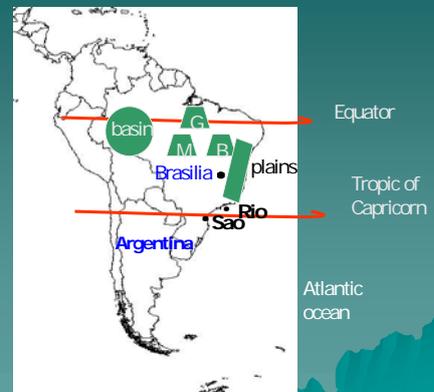


Maria Xanthou

23

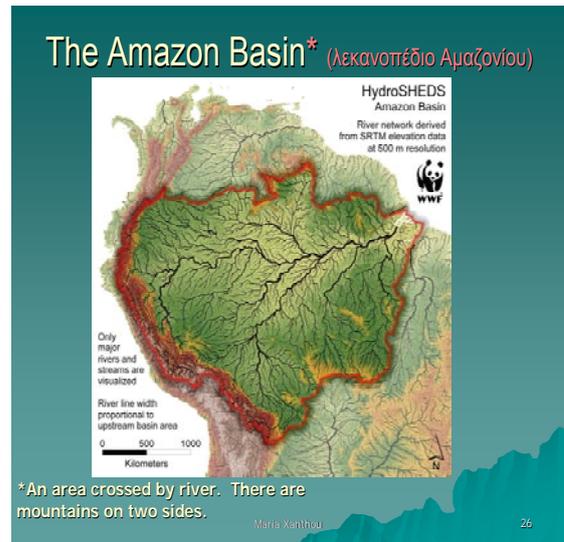
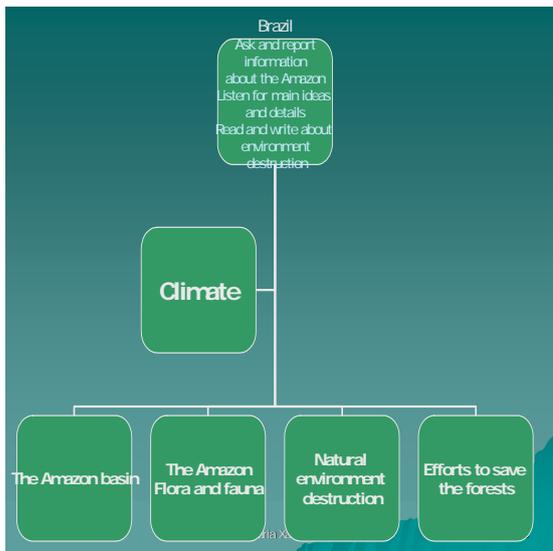
## Do you remember...?

- ◆ physical environment



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- ◆ Can you describe a forest that you know?



Handout, p.3

## The Amazon basin – Amazonia

### True or False?



- ◆ The Amazon is the second in length river of the world
- ◆ It starts from Andes (Perou) to the Pacific Ocean
- ◆ The biggest part of the Amazon basin is covered by **plains**.
- ◆ The Amazon is **navigable** (p??t??)  
Big boats can travel
- ◆ There are many plants because of the heavy **rainfall**.
- ◆ The jungle of Amazon is one of the most important **biotopes** in the world
- ◆ It is easy to walk and see all the jungle
- ◆ V
- ◆ X
- ◆ X
- ◆ V
- ◆ V
- ◆ V
- ◆ X

Maria Xenithou 27

## Amazonia



- ◆ The forests of Amazon are important because they **produce** much **oxygen**
- ◆ The **heat** and **humidity** make the life of people very difficult
- ◆ **Mosquitoes** transmit green fever
- ◆ V
- ◆ V
- ◆ X

Maria Xenithou 28

## The role of the Amazon in the life of the country

Handout, p.4

### Indians (Amerindians)



[http://www.minelinks.com/wordpress/jungle\\_po\\_phe22jjs3](http://www.minelinks.com/wordpress/jungle_po_phe22jjs3)

- ◆ Choose the correct word:
- ◆ In the Amazon **jungle** there are two/ten hundred thousands Indians.
- ◆ People in the jungle live in **caves/huts**.
- ◆ They eat **fruits/hamburgers** and fish.
- ◆ We don't know all the **racess/food** of the Indians in the Amazon. Some **regions** have not been explored.
- ◆ (200000)
- ◆ huts
- ◆ fruits
- ◆ races



Amazon village

Maria Xenithou 29

## The role of the Amazon in the life of the country

Handout, p.4

### Flora and Fauna (Χλωρίδα και Πανίδα)



[http://www.tourism4travel.com/blog/wp-content/uploads/2012/01/amazonia\\_forest.jpg](http://www.tourism4travel.com/blog/wp-content/uploads/2012/01/amazonia_forest.jpg)

[http://www.brasserie.com/azil\\_tours/fora.asp](http://www.brasserie.com/azil_tours/fora.asp)

- ◆ **Flora** (SWA 56)
- ◆ Look at the map. What kind of **flora** is there in the Amazon?
- ◆ Unscramble the words: rtoipacl froetts
- ◆ .....
- ◆ **Tropical forests**
- ◆ Amazonia: 55,000 **species** of plants



Global Distribution of Original and Remaining Forests



Maria Xenithou 30

## What trees can we find in Cyprus?





- ◆ cypress, olive trees, almond trees

Maria Xenidou 31

## Fauna

Handout, p.5

- ◆ 516 kinds of amphibians, 1622 birds, 467 reptiles, 428 mammals



http://www.brazadv.com/brazil\_tours/fauna.asp 32

## Animals

### What animals can we find in Cyprus?






agrino, donkey, goat, rabbit

Maria Xenidou 33

## The role of the Amazon in the life of the country:

Handout, p.5

### Natural environment destruction and its consequences



Fire in the Amazon forests



Deforestation for cattle grazing



- ◆ Use the words: cut, Amazon, streets, natural wealth, money, United Nations, underground
- ◆ Fill in the missing words
- ◆ Brazilian government exploits the ..... of the basin.
- ◆ They ..... mines to ..... and build houses.
- ◆ They made long ..... in the forest and try to find ..... wealth.
- ◆ In some years the ..... will be smaller. Less flora, fauna, oxygen.
- ◆ The ..... ask the government of Brazil to stop cutting the trees.
- ◆ Rich countries offer ..... to help other areas of Brazil to develop.

Maria Xenidou 34

## How can we save the forests?

Handout, p.6



[http://travel.mongobay.com/pix/pix/tambopata-tambopata\\_1030\\_5148.html](http://travel.mongobay.com/pix/pix/tambopata-tambopata_1030_5148.html)

### True or False?

- ◆ Everyone must help to save the forests. ....
- ◆ We must cut forests to build houses. ....
- ◆ We must buy toxic products. ....
- ◆ The governments must create parks to protect flora and fauna. ....

◆ V  
◆ X  
◆ X  
◆ V

Sing: Create parks to protect flora and fauna.

Maria Xenidou 35

## Respond in groups

- ◆ Flora (boards)
- ◆ Fauna
- ◆ How do they destroy the forest?
- ◆ What can people do?

Maria Xenidou 36

## Climate



Look at the map (SMA, pp.11, 56)

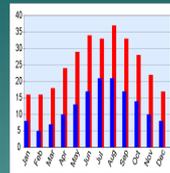
- Brazil is in the tropical/cold area of the earth between the Equator and the Tropic of Capricorn. (show)
- The climate is cold/tropical.
- It is hot/cold with low/high temperatures and rainfalls.
- The total quantity of rain that falls in the country in one year is between 2000 and 5000 mm/100-200 (Cyprus 489mm)
- Most rains fall in the Plateau Brazil/basin of Amazon and in the coastal regions
- It doesn't rain often in the north-east/west area of Brazil so it is not developed.

[http://www.worldbook.com/wb/imag es/content\\_spotlight/climates/south\\_ america\\_climate.gif](http://www.worldbook.com/wb/imag es/content_spotlight/climates/south_ america_climate.gif)

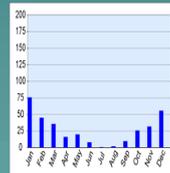
<http://www.isc.socsci.org/bv/visits/bds/sco ps1/images/fig15.1.gif>

Maria Xanthou

## Climate in Cyprus



Mediterranean Climate:  
hot, dry summer  
and cool winters



Maria Xanthou

## Compare the cities of Brazil and Cyprus (colder, Brazil, July)

Town	Medium temperature(°C)		Medium rainfall (mm)	
	January	July	January	July
Rio de Janeiro	26	21	125	40
Belem	28	28	350	150
Manaus	27	27	250	60
Nicosia	10	29	51	2
Pafos	12	25	105	0

- ◆ In January it is ..... in Cyprus than in Brazil
- ◆ colder
- ◆ In January it rains much more in .....
- ◆ Brazil
- ◆ In ..... it rains in Brazil but it doesn't rain in Cyprus
- ◆ July

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## Lets play football!

In Brazil, it is ..... with high temperatures and rainfalls.

- ◆ hot
- ◆ 2. The climate in Brazil is .....
- ◆ tropical

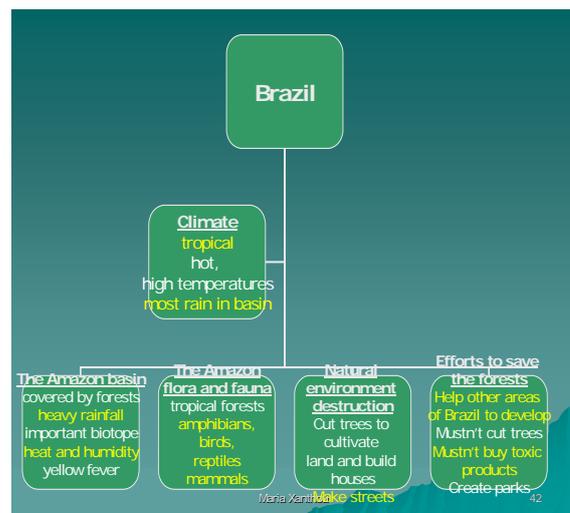


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## Gap-filling (Choose one sentence)

- ◆ A. Most rain falls in the .....
- ◆ B. It doesn't rain often in the ..... area of Brazil so it is not .....
- ◆ basin/west
- ◆ northeast, developed

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- ◆ True – False (thumbs up/down)
- ◆ It never rains in the Amazon basin
- ◆ True – False (stand up if true)
- ◆ People cut trees to build houses in the Amazon

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- ◆ Put the word cards at the proper place.
- ◆ rainfall, biotope, humidity (υγρασία-πολλοί υδρατμοί), navigable, reptile, cultivate, high temperature



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- ◆ a) Guessing game - Pictionary: Look at the drawing. What is it? (A place where plants and animals grow)
- ◆ biotope
- ◆ b) I spy a word beginning with f...
- ◆ Flora
- ◆ c)  natural environment destruction

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- ◆ d) afnua =
- ◆ fauna
- ◆ e) r-----l
- ◆ rainfall
- ◆ f) Match

animals  
plants

flora  
friend  
fauna



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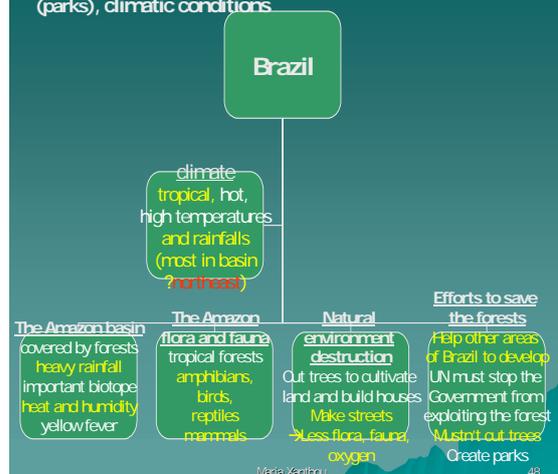
## BINGO

flora	Amazon	fauna
biotope	reptiles	heat
cut	build	create

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Enter information in writing journals: flora (tropical forests), fauna (birds etc), destruction (cut, burn), forest protection (parks), climatic conditions



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## new words

- ◆ map
  - ◆ income
  - ◆ coastal
  - ◆ plateau
  - ◆ basin
  - ◆ plain
  - ◆ overpopulated
  - ◆ ocean
  - ◆ city
- ◆ Capricorn
  - ◆ north
  - ◆ west
  - ◆ east
  - ◆ South
  - ◆ continent
  - ◆ Equator
  - ◆ density
  - ◆ population

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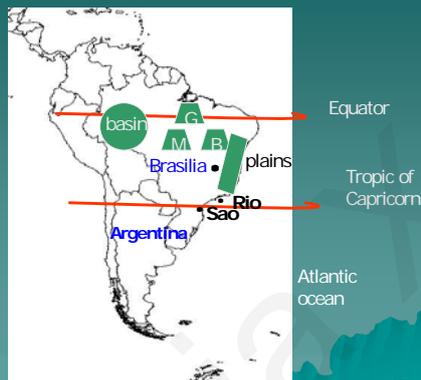
- ◆ cultivate
  - ◆ government
  - ◆ exploit
  - ◆ underground
  - ◆ information
  - ◆ mammal
  - ◆ reptile
  - ◆ plants
  - ◆ environment
  - ◆ species
  - ◆ forest
  - ◆ tropical
  - ◆ jungle
  - ◆ hut
  - ◆ fever
  - ◆ consequences
- ◆ transit
  - ◆ mosquitoes
  - ◆ humidity
  - ◆ flora
  - ◆ heat
  - ◆ biotope
  - ◆ rainfall
  - ◆ navigable
  - ◆ efforts
  - ◆ destruction
  - ◆ natural
  - ◆ fauna
  - ◆ temperature
  - ◆ wealth
  - ◆ develop
  - ◆ region
  - ◆ climate
  - ◆ land

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## Lesson 3

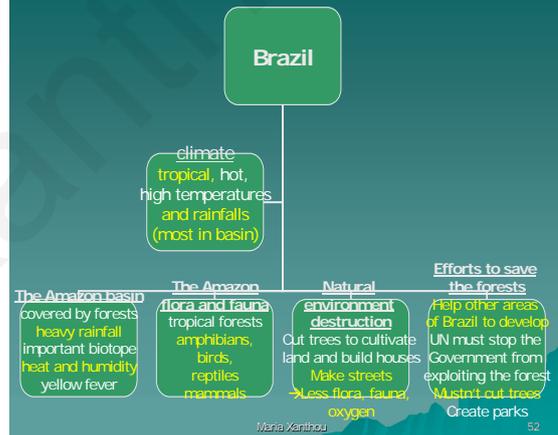
- ◆ physical environment



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## Do you remember...?



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## Brainstorming

- ◆ What products can Brazil produce?

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## Brazil

Ask and report information about products  
 Listen for main ideas and details  
 Read and write about Productive resources  
 Complete Venn diagram

productive resources  
 forest wealth  
 agriculture  
 farming  
 mineral  
 industry

development of industry

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Handout, p.8

## Productive resources of the country

The role of the Amazon in the economy of the country

1 **Forest wealth (βασικός πλούτος)**

- Match the pictures with the sentences (come and show)
- a) The forests of Amazon give timber (ξύλινα).
- b) They get caoutchouc from the trunks of caoutchouc trees.
- c) They take the juice to the factories and convert (μετατρέπουν) it into rubber (λάσπηχο).

2

3

55

Handout, p.9

## Productive resources of the country

### Παγωγικές πηγές

♦ Agriculture (γεωργία) SWA p.54

- The government allows the farmers to burn the forests to cultivate land
- They take water from rivers to water barren areas.
- Main agricultural products:
- ♦ **Look at the map SWA, p.44**
- ♦ **Unscramble: tbcocao, cttoon, sgure cnae, ceoffe, ctiurs furiit, bnanasa, gareps**
- ♦ coffee, sugar cane, cotton, tobacco, citrus fruits, bananas, grapes etc.
- ♦ Brazil is 'the country of c.....'
- ♦ coffee'
- ♦ There are plantations of coffee trees in the south-east
- ♦ Brazil produces the 1/4 of all the coffee produced in the world

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## Cyprus agriculture

- ♦ cereals, olives, carobs, almonds, potatoes, citrus

57

## Compare the products of Cyprus, Brazil and Egypt

58

## Farming (κτηνοτροφία)

SWA, p.54

Handout, 9-10

- ♦ It is developed in ...
- ♦ the central and south areas
- ♦ Unscramble the words: wocs, ipsg, oagts, hspce, ptulory
- ♦ cows, oxen, pigs, goats, sheep and poultry
- ♦ Exports products in tins and frozen meat.

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## Productive resources of the country

Handout, p.10

- ♦ **Mineral wealth (ορυκτός πλούτος)**
- ♦ Map (SWA, p.54)
- ♦ iron, gold, copper, diamonds

60

## Lets play basketball

Report products related to forest wealth, agriculture, farming, and mineral wealth in Brazil





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## Economy of the country

- ◆ For many years economy **depended** on sugar, caoutchouc, gold, and coffee.

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## Productive resources of the country

### Brazil is developing Handout, p.11



- ◆ **Industry** (Is??a??a)
- ◆ **Delete**
- ◆ Brazil **borrowed** money/factories from other countries.
- ◆ Brazil's **external debt** is more than 110 billion/million dollars.
- ◆ Brazil produces electric/solar energy from hydroelectric power stations near rivers.
- ◆ Brazil discovered gold/oil in the Atlantic ocean.
- ◆ They use oil/alcohol to move cars, which they get from sugar cane.
- ◆ The industries produce silk/cars/aeroplanes/ships/textiles/chemical products/ paper/ caoutchouc/ tobacco/spaceships
- ◆ **Sing**
- ◆ Industries produce cars, textiles, tobacco, and caoutchouc.
- ◆ **Mining** (cars, aeroplanes, textiles)

63

## Brazil

**development of industry**

- ◆ **Productive resources**
  - ◆ forest wealth: timber, caoutchouc
  - ◆ agriculture: coffee, tobacco, sugar cane
  - ◆ farming: cows, goats, sheep, poultry
  - ◆ minerals: gold, iron, copper, diamonds
  - ◆ **Industry**: cars, textiles, caoutchouc, chemical products, paper
- ◆ **development of industry**: Oil in Atlantic, Alcohol to move cars, Produce electric energy

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- ◆ Match the words with the pictures
- ◆ timber, tobacco, sugar cane, poultry, copper, textiles, oil



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## Gap-filling – Choose one sentence

- ◆ A. Brazil produces .....energy.
- ◆ B. Brazil is developing because .....
  - ◆ electric
  - ◆ electric energy
  - ◆ oil in Atlantic
  - ◆ alcohol to move cars

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## TIME FOR BOWLING

Industries produce...



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Children use the response boards in their groups.

67

- ◆ True or False? (thumbs up/down)
- ◆ There is gold in Brazil
- ◆ True/False? (stand up if true)
- ◆ There are many farms with cows.

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- ◆ a)
- ◆ b) oil
- ◆ I spy a word beginning with d...
- ◆ diamonds
- ◆ c) tteilxe
- ◆ textile
- ◆ d) c-----c
- ◆ caoutchouc

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## Match

- ◆ Growing plants
- ◆ Getting minerals from the earth
- ◆ Mineral wealth
- ◆ Agriculture
- ◆ Farming

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Present productive resources diagrammatically in writing journals.

### ◆ Productive resources

- ◆ forest wealth → timber, caoutchouc
- ◆ agriculture → coffee, tobacco, sugar cane
- ◆ farming → cows, goats, sheep, poultry
- ◆ minerals → gold, iron, copper, diamonds
- ◆ Industry → cars, textiles, caoutchouc

### Development of industry

Oil in Atlantic  
Alcohol to move cars  
Produces electric energy

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## new words

- ◆ map
- ◆ income
- ◆ coastal
- ◆ plateau
- ◆ basin
- ◆ plain
- ◆ overpopulated
- ◆ ocean
- ◆ city
- ◆ Capricorn
- ◆ north
- ◆ west
- ◆ east
- ◆ South
- ◆ continent
- ◆ Equator
- ◆ density
- ◆ population

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- ◆ cultivate
- ◆ government
- ◆ exploit
- ◆ underground
- ◆ information
- ◆ mammal
- ◆ reptile
- ◆ plants
- ◆ environment
- ◆ species
- ◆ forest
- ◆ tropical
- ◆ jungle
- ◆ hut
- ◆ fever
- ◆ consequences
- ◆ transmit
- ◆ mosquitoes
- ◆ humidity
- ◆ flora
- ◆ heat
- ◆ biotope
- ◆ rainfall
- ◆ navigable
- ◆ efforts
- ◆ destruction
- ◆ natural
- ◆ fauna
- ◆ temperature
- ◆ wealth
- ◆ develop
- ◆ region
- ◆ climate
- ◆ land

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- ◆ almond tree
- ◆ cypress
- ◆ convert
- ◆ textile
- ◆ hydroelectric
- ◆ coal
- ◆ copper
- ◆ frozen
- ◆ ox
- ◆ poultry
- ◆ sugar cane
- ◆ tobacco
- ◆ citrus
- ◆ cereals
- ◆ carob
- ◆ barren
- ◆ trunk
- ◆ timber
- ◆ depend
- ◆ product
- ◆ mineral
- ◆ farming
- ◆ agriculture
- ◆ industry
- ◆ resources
- ◆ external
- ◆ debt
- ◆ borrow

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## Lesson 4

Do you remember...?  
physical environment



75

## Brazil

climate  
tropical, hot,  
high temperatures  
and rainfalls  
(most in basin  
?+south)

The Amazon basin  
covered by forests  
heavy rainfall  
important biotope  
heat and humidity  
yellow fever

The Amazon  
flora and fauna  
tropical forests  
amphibians,  
birds,  
reptiles  
mammals

Natural  
environment  
destruction  
Cut trees to cultivate  
land and build houses  
Make streets  
Less flora, fauna  
oxygen

Efforts to save  
the forests  
Help other areas  
of Brazil to develop  
UN must stop the  
Government from  
exploiting the forest  
Mustn't cut trees  
Create parks

products

## Brazil

Productive resources  
forest wealth  
timber, caoutchouc  
agriculture  
coffee, tobacco, sugar cane  
farming  
cows, goats, sheep, poultry  
minerals  
gold, iron, copper, diamonds  
Industry  
cars, textiles, caoutchouc  
chemical products, paper

## development of industry

Oil in Atlantic  
Alcohol to  
move cars  
Produces electric energy

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76

- ◆ This affects population distribution.  
Επηρεάζεται η κατανομή πληθυσμού

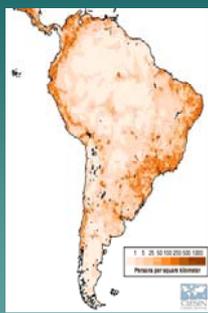
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## Way of life, habits, problems of residents

Handout, p.12



[http://eodbglossary.gisfc.nasa.gov/Study/Location/Images/s\\_america.gif](http://eodbglossary.gisfc.nasa.gov/Study/Location/Images/s_america.gif)

- ◆ **Population distribution**
- ◆ Population distribution is not the same everywhere.
- ◆ Look at the map (pb 133)
- ◆ 1. Most people live in ....., and... Rio de Janeiro and Sao Paolo
- ◆ Most people live near the ... Atlantic ocean.
- ◆ 2. There are many people in these areas because of the **plantations (the cultivated fields)** of ... sugar cane, coffee, cotton, and tea.
- ◆ 3. The **discovery** of ...and... in central-eastern Brazil in 1700 attracted many immigrants gold and diamonds
- ◆ 4. Not many people live in ...
- ◆ The inside of the country is **underpopulated** (αποικιοκτημένο)
- ◆ 5. Which other countries of S.America are under populated? Argentina and Bolivia.

Maria Xanthou 80

Handout, p.13



- ◆ **Problems of Brazilians. What can they do?**
- ◆ **Need:** underline problems
- ◆ **Task:** Choose the correct words
- ◆ In Brazil there is **unequal distribution** of national wealth. Only some people have money.
- ◆ There is high/low standard of living.
- ◆ Many people live in the centre/north/east of Brazil.
- ◆ The government took the capital to Brasilia/Sao Paolo and gave free land in the Amazon area
- ◆ Problems of the cities (3/4 of population lives there): overpopulation (**many people**) / big parks/ unemployment/ poverty/ homeless/ poor neighbourhoods = favelas/ illnesses/ undernourishment/ children in the streets, steal or work all day
- ◆ The government builds public zoos/houses and protects abandoned (**parents left them**) animals/children

Maria Xanthou 81

## Gap-filling (choose one sentence)

- ◆ A. Problems in the cities:  
....., ....., .....
- ◆ B. Some children don't have a .....

- ◆ **overpopulation, unemployment, poverty**
- ◆ **house**

Maria Xanthou In teams 82

## Compare with the life and standard of living in Cyprus

- ◆ High standard of living
- ◆ Every family has or rents a house
- ◆ Food
- ◆ No children in the streets
- ◆ No homeless (άστεργοι)

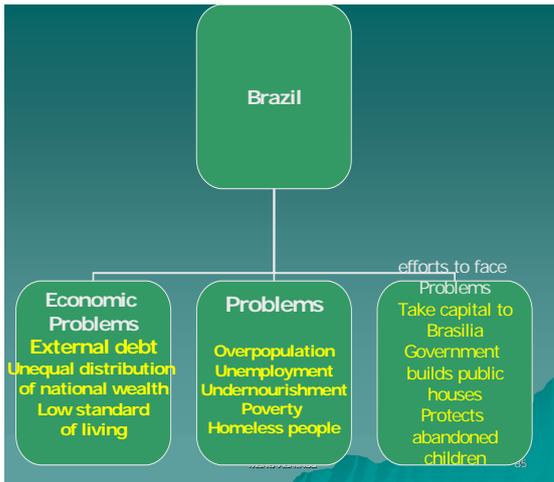
Maria Xanthou 83

## Bingo (problems of Brazil)

unemployment	poverty	standard
protect	distribution	favelas
underpopulated	population	public

Sing: Big problems overpopulation, unemployment and external debt  
Miming: poverty

Maria Xanthou



- ◆ Match the words with the pictures
- ◆ Undernourishment, overpopulation in Sao Paolo, poverty





Maria Xeritrou 86

**Review-**  
Lets play tennis




Problems

Efforts to face them




Use the response boards in groups. Maria Xeritrou 87

- ◆ **True or False? (thumbs up/down)**
- ◆ All the people in big towns of Brazil are rich
- ◆ **True or False? (Stand up if true)**
- ◆ Some children do not have a bed

Maria Xeritrou 88

- ◆ Favelas, poor neighbourhoods
- ◆ I spy a word beginning with p...
- ◆ poverty



- ◆ public
- ◆ Public

- ◆ U-----t
- ◆ unemployment



Maria Xeritrou 89

**Match words with definitions**

- ◆ People can't find a job
- ◆ People don't have food to eat

X

- ◆ Undernourishment
- ◆ Unemployment
- ◆ Overpopulation

Maria Xeritrou 90

Enter information about Brazil's problems in writing journals accompanying words with pictures.

### ◆ Problems

- ◆ External debt
- ◆ Unequal distribution of national wealth
- ◆ Low standard of living
- ◆ Overpopulation
- ◆ Unemployment
- ◆ Undernourishment
- ◆ Poverty
- ◆ Homeless people
- ◆ People live on the east → plantations, gold, diamonds

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### new words

- |                 |              |
|-----------------|--------------|
| ◆ map           | ◆ Capricorn  |
| ◆ income        | ◆ north      |
| ◆ coastal       | ◆ west       |
| ◆ plateau       | ◆ east       |
| ◆ basin         | ◆ South      |
| ◆ plain         | ◆ continent  |
| ◆ overpopulated | ◆ Equator    |
| ◆ ocean         | ◆ density    |
| ◆ city          | ◆ population |

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- |                |               |
|----------------|---------------|
| ◆ cultivate    | ◆ transmit    |
| ◆ government   | ◆ mosquitoes  |
| ◆ exploit      | ◆ humidity    |
| ◆ underground  | ◆ flora       |
| ◆ information  | ◆ heat        |
| ◆ mammal       | ◆ biotope     |
| ◆ reptile      | ◆ rainfall    |
| ◆ plants       | ◆ navigable   |
| ◆ environment  | ◆ efforts     |
| ◆ species      | ◆ destruction |
| ◆ forest       | ◆ natural     |
| ◆ tropical     | ◆ fauna       |
| ◆ jungle       | ◆ temperature |
| ◆ hut          | ◆ wealth      |
| ◆ fever        | ◆ develop     |
| ◆ consequences | ◆ region      |
|                | ◆ climate     |
|                | ◆ land        |

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- |                 |               |
|-----------------|---------------|
| ◆ almond tree   | ◆ barren      |
| ◆ cypress       | ◆ trunk       |
| ◆ convert       | ◆ timber      |
| ◆ textile       | ◆ depend      |
| ◆ hydroelectric | ◆ product     |
| ◆ coal          | ◆ mineral     |
| ◆ copper        | ◆ farming     |
| ◆ Frozen        | ◆ agriculture |
| ◆ ox            | ◆ industry    |
| ◆ poultry       | ◆ resources   |
| ◆ sugar cane    | ◆ external    |
| ◆ tobacco       | ◆ debt        |
| ◆ citrus        | ◆ borrow      |
| ◆ cereals       |               |
| ◆ carob         |               |

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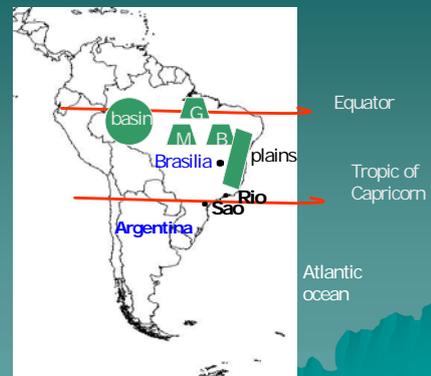
- |                    |                |
|--------------------|----------------|
| ◆ abandon          | ◆ unemployment |
| ◆ steal            | ◆ unequal      |
| ◆ undernourishment | ◆ plantation   |
| ◆ illness          | ◆ resident     |
| ◆ neighbourhood    | ◆ discover     |
| ◆ poverty          | ◆ distribution |
| ◆ homeless         | ◆ public       |
|                    | ◆ protect      |

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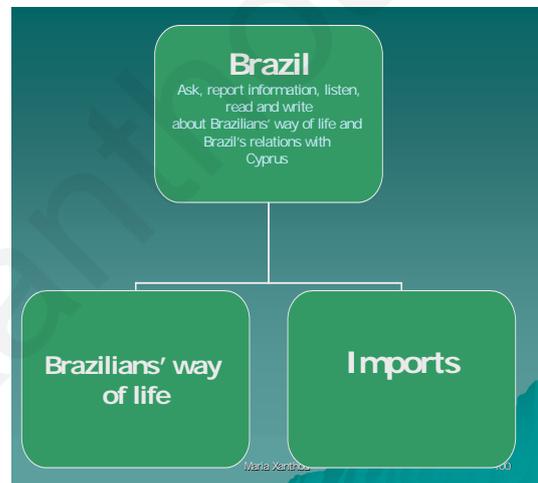
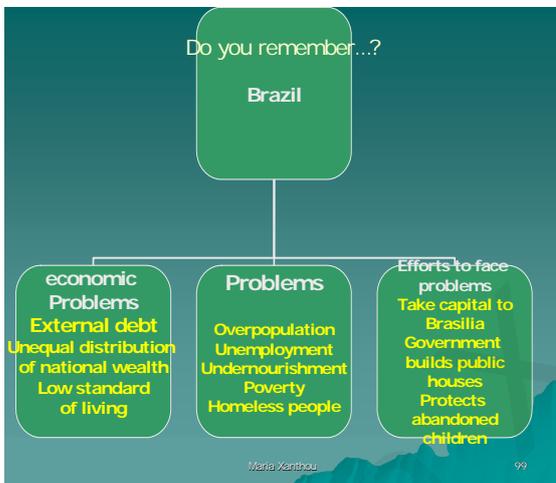
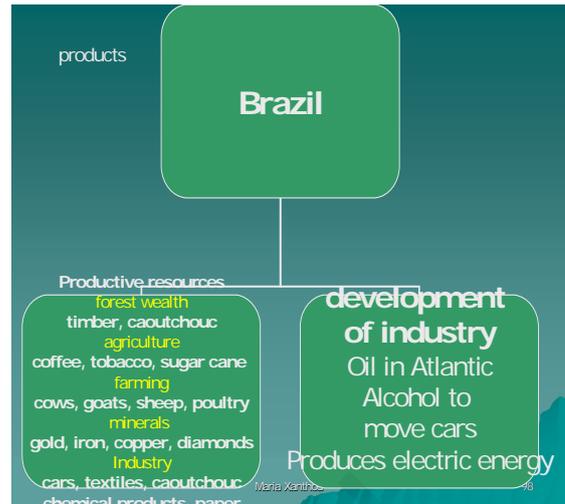
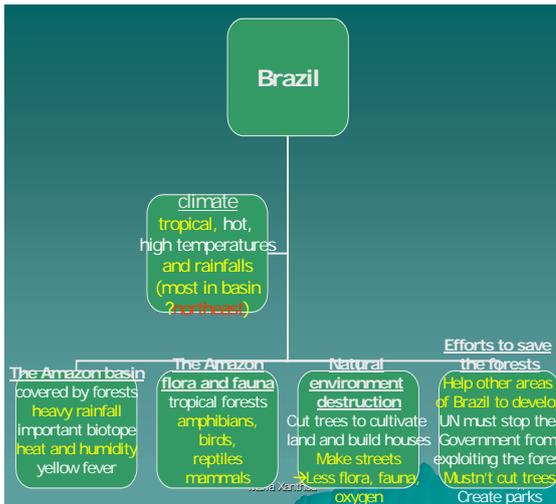
95

## Lesson 5

Do you remember...?  
physical environment



96



**Brainstorming**

- ◆ Brazilians' way of life
- ◆ Cyprus imports...

Handout, p.13

**What are the characteristics of Brazilians?**



<http://www.coolestspringbreak.com/image/RealRio-carnival.jpg>



[http://image.guardian.co.uk/sys-images/Travel/Pix/pictures/2007/10/15/RioCarnival\\_460.jpg](http://image.guardian.co.uk/sys-images/Travel/Pix/pictures/2007/10/15/RioCarnival_460.jpg)

- ◆ Unscramble: ftoaabll, crainavi, dnaicng, umisc,
- ◆ Brazilians love...
- ◆ football, carnival, dancing and music
- ◆ Brazilians organize festivals every year. The carnival of Rio de Janeiro is famous: thousands of tourists visit it to admire the colours, the floats (??mata), thousands of Brazilians walk in a parade, dancing 'samba'.



[http://upload.wikimedia.org/wikipedia/commons/thumb/4/46/Maracana\\_Stadium.jpg/250px-Maracana\\_Stadium.jpg](http://upload.wikimedia.org/wikipedia/commons/thumb/4/46/Maracana_Stadium.jpg/250px-Maracana_Stadium.jpg)



<http://www.60z.uvic.ca/~pmolshel/images/pele.jpg>

- ◆ Brazilians love sports. They prefer ...
- ◆ football. Thousands of people watch football matches. Some **stadiums** are the biggest in the world .....
- ◆ (Marakana in Rio de Janeiro).
- ◆ There are many famous Brazilian football players e.g. ....
- ◆ Pele is considered to be the best football player
- ◆ Brazilians say that 'football is **religion**'

Sing: Brazilians love football, dancing, music, and carnival.

Miming: football, dancing

## Relations between Cyprus and Brazil



[http://i45.photobucket.com/albums/t97/businessshiny/small\\_cup\\_of\\_coffee.jpg](http://i45.photobucket.com/albums/t97/businessshiny/small_cup_of_coffee.jpg)



<http://www.yumedsupport.org/cocoa.6.jpg>



<http://minecooks.typepad.com/photos/uncategorized/sugar.jpg>

- ◆ Cyprus imports (εἶς ??εἶ?)  
Unscramble
- ◆ cfoefe, ococa, usagr
- ◆ coffee, cocoa, sugar

## Brazil

Brazilians' way of life  
football  
carnival  
dancing  
music

### Imports

coffee  
cocoa  
sugar

## Review- Lets play tennis



Way of life

Imports from Brazil



Use the response boards in groups.

- ◆ True or False? (thumbs up/down)
- ◆ Cyprus imports coffee from Brazil.
- ◆ True or False? (Stand up if true)
- ◆ Cyprus imports aeroplanes from Brazil

- ◆ carnival
- ◆ I spy a word beginning with i
- ◆ Imports
- ◆ Pictionary: draw on board – guess
- ◆ Cyprus imports coffee from Brazil
- ◆ ococa
- ◆ coccoa
- ◆ s - - - - m
- ◆ stadium



◆ Bingo

carnival	dancing	coffee
football	cocoa	sugar
music	stadium	Pele

Match word with definitions

- ◆ It has got a brown colour. Cyprus imports it from Brazil
- ◆ wood
- ◆ coffee
- ◆ chocolates

new words

- ◆ map
- ◆ income
- ◆ coastal
- ◆ plateau
- ◆ basin
- ◆ plain
- ◆ overpopulated
- ◆ ocean
- ◆ city
- ◆ Capricorn
- ◆ north
- ◆ west
- ◆ east
- ◆ South
- ◆ continent
- ◆ Equator
- ◆ density
- ◆ population

- ◆ almond tree
- ◆ cypress
- ◆ convert
- ◆ textile
- ◆ hydroelectric
- ◆ coal
- ◆ copper
- ◆ Frozen
- ◆ ox
- ◆ poultry
- ◆ sugar cane
- ◆ tobacco
- ◆ citrus
- ◆ cereals
- ◆ carob
- ◆ barren
- ◆ trunk
- ◆ timber
- ◆ depend
- ◆ product
- ◆ mineral
- ◆ farming
- ◆ agriculture
- ◆ industry
- ◆ resources
- ◆ external
- ◆ debt
- ◆ borrow

- ◆ cultivate
- ◆ government
- ◆ exploit
- ◆ underground
- ◆ information
- ◆ mammal
- ◆ reptile
- ◆ plants
- ◆ environment
- ◆ species
- ◆ forest
- ◆ tropical
- ◆ jungle
- ◆ hut
- ◆ fever
- ◆ consequences
- ◆ transmit
- ◆ mosquitoes
- ◆ humidity
- ◆ flora
- ◆ heat
- ◆ biotope
- ◆ rainfall
- ◆ navigable
- ◆ efforts
- ◆ destruction
- ◆ natural
- ◆ fauna
- ◆ temperature
- ◆ wealth
- ◆ develop
- ◆ region
- ◆ climate

- ◆ abandon
- ◆ steal
- ◆ undernourishment
- ◆ illness
- ◆ neighbourhood
- ◆ poverty
- ◆ homeless
- ◆ unemployment
- ◆ unequal
- ◆ plantation
- ◆ resident
- ◆ discover
- ◆ distribution
- ◆ public
- ◆ protect

- ◆ habit
- ◆ import
- ◆ parade
- ◆ stadium
- ◆ religion

Enter information about Brazilians' way of life and Brazil's relations with Cyprus in writing journals in diagrammatic form

Brazil



### Down: The most important festival in Brazil

- ◆ 1. It is used to make rubbers (e?ast??) C - - - - -
- ◆ 2. A big country near Brazil A - - - - -
- ◆ 3. ...de Janeiro (The old capital of Brazil) R - -
- ◆ 4. They came from Africa to Brazil N - - - -
- ◆ 5. They live in Amazonia I - - - - -
- ◆ 6. ? country on the north of Brazil V - - - - -
- ◆ 7. Brazilian dancing (reversed) A - - - -
- ◆ 8. It is used to move cars (reversed) L - - - - -

- ◆ 1. Caoutchouc
- ◆ 2. Argentina
- ◆ 3. Rio
- ◆ 4. Negros
- ◆ 5. Indians
- ◆ 6. Venezuela
- ◆ 7. Almas
- ◆ 8. Lohocla

### ◆ CARNIVAL



<http://www.travelerworldwide.com/images/2000/photos/brazil/carnival/carnival2.jpg>

Maria Xanthou

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### True or False? (get up if the sentence is correct)

- ◆ Most people live in the centre of Brazil
- ◆ Overpopulation and unemployment in the cities cause poverty

- ◆ X
- ◆ V

Maria Xanthou

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### Gap-filling (choose one sentence)

- ◆ Many people from Europe and Asia went to Brazil to find .....and .....and to plant ....., ....., ....., and .....
- ◆ The ..... are in danger
- ◆ gold, diamonds / sugar cane, coffee, cotton, tea, and caoutchouc
- ◆ tropical forests

Maria Xanthou

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### South Africa



Maria Xanthou

15	◆	\$1 MILLION
14	◆	\$500,000
13	◆	\$250,000
12	◆	\$125,000
11	◆	\$64,000
10	◆	\$32,000
9	◆	\$16,000
8	◆	\$8,000
7	◆	\$4,000
6	◆	\$2,000
5	◆	\$1,000
4	◆	\$500
3	◆	\$300
2	◆	\$200
1	◆	\$100

Maria Xanthou

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◆ You are in Cyprus. Brazil is on the... ◆

◆ A: North east ◆ B: north ◆

◆ C: South west ◆ D: east ◆

**Correct!**



Mania Xanthidou 122

◆ Name a country near Brazil ◆

◆ A: Kenya ◆ B: Egypt ◆

◆ C: Argentina ◆ D: Morocco ◆

◆ The capital of Brazil is ◆

◆ A: Manaus ◆ B: Sao Paolo ◆

◆ C: Rio de Janeiro ◆ D: Brazilia ◆

◆ It covers half Brazil ◆

◆ A: Amazon basin ◆ B: Andes ◆

◆ C: Plain ◆ D: Amazon river ◆

◆ Plateau on the north ◆

◆ A: Peru ◆ B: Guiana ◆

◆ C: plains ◆ D: Andes ◆

◆ Brazil's plains are near the ◆

◆ A Pacific ocean ◆ B Mediterranean Sea

◆ C Atlantic ocean ◆ D Indian ocean

◆ The forests of the Amazon do not produce... ◆

◆ A oxygen ◆ B caoutchouc

◆ C timber ◆ D iron

◆ Mosquitoes transmit malaria and...fever ◆

◆ A red ◆ B white

◆ C orange ◆ D yellow

◆ Brazil does not produce... ◆

◆ A sugar cane ◆ B almonds

◆ C tobacco ◆ D coffee

◆ Which is not a problem of Brazil? ◆

◆ A overpopulation ◆ B unemployment

◆ C illnesses ◆ D carnival

Great Job!!!!



Thank you for playing!

Maria Xanthou 132

Extra activity: Prepare a brochure for  
travelers to Brazil

You can use Kidspiration  
programme.

Maria Xanthou

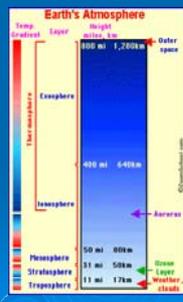
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Maria Xanthou

## 2. PowerPoint Presentations for Science CLIL lessons with CLELD

### Lesson 1(1X80) Atmospheric Pressure





Maria Xanthou 1

### Atmospheric Pressure

Ask and report  
Information  
Listen for main ideas  
Read and write about air

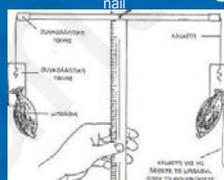
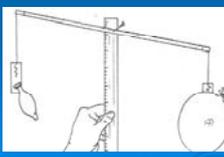
#### Applications εφαρμογές

- Has the air got weight?
- Does the air exercise pressures?
- What happens when we reduce air from a certain space?
- To which direction (κατεύθυνση) is air pressure exercised?

- > We cannot see, touch, smell, or taste the air.
- > Have you ever seen its results?
- > When the wind blows we feel it on our face, or we see that it moves the leaves or raises dust etc.

Maria Xanthou 3

### Has the air got weight?

- > Experiment – πείραμα
- > We put a straw (καλαμάκι) on the top of a ruler.
- > We put two balloons on the two sides.
- > I blow air in one balloon. Inflate (φουσκώσε) one balloon.
- > The scale (ζυγαριά) is not balanced.
- > Conclusion - Συμπέρασμα
- > The air has weight (βάρος)

Maria Xanthou 4

### Does the air exercise pressures?



- > Experiment
- > Put some books on a ball of dough (ζυμάρι)
- > What happened?
- > The ball changed its shape.
- > The books exercised pressures (πιέσεις) on the dough.

Maria Xanthou 5

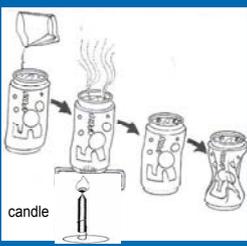
### Do pressures always cause deformation?



- > Experiment
- > A) One child is holding a piece of paper.
- > Another child is pressing. Paper is torn
- > B) Two children push the paper.
- > The paper is not torn
- > Pressure is neutralized (εξουδετερώθηκε)
- > The force (δύναμη) which is exercised by pressure on a body may or may not deform (μορφοποιεί) the body.

Maria Xanthou 6

## Can the air deform with its weight the bodies within it?



candle

The pressure exercised by the air with its weight is called atmospheric pressure

- > **Hypothesis**
  - since air has weight it should deform bodies
  - the air may weight little so it may not cause deformation of bodies
- > **Watch an experiment**
  - aluminum tin with two small holes on one side
- > **Problem:** What will happen if some air from the inside comes out?
- > **Predictions - προβλέψεις**
  - How can the air inside get out?
  - Some water is placed in the tin and the tin is placed on fire.
- > **Stems** come out –close holes
- > Stems are liquefied
- > Tin is **deformed**
- > **Explanation - Εξήγηση**
  - When the inside air was reduced (αραιώσαν αέρα), the inside pressure was reduced → the tin was deformed by the pressure exercised from the **outside**.

Maria Xanthou 7

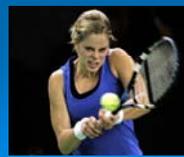
## Lets play tennis

Make sentences about the air




weight

deform




Maria Xanthou 8

## To which direction is the atmospheric pressure exercised? (handout, p.1)





- > **Hypothesis**
  - from the sides because the tin was pressed from the sides
  - from up moving downwards because the atmosphere is over the Earth.
- > **Experiment**
  - Fill up a glass with water to the brim, place cardboard (χαρτί??), turn to all directions.
- > **Questions**
  - Why didn't the cardboard fall?. Why wasn't the water poured?. Which pressure held the cardboard on the glass?
- > **Explanation**
  - The atmospheric pressure pushed the cardboard
  - To which direction did the atmospheric pressure push the cardboard?
  - To all directions, because the cardboard didn't fall (→ )
- > **Conclusion**
  - The atmospheric pressure is exercised to all directions (πασίθεν (πασί???)?)

Maria Xanthou Children represent air 9

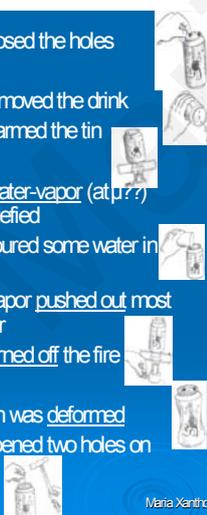
- > Sing: The air has weight, it exercises pressures to all directions
- > Game: Match words with pictures
- > Place words on word wall
- > neutralized, all directions, reduce air, weight






## Handout p.2

1. We closed the holes
2. We removed the drink
3. We warmed the tin
4. The water-vapor (ατμ???) was liquefied
5. We poured some water in the tin
6. The vapor pushed out most of the air
7. We turned off the fire
8. The tin was deformed
9. We opened two holes on the tin



- > Number the pictures to show the sequence (σε???) for the tin experiment
- > 9, 2, 5, 3, 7, 6, 1, 4, 8
- > 7 2 4
- > 8 3 6
- > 5 9 1

Maria Xanthou 11

## Gap-fill (Choose one paragraph)

- > A) When the air in a tin is ....., it is ..... The ..... outside is greater and it ..... the tin.
- > B) The ..... exercises pressures on bodies.

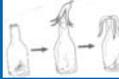
**A. warmed, reduced, pressure, deforms**  
**B. air**

Maria Xanthou 12

## Applications Handout, p.3

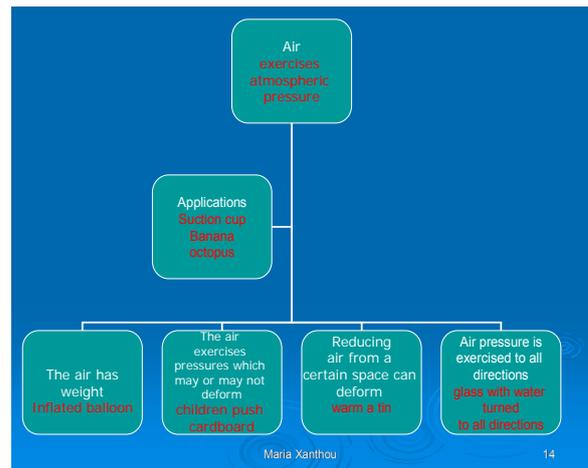
### Discuss in your group - Explain






- The hunger with suction cup (βε? ???a-??εαst???) is held on the wall without glue
- The atmospheric pressure presses the outside part of the suction cup and holds it on the wall.
- If we squeeze two suction cups they will not separate apart.
- The pressure we exercise pushes out some of the air between the two suction cups and the atmospheric pressure outside doesn't allow them to separate apart.
- We light the cotton and throw it in a bottle. The banana falls.
- The flame warms the air in the bottle and forces some of it to go out. The atmospheric pressure presses the banana to go into the bottle.
- The octopus hooks with its suction cups on the rocks and on our hand
- When the octopus presses our hand, it pushes out the air under the suction cups and it hooks. The atmospheric pressure presses the suction cups.

Maria Xanthou 13



## Lets race!




- The pressure exercised by the air is called. ....
- Tell us one application of atmospheric pressure
- When the air pushes our body, it is not deformed because our inside pressure. .... the air pressure
- To which direction is air pressure exercised?








Use the response boards in your groups.  
Maria Xanthou 15

- **True/False (thumbs up/down)**
- The banana slips in the bottle because the air in the bottle warmed it
- **True/False (stand up if true)**
- The suction cup stays on the wall because there is not much air under it. So the outside pressure presses it.

Maria Xanthou 16

- Draw  ← What is this?
- Atmospheric pressure
- I spy a word beginning with d
- (deform/directions)
- Picture labeling 
- The air has weight
- dferom
- deform
- -----
- pressure 

Maria Xanthou 17

## Bingo

air	weight	reduce
deform	directions	suction cup
pressure	banana	octopus

Maria Xanthou 18

## Match

- 1. Atmospheric pressure can cause this when the inside pressure of an object is small.
- A. neutralization
- B. deformation
- C. reduction
- D. exercise

Maria Xanthou

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- Enter information about atmospheric pressure in writing journals

- The air has weight



- Reducing air → can deform



- Air pressure is exercised to all directions



Maria Xanthou

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## new words

- straw
- scale
- pressure
- dough
- neutralize
- force
- deform
- prediction
- steam
- liquefy
- reduce
- experiment
- direction
- vapor
- sequence
- application
- suction cup
- separate
- hook
- cardboard
- squeeze
- candle
- inflate
- remove
- discuss
- blow
- explanation

Maria Xanthou

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## Lesson 2 (1X80)

### What is there around us?



Maria Xanthou

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## Atmospheric Pressure

Ask and report  
Information  
Listen for main ideas  
Read and write about air

Does the air exercise great forces ?

What happens when we go higher?

Maria Xanthou

23

## Do you remember?

- The air has **weight**
- The air **exercises pressures** with its weight to all directions
- The air pressure is called **atmospheric pressure**
- We can see the results of the atmospheric pressure when the air is **reduced** or pushed out from a certain space.

Maria Xanthou

24

## How strong are the forces exercised by the atmospheric pressure? Handout, p.4



Tie the bag

Turn the bag inside out

Put the bag in the vessel. Blow - Fasten with elastic bands

### Conclusion:

the atmospheric pressure can exercise great forces.

Does the air around us press our body?

The air presses our body from the outside. The inside pressure of our body neutralizes the atmospheric pressure so we don't feel it.

- > Pull the thread (???)
- > What do you observe? (Ti pa?at??e?)
- > The bag can't come out.
- > Make holes in the bag using your pencil.
- > Pull again
- > What do you observe?
- > The bag comes out
- > **Explanation**
- > In the first case what happened to the air under the bag?
- > It became thinner
- > What happened to its pressure?
- > Less
- > Where does the air exercise more pressure inside or under the bag?
- > inside
- > Why can't the bag come out?
- > Inside pressure was greater than under the bag.
- > Why did you pull easier the bag out of the vase in the second case?
- > The pressure in the bag was the same as outside

Maria Xanthou

## Lets play football!



1. What can the atmospheric pressure exercise?
  - > **Great forces (δυνάμεις)**
2. Why don't we feel the air pressure?
  - > The inside pressure of our body neutralizes (εξουδετερώνει) the atmospheric pressure

Maria Xanthou

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Handout, p.5



Fasten the straw in the test tube with placticine.

Warm the under part of the tube with a candle.

Turn the tube upside down and put the end of the straw in the coloured water.

- > **Experiment**
- > **What happened?**
- > The water got in the straw.
- > The water moved upwards and got in the test tube.
- > Water is running from the straw.
- > The water vapor pushed out part of the air
- > The air in the tube became thinner.
- > The outside pressure (εξωτερική πίεση) pushed the water in the straw where the pressure was lower.

Maria Xanthou

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## Is the atmospheric pressure the same everywhere? Handout, p.6



- > **Experiment**
- > A
- > 1) Place one book over the ball of dough (ζυμάρι).
- > 2) Place three or four books over the other ball.
- > 3) **Raise** the books.
- > What do you observe?
- > **Conclusion**
- > The greater the weight over a body, the greater the pressure exercised on it

Maria Xanthou

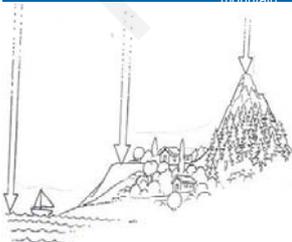
28

## Is the atmospheric pressure the same everywhere? Handout, p.6

Here all the layers (στρώματα) of the air press with their weight the surface of the sea.

There are less layers of air over the plateau (οροπέδιο)

Here there are very few layers of air pressing with their weight the peak of the mountain.



- > B
- > In higher places such as the peak (κορυφή) of a mountain, the atmospheric pressure is reduced (μειώνεται) because ...
- > there are less layers (λιγότερα στρώματα) of air pressing with their weight over the bodies.
- > **Conclusion**
- > The higher we go, the greater is the reduction of atmospheric pressure.

29



Immerse the can without its lid, in the water



Close the can with the lid

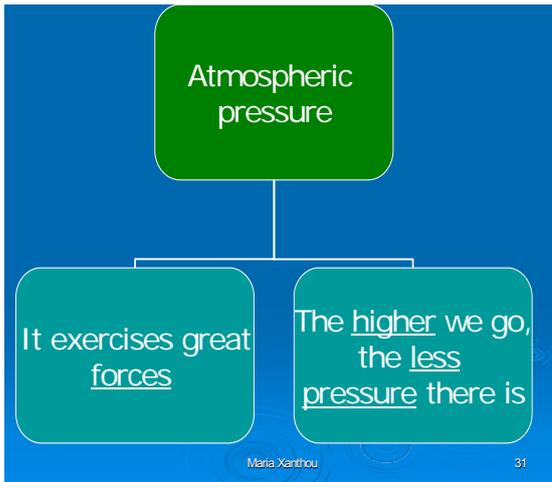


Take the can out of the water

- > Problem: How can water run without removing the lid (κόλυμα)?
- > **Hypothesis**
- > A hole has to be made in the lid.
- > Punch a hole on the lid (hammer and nail)
- > The water streams (comes) out of the holes
- > The water flow (ροή) is stopped each time we close the lid's hole.
- > **Conclusion**
- > The hole in the lid allows the air to get in the can and exert pressure on the water forcing it out of the can.
- > Some children represent atmospheric pressure entering the lid

Maria Xanthou

30



**Say rhythmically**

➤ The higher we go, the less pressure we can feel

Maria Xanthou 32

➤ Match the words with the pictures

➤ Less layers of air, little atmospheric pressure, great atmospheric pressure





Maria Xanthou 33

➤ Gap-fill (Choose one paragraph)

➤ A) The atmospheric pressure exercises ..... but the ..... we go, the ..... pressure we can feel

➤ B) On the top of a mountain there is ..... atmospheric pressure.

➤ A. **great forces, higher, less**

➤ B. **little**

Maria Xanthou 34

**Lets race!**




➤ The water is not running because...

➤ The outside pressure is pressing



➤ If we open a hole the water can run because...

➤ The outside pressure will force water to run




Use the response boards in your groups.  
Maria Xanthou 35

➤ **True/False (thumbs up/down)**

Mr Brown is very strong so he doesn't feel the atmospheric pressure.

➤ **True/False (stand up if true)**

When we drink a milkshake in Platres we accept less pressure than when we drink it in Paphos castle.

Maria Xanthou 36

What is this?



- > great atmospheric pressure
- > I spy a word beginning with l
- > layers
- > Picture labeling



- > The outside pressure pushed the water in the straw where the pressure was lower
- > tblue
- > tube
- > -----
- > force



Maria Xanthou 37

## Bingo

raise	immerse	vessel
layer	tube	lid
hammer	flow	press

Maria Xanthou 38

## Match

- > 1. When we .....the air in a bottle, it escapes and becomes thinner.
  - > A. wash
  - > B. warm
  - > C. blow

Maria Xanthou 39

## new words

- > raise
- > immerse
- > vessel
- > fasten
- > tube
- > peak
- > layer
- > lid
- > hammer
- > flow
- > press
- > exert
- > punch
- > pull
- > case
- > observe

Maria Xanthou 40

- > Enter information in journals
- > Atmospheric pressure exercise
- > great forces
- > The higher we go, the less pressure there is



Maria Xanthou 41

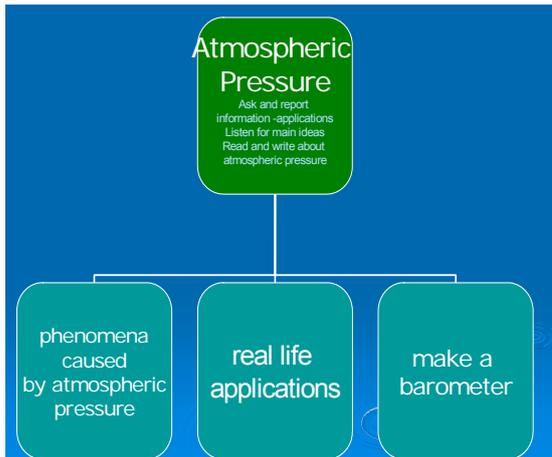
## Lesson 3 (1X80?)

### Bottle and egg




- > 'magic' bottle and a hard-boiled egg (shell the egg)
- > Can the egg get in the bottle?
- > no → the bottle's mouth has a smaller diameter than the diameter of the egg.
- > Try to put the egg in the bottle
- > There is a way to put the egg in the bottle without crushing it.

Maria Xanthou 42



- ## Remember?
- > a) It is difficult to see that there is air
  - > We cannot see it, touch it, smell it, or taste it. We realize its existence from its results; When the wind blows we feel it on our face, or we see that it moves the leaves
  - > b) The atmospheric pressure exercises great forces
  - > c) The results of the atmospheric pressure are obvious when the air is reduced from a certain space
  - > d) The higher we go, the greater is the reduction of atmospheric pressure.

- > **Watch an experiment**
- > A piece of cotton with alcohol
- > Light the cotton and throw it in the bottle
- > When the flame is put out, we put the egg on the bottle's mouth
- > The egg falls in the bottle
- > **Explain**
- > Flame warmed the air in the bottle and part of it **escaped**.
- > Lower pressure in the bottle
- > The air outside exerts pressure on the egg.
- > The atmospheric pressure pushes the egg in the bottle
- > Why did this happen? Work with the next task.

Handout, p.8

- > **Experiment (8A)**
- > Hold a **funnel** (χωνί) with mouth on the narrow side and close the other side with a piece of photocopy paper
- > Sip (ρούφηξε) while removing hand from the piece of paper
- > The piece of paper is absorbed inside the **funnel** and is held for a while on the lips of the funnel
- > **Explanation**
- > The inside pressure was reduced because we sipped the air from the funnel →
- > the atmospheric pressure pushed the piece of paper inside the **funnel**.

- > Compare the funnel and egg experiments
- > Just as the **quantity** of air in the **funnel** was reduced by sipping, the same happened to the quantity of air in the bottle by expelling the warm air. The difference of air pressure was the cause of what happened.
- > **Conclusion**
- > when part of the air in a certain space is reduced, then the air pressure in this space is also reduced and the result is that the atmospheric pressure is exercising greater pressure.

- > A balloon is *blown up*. It is pressed by the teacher's hand.
- > The air comes out of the balloon.
- > **Explanation**
- > the air inside the balloon had **more pressure** than the air outside the balloon. So, the air in the balloon moved outside due to greater inside pressure to space which had **less pressure**.
- > Some children come out in front of the class. They represent how low and high atmospheric pressure react.
- > **Sing: When air is reduced, then pressure is reduced.**



- > **Experiment**
- > Transfer some water from one glass to another. Use a dropper.
- > Discuss about how the dropper works
- > We press the plastic part of the dropper to push the air out. We immerse the dropper in a glass of water and release the plastic part. The dropper is filled with water.
- > **Explanation**
- > The plastic part is pressed to push out the air. The little air in the dropper exercises little pressure. When the ending of the dropper is immersed in the water and we stop pressing the plastic part, the atmospheric pressure pushes the water in the tube of the dropper.

## Lets play basketball

a) Which pressure was reduced? inside

b) Where can you see more pressure if you press the balloon? inside



## Explain



- > The boy was sipping when the juice was over. The box was deformed / indented. Why?
- > The pressure in the box was reduced and the atmospheric pressure pushed the walls of the box inside
- > Mother opens two holes on the milk tin. Why?
- > The air comes from one hole, it exercises normal atmospheric pressure and pushes the milk to the other hole.

## Explain



- > Why do water vessels (d??eã) usually have two holes?
- > Air comes from one hole and pushes the water to the other hole
- > How can a funnel raise a table?
- > The air under the suction cup escapes, so the atmospheric pressure holds it tied on the table.

## Explain



- > Nicos closed the mouth of the bottle using plasticine. Now, he is trying to drink. The drink doesn't reach his mouth. Why?
- > When a child starts sipping, the liquid level moves downwards. This reduces the air in the bottle and therefore its pressure. The reduced pressure cannot push the drink to the child's mouth.
- > When Maria was in Troodos, she half-filled a bottle with water. When she went to Nicosia, the bottle was a little indented. Why?
- > The outside pressure was greater than the inside pressure.

## Atmospheric pressure



explained phenomena caused by atmospheric pressure

real life applications

make a barometer

## Make a barometer

- Materials
- bottle made of transparent glass (1/2 to 1 litre)
  - plastic straw
  - plasticine
  - cardboard (15 cm X1,5 cm)
  - glue
  - candle
  - matches
  - empty vase
  - coloured water



Use plasticine to make a lid for the bottle.



Make a scale with the cardboard and stick it on a straw.



Remove the lid. Pass the straw through the lid. Fasten the lid on the bottle.



Use a lit candle to drop some melted wax around the lid.



Warm the bottle with your hands for one minute.

Turn the bottle in a vase with coloured water. Wait until the water reaches half of the scale. The barometer is ready. If the atmospheric pressure is increased, where will the water go?

Maria Xanthou



## Lets play football!



1. Why can't the boy sip?  
Low pressure
2. Why do we press the dropper?  
Push the air out – little pressure inside and the water comes in



Maria Xanthou

56

## Match words with pictures

- reduced pressure, atmospheric pressure pushes (2)



Maria Xanthou

57

## Gap fill (choose one paragraph)

- A) Water vessels usually have ..... holes. .... enters from ..... and .....the water to.....
- B) The ..... can help us to pour milk from a tin when we open .....holes.
- A. two, Atmospheric pressure, one hole, pushes, the other
- B. Atmospheric pressure, two

Maria Xanthou

58

## TIME FOR BOWLING

1. The suction cup can lift a table because the ..... escapes, so the atmospheric pressure can hold it on the table.
2. The bottle was filled up in Platres. Now the girl is in Nicosia. It is deformed because the outside pressure is .....



Use the response boards in your groups.

Maria

## Atmospheric pressure



15	\$1 MILLION
14	\$500,000
13	\$250,000
12	\$125,000
11	\$64,000
10	\$32,000
9	\$16,000
8	\$8,000
7	\$4,000
6	\$2,000
5	\$1,000
4	\$500
3	\$300
2	\$200
1	\$100

Maria Xanthou

60

 The atmospheric pressure....  
the box

A: deformed      B: reduced  
C: warmed      D: boiled

# Correct!



Maria Xanthou 62

 The air goes in the tin and  
exerts.....on the milk.

A: warm      B: fire  
C: pressure      D: sip

➤ Draw  What is this?

➤ I spy a word beginning with e

➤ escape

➤ Picture labeling 

➤ outside

➤ -----

➤ dropper

Maria Xanthou 64

## Bingo

boil	dropper	funnel
quantity	explanation	release
escape	observe	sip

Maria Xanthou 65

## Match

➤ 1. It helps us to push air out and take water from a glass.

➤ A. funnel

➤ B. dropper

➤ C. barometer

Maria Xanthou 66

**new words**

- boil
- funnel
- sip
- quantity
- dropper
- release
- escape

Maria Xanthou

67

➤ Enter information about what can be caused by atmospheric pressure in writing journals

➤ **Atmospheric pressure**



➤ **applications**



Maria Xanthou

68

Handout, p.10

**Make a barometer**

- Materials
- bottle made of transparent glass (1/2 to 1 litre)
  - plastic straw
  - plasticine
  - cardboard (15 cm X1,5 cm)
  - glue
  - candle
  - matches
  - empty vase
  - coloured water



Use plasticine to make a lid for the bottle.



Make a scale with the cardboard and stick it on a straw.



Remove the lid. Pass the straw through the lid. Fasten the lid on the bottle.



Use a lit candle to drop some melted wax around the lid.



Warm the bottle with your hands for one minute.

Turn the bottle in a vase with coloured water. Wait until the water reaches half of the scale. The barometer is ready. If the atmospheric pressure is increased, where will the water go?



### 3. PowerPoint Presentations for Maths CLIL lessons with CLELD

**Maths (CLIL)**

- The Circle
- Grade: 6
- Lesson 1

• Do you know any circular objects?  
κυκλικά αντικείμενα

Maria Xanthou 1

Circle speak about the circle

- Centre (κέντρο). Radius (ακτίνα). Diameter (διάμετρος). Circumference (περιφέρεια)
- Find the **relation** between the radius and the diameter
- Draw a circle. its radius. and its diameter

Maria Xanthou 2

• Have you seen the wheel (τροχός) of a bike? What has it got?

- **Radius (ακτίνα)**
- **Radii**



Maria Xanthou 3

**A**

- Use your ruler to draw a **line segment** (ευθύγραμμο τμήμα) which joins the centre (κέντρο) of the circle and a point (σημείο) on the circle **circumference** (περιφέρειας του κύκλου).
- The **line segment** which joins the centre of the circle with one of the points of its circumference is called **radius (ακτίνα)** of the circle.

Maria Xanthou 4

**B**

- Use your ruler to draw a **line segment** which **joins** two points of the circle circumference **and** passes from the **centre** of the circle.
- The **line segment** which **joins** two points of the circle circumference and passes through the **center** of the circle is called **diameter** of the circle.

**C. Pair work**

1. How many diameters has a circle got? .....
2. How many radii has a circle got?.....

Many. infinite

Maria Xanthou 5

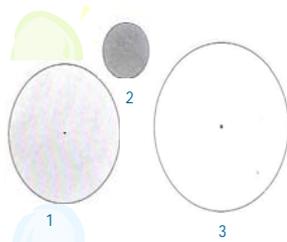
**Lets play tennis**

Show the centre  
Draw a radius

Show the circumference  
Draw a diameter

Groups use their response boards to answer

Maria Xanthou 6



Circle	Radius	Diameter (cm)
1	2.5	
2	1	
3	3	

### D

• **Measure** the radius and the diameter of the circles using your ruler. **Complete** the **chart**.

• Conclusion: The diameter is two times the radius.  
 Η διάμετρος είναι **διπλάσια** από την ακτίνα.

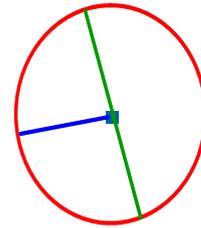
• Show the diameter using both of your hands and the radius using one of your hands.

• Sing: Two times the radius gives the diameter.

Maria Xanthou

7

- Show the words on the circle
- **centre, radius, diameter, circumference**



radius. diameter. =. 2. x  
 diameter = 2 x radius

Maria Xanthou

8

Fill in the gaps. Choose A or B

- A. The ..... joins the centre of the circle and a point on the circle's **circumference**.
- B. The radius of a circle is a straight-line drawn from the ..... of the circle to any point on its .....

A. radius

- B. centre. circumference

Maria Xanthou

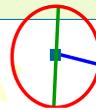
9



centre.  
radius.  
diameter.  
circumference

Find the relation  
between the  
radius and the  
diameter

Draw a circle.  
its radius. and  
its diameter



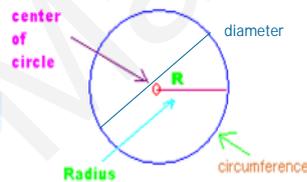
$$d = 2 \times r$$

$$\Delta = 2 \chi \alpha$$

Maria Xanthou

10

### CIRCLE



<http://www.geocities.com/kevinbisesser/AreaOfCircle.html>

- The diameter is two times the radius  
 $(d = 2 \times r)$

Maria Xanthou

11

### ΚΥΚΛΟΣ



Η διάμετρος είναι το **διπλάσιο** της ακτίνας.

Η ακτίνα είναι το **μισό** της διαμέτρου.

$$\delta = 2 \cdot \alpha$$

$$\alpha = \delta : 2$$

Maria Xanthou

12

## Lets race!

- The periphery of the circle is called .....
- circumference
- This line joins two points on the circle's circumference and passes through the centre: .....
- diameter



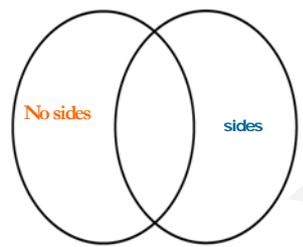


Maria Xanthou 13

- **True or False (thumbs up/down)**
- The radius is two times the diameter
- **True or False (stand up if true)**
- Two times the radius equals the diameter.

Maria Xanthou 14

## Compare the circle with the square



Maria Xanthou 15



- diameter
- The diameter is two times the radius
- I spy a word beginning with c
- circumference
- driasu
- radius
- - e - - - -
- centre



Maria Xanthou 16

## Match

- From the center to the circumference
- It joins two points of the circumference, and passes through the centre of the circle

- diameter
- radius
- centre

Maria Xanthou 17

## Bingo

radius	diameter	circumference
centre	join	line segment
measure	pass	circular

Maria Xanthou 18

## Circle Crossword

- The periphery of a circle -----
- The circle has many ---- (reversed)
- It joins two points of the circumference and passes through the center (reversed)-----
- A radius joins the ----- of the circle and a point on the circle's circumference
- The diameter of a circle is a ---- segment
- Two times the radius ----- the diameter.

- 1. circumference
- 2. idar
- 3. retemaid
- 4. centre
- 5. line
- 6. equals

Maria Xanthou 19

## new words

- centre
- radius
- diameter
- circumference
- line segment
- join
- pass
- infinite
- chart
- equal
- circular
- object
- measure
- wheel
- square

Maria Xanthou 20

- Draw a circle and enter information in writing journals

Maria Xanthou 21

## Maths (CLIL) Lesson 2

- This is a **compass** (διαβήτης). Look how we can draw a circle

Maria Xanthou 22

Circle  
Listen - Read  
problems  
Write and report  
answers

- Draw a circle using the **compass**
- Draw a circle when you know the **radius** or the **diameter**
- Solve problems – **calculate the diameter**
- Next lesson: calculate the **circumference**

Maria Xanthou 23

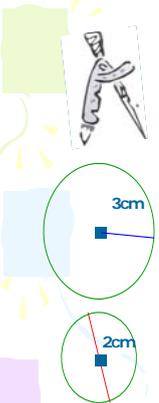
## Do you remember...?

<http://www.geocities.com/kevinbisesser/AreaOfCircle.html>

- The diameter is two times the radius ( $d = 2 \times r$ )

Maria Xanthou 24

### A



- Use your compass and your ruler to draw the circles:
- Circle with **radius** 3cm
- Circle with **diameter** 4cm.

Maria Xanthou 25

### B

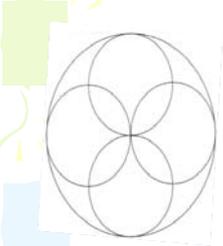
Coin	Length of opening
20 c	23 mm
10 c	20 mm



- A parking meter will be set up in a parking place. People can put 20cent and 10 cent coins. The opening of the coin slot for each coin will be 2mm bigger than their diameter. Help the machine designer to complete the table.

Maria Xanthou 26

### C

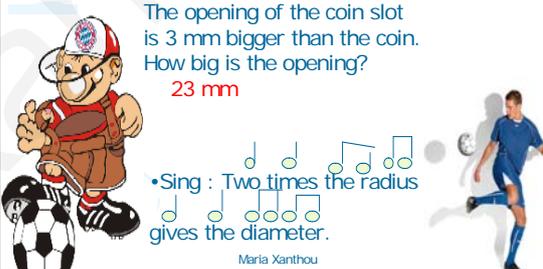


- Use only your **compass** to draw the shapes. Compare the length of the **radius** of the small circles to the radius of the big circle and write your **observations**.
- **Conclusion:** The length of the radius of the small circles is half the length of the radius of the big circle
- Show the diameter using both of your hands and the radius. using one hand.

Maria Xanthou 27

### Lets play football!

- 1. A circle has a 6 cm diameter. How can you draw it?  
**3 cm radius**
- 2. A coin has a 10 mm radius. The opening of the coin slot is 3 mm bigger than the coin. How big is the opening?  
**23 mm**



• Sing : Two times the radius gives the diameter.

Maria Xanthou

- Match words with drawings. centre, radius, diameter, circumference, compass



Maria Xanthou 29

### Fill in the gaps. Choose A or B

- A. We use a ..... to draw a circle. If the circle has a .....cm diameter. then its radius is.....cm
- B. I use a .....to draw a circle.
- A. compass, 6cm, 3cm
- B. compass

Maria Xanthou 30

Circle

Draw a circle using the compass

Draw a circle when you know the radius or the diameter  
 $d=8\text{ cm}$   
 $r=4\text{ cm}$

Solve problems – calculate the diameter

Maria Xanthou 31

- We use a compass to draw a circle
- If  $d=3\text{ cm}$
- $r=1.5\text{ cm}$

<http://www.geocities.com/kevinblissesser/AreaOfCircle.html>

- The diameter is two times the radius  
 $(d = 2 \times r)$

Maria Xanthou 32

## Let's race!

- Draw a circle with a 10 cm diameter. How much did you open the compass?
- 5 cm
- Draw a circle with a 3.5 cm radius. What is the diameter?
- 7 cm

Children use the response boards in their groups.

Maria Xanthou 33

- **True or False (thumbs up/down)**
- If the diameter is 11 cm, then the radius is 22 cm.
- **True or False (stand up if true)**
- If the radius is 7 cm, then we can draw a circle with a 14 cm diameter.

Maria Xanthou 34

- radius
- The radius is half the diameter
- I spy a word beginning with c
- compass
- daiemtre
- diameter
- - o - -
- coin

Maria Xanthou 35

## Bingo

radius	diameter	circumference
centre	compass	line segment
circle	coin	infinite

Maria Xanthou 36

## Match

- From the center to the circumference
- It is two times the radius

- diameter
- radius
- centre

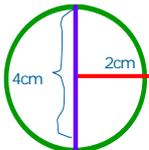
Maria Xanthou 37

## new words

- centre
- radius
- diameter
- circumference
- line segment
- join
- pass
- infinite
- chart
- equal
- circular
- object
- measure
- wheel
- square
- compass
- calculate
- length
- conclusion
- observation
- coin
- decoration
- relation
- shape

Maria Xanthou 38

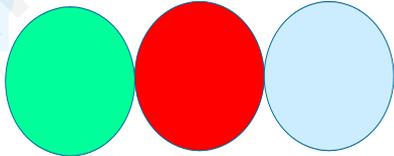
- Enter information about the circle in writing journals



Maria Xanthou 39

## Extra activity

- Use colourful papers to create **decorations** using circular shapes of different sizes.



Maria Xanthou 40

## Maths (CLIL) Lesson 3

- Look at these circular objects. How can we find their **circumference**?



Maria Xanthou 41

Circle

Listen - Read problems  
Write and report answers

Next lesson:  
calculate area

Find the length (p????) of a circle

Find the Circumference  
Discover number p

Find the Circumference when you Know the radius

Solve problems (Calculate Circumference)

Maria Xanthou 42

### Do you remember..?

- We use a compass to draw a circle
- If  $d=3\text{ cm}$
- $r=1.5\text{ cm}$

<http://www.geocities.com/kevinbisesser/AreaOfCircle.html>

- The diameter is two times the radius ( $d = 2 \times r$ )

Maria Xanthou 43

### A

- Take ten **circular** objects. Measure their **circumference** (περίμετρος) using a piece of thread. and their **diameter** using your ruler. Write your measurements in the table.

Name of object	Length of circumference (mm)		Circumference : Diameter A: B
	A	B	
1 cup			
2 tin			
3 plate			
4 glass			
5 funnel			
6 bowl			
7 tambourine			
8 tin			
9 bottle			
10 cello tape			

Maria Xanthou 44

### B

- Write one equation for the circle circumference.  
Circumference = .....
- Circumference = diameter x 3.14**

The **ancient** Greeks studied the relation between **circumference** and diameter. The ratio between the circumference and the diameter of a circle is called 'pi' and it is symbolized with  $\pi$ . It is  $22/7$  or around 3.14.

Maria Xanthou 45

### C. Solve the problems

- 1. Use  $\pi$  to find the length of the dotted line  
(Βρες το μήκος της διακεκομμένης γραμμής).

The line forms a circle with a 4 cm radius.

$C = d \times 3.14$   
 $C = 8\text{cm} \times 3.14$   
 $C = 25.12\text{ cm}$

Maria Xanthou 46

- 2. A football ground (stadium) has the following **shape**. Its two sides are semicircle (ημικύκλιο). **Calculate** the **circumference** of the stadium.

The radius of the circle is 12.5 m

$C = d \times 3.14$   
 $C = 25 \times 3.14 = 78.5\text{ m}$

Stadium periphery =  $50\text{ m} + 50\text{ m} + 78.5\text{ m} = 178.5\text{ m}$

Maria Xanthou 47

- 3. The **diameters** of the wheels of a bicycle are 25cm and 110 cm. If the bike driver covers a 500m distance. how many **turns** (γύρους) will each wheel do?

500 m = .....cm  
50000cm

Circumference of small circle  
 $C = d \times 3.14$   
 $25 \times 3.14 = 78.5\text{ cm}$

Circumference of big circle  
 $C = d \times 3.14$   
 $110 \times 3.14 = 345.4\text{ cm}$

50000cm : 78.5 = 637 turns  
50000cm : 345.4 = 145 turns

Maria Xanthou 48

- Show the diameter and circumference of a circle using your hands.
- Sing: Circle **circumference equals** 3.14 times the **diameter**.

Maria Xanthou 49

### Lets play basketball

- $C = \dots \times 3.14$   
diameter
- If diameter is 2cm. What is the circumference?  
• 6.28 cm

Maria Xanthou 50

- Put flash cards at the correct place
- diameter. circumference. 3.14
- Circumference = diameter x 3.14**

Maria Xanthou 51

### Fill in the gaps. Choose A or B

- A. A circle has a 2 cm diameter. Its circumference is.....cm.  
• 6.28 cm
- B. A circle has a 2 cm radius. Its diameter is.....and its circumference is .....cm.  
• 12.56

Maria Xanthou 52

Circle

$C = 8\text{cm} \times 3.14$   
 $C = 25 \times 3.14 = 78.5\text{ m}$   
 $50\text{ m} + 50\text{ m} + 78.5\text{ m}$   
 $110 \times 3.14 = 345.4\text{ cm}$   
 $5000\text{ cm} : 345.4 = 1446$   
 $25 \times 3.14 = 78.5\text{ cr}$   
 $6000\text{ cm} : 78.5 = 637$

- Find the length of a circle thread
- Find the circumference  
Discover number  $\pi = 3.14$
- Find the circumference when you know the radius  
 $C = d \times 3.14$
- Solve problems (Calculate circumference)

Maria Xanthou 53

- We use a compass to draw a circle
- If  $d=4\text{ cm}$ .  $r=2\text{ cm}$

- $d = 2 \times r$
- $r = d : 2$
- Circumference = diameter x 3.14**

Maria Xanthou 54

### Lets race!

- The diameter is 1 cm. What is the C?
- 3.14 cm
- The diameter is 10 cm. What is the C?
- 31.4 cm





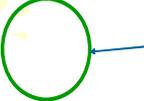



Use the response boards in your groups.

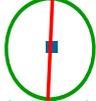
Maria Xanthou 55

- **True or False (thumbs up/down)**
- If the diameter is 3 cm. then the circumference is 6 cm.
- **True or False (stand up if true)**
- If the radius is 1 cm. then the circumference is 6.28 cm.

Maria Xanthou 56



• Circumference



- The circumference is 3.14 times the diameter.
- I spy a word beginning with t
- thread
- wehel
- wheel

- - i - - - - -
- circular



Maria Xanthou 57

### Bingo

dotted	distance	tray
tambourine	ancient	discover
circle	cellotape	semicircle

Maria Xanthou 58

### Match

- 3.14 times the diameter
- diameter
- radius
- circumference

Maria Xanthou 59

- Enter information about the length of circle circumference in writing journals
- **Circumference = diameter x 3.14**

Maria Xanthou 60

## Extra problems

- 1. A circular plate has a 6cm radius. What is its **circumference**?
- 2. The circumference of a bus wheel is 282.6 cm. What is its **diameter**?
- 3. The circumference of a circle is 172.7 cm. What is its **diameter**?

- 1. 37.68 cm
- 2. 90 cm
- 3. 55 cm

Maria Xanthou 61

- 4. The radius of a circle is 1.5 cm. What is its **circumference**?
- 5. The circumference of a bike wheel is 94.2 cm. What is its **diameter**?

- 4. 9.42 cm
- 5. 30 cm

Maria Xanthou 62

## new words

- centre
- radius
- diameter
- circumference
- line segment
- join
- pass
- infinite
- chart
- equal
- circular
- object
- measure
- wheel
- square
- compass
- calculate
- length
- conclusion
- observation
- coin
- decoration
- relation
- shape

Maria Xanthou 63

- semicircle
- dotted
- distance
- discover
- cup
- tray
- tambourine
- cello tape
- tin
- ancient

Maria Xanthou 64

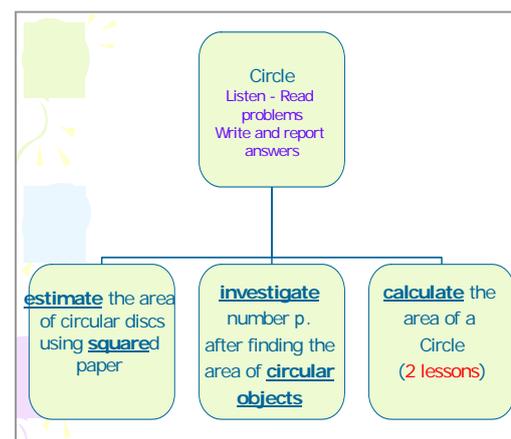
## Maths (CLIL) Lesson 4

- Look at these **circular objects**. How can we find their area?



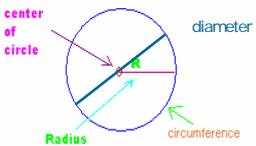



Maria Xanthou 65



### Do you remember ?

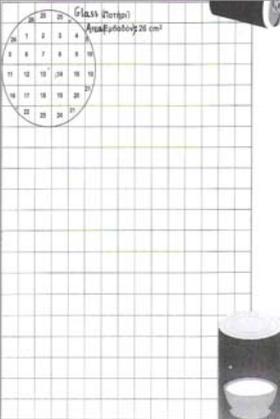
- We use a compass to draw a circle
- If  $d=4$  cm.  $r=2$  cm



- $d = 2 \times r$
- $R = d : 2$
- Circumference = diameter x 3.14**

Maria Xanthou 67

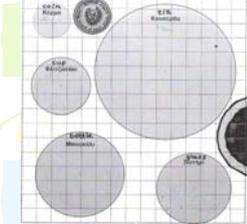
### A



- Draw the **outline** of circular objects and **calculate** the **area** of their surface. Look at the example.

Maria Xanthou 68

### B



- Measure the **radius** of each circle and write your measurements in the table. Use the **calculator** to find the **ratio** between the area of the surface and the **square of the radius**.

Object	Radius (cm)	Area of surface (cm <sup>2</sup> ) A	Radius x Radius (cm <sup>2</sup> ) B	Area: (Radius x Radius) A:B
coin				
cup				
glass				
bottle				
tin				

Maria Xanthou 69

### C

- Write an equation which connects the area and the radius of a circle.
- Area = (radius x radius) x 3.14
- $A = r^2 \times 3.14$
- Area =  $\pi \times$  radius x radius
- Show the **circumference** and **area** of a circle using your hands.
- Sing: Circle area equals  
3.14 times the square of radius.

Maria Xanthou 70

### Choose problems to solve (p.161)

- The diameter of a circle is 90 cm. What is its **area**?
- The **area** of a circular disc is 113.04 cm<sup>2</sup>. What is its radius?
- A **grass sprinkler** throws water to 1.5 m to all directions while it turns. What is the **area** of the grass that it waters?
- A pizza has a 30 cm diameter. What is its circumference?

- $A = (45 \times 45) \times 3.14$   
 $6358.5 \text{ cm}^2$
- $A = (r \times r) \times 3.14$   
 $113.04 = (r \times r) \times 3.14$   
 $113.04 / 3.14 = r \times r$   
 $36 = r \times r$   
 $r = 6 \text{ cm}$
- $r = 1.5$   
 $A = (r \times r) \times 3.14$   
 $A = (1.5 \times 1.5) \times 3.14$   
 $A = 7.06 \text{ m}^2$
- $C = d \times 3.14$   
 $C = 30 \times 3.14$   
 $C = 94.2 \text{ cm}$

Maria Xanthou 71

### Choose problems to solve (p.161)

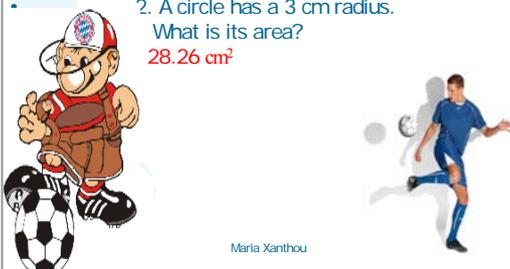
- A dog is tied on a **stake**. The rope is 3m long. He runs around the stake. How much area has he got?
- A **hurricane** will hit a village at a 9 m radius. What is the **affected** area?
- A **semi circle carpet** has a 2m diameter. What is its area?

- $r = 3\text{m}$   
 $A = (r \times r) \times 3.14$   
 $A = (3 \times 3) \times 3.14$   
 $A = 28.26 \text{ m}^2$
- $r = 9\text{cm}$   
 $A = (r \times r) \times 3.14$   
 $A = (9 \times 9) \times 3.14$   
 $A = 254.34 \text{ m}^2$
- $r = 1\text{m}$   
 $A = (r \times r) \times 3.14$   
 $A = (1 \times 1) \times 3.14$   
 $A = 3.14 : 2 = 1.57 \text{ m}^2$

Maria Xanthou 72

## Lets play football!

- 1. A circle has a 2 cm radius. What is its area?  
**12.56 cm<sup>2</sup>**
- 2. A circle has a 3 cm radius. What is its area?  
**28.26 cm<sup>2</sup>**



Maria Xanthou

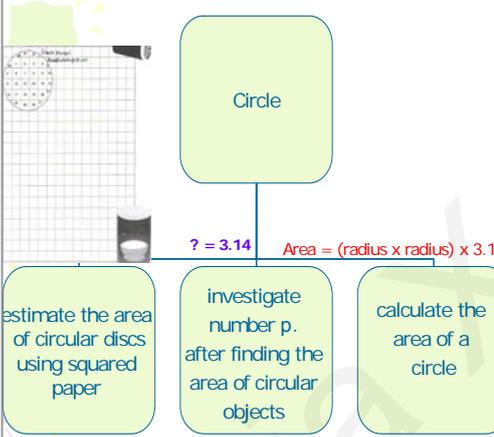
- Put words at the correct place: radius, radius, area, area, 3.14, =, x, x
- Area = (radius x radius) x 3.14**

Maria Xanthou 74

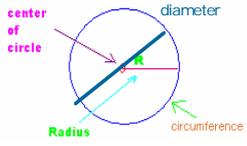
### Circle

$? = 3.14$     **Area = (radius x radius) x 3.14**

- estimate the area of circular discs using squared paper
- investigate number p. after finding the area of circular objects
- calculate the area of a circle



- We use a compass to draw a circle
- If  $d=8$  cm.  $r=4$  cm



- $d = 2 \times r$
- $r = d : 2$
- Circumference = diameter x 3.14**
- Area = (radius x radius) x 3.14**

Maria Xanthou 76

## Lets race!

- $r = 5$  cm. Area?  
**78.5 cm<sup>2</sup>**
- $r = 10$  cm. Area?  
**314 cm<sup>2</sup>**



Use the response boards in your groups.

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- True or False (thumbs up/down)**
- If the radius is 3 cm. then the area is 280 cm<sup>2</sup>
- True or False (stand up if true)**
- If the diameter is 2 cm. then the area is 3.14 cm<sup>2</sup>

Maria Xanthou 78

- Area
- The area is 3.14 times the square of radius.
- I spy a word beginning with s
- square
- euqaoitn
- equation
- - a - - - - -
- calculator

Maria Xanthou 79

### Bingo

sprinkler	outline	surface
square	hurricane	rope
calculator	affect	carpet

Maria Xanthou 80

### Match

- 3.14 times the square of radius
- diameter
- area
- circumference

Maria Xanthou 81

- Enter new information about the circle in writing journals
- Area = (radius x radius) x 3.14
- Εμβαδόν = (ακτίνα x ακτίνα) x 3.14
- Area = π x radius x radius

area

Maria Xanthou 82

### new words

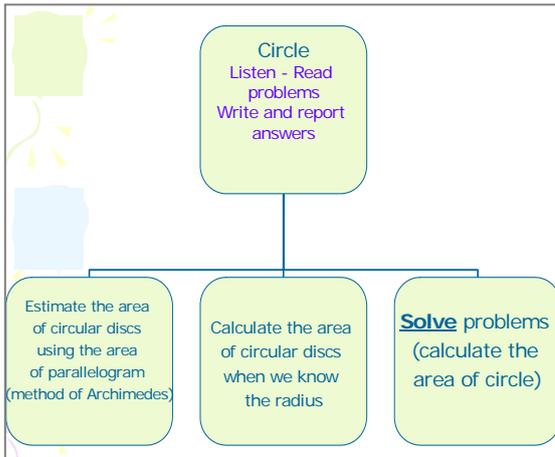
- semicircle
- dotted
- distance
- discover
- cup
- tray
- tambourine
- cello tape
- tin
- ancient
- sprinkler
- stake
- outline
- surface
- hurricane
- rope
- calculator
- affect
- investigate
- carpet

Maria Xanthou 83

### Maths (CLIL) Lesson 5

- Look at the **circle** and the **parallelogram**. What can we do to find out their area?
- Is there a way to cut the circle and turn it into a parallelogram?

Maria Xanthou 84



### Do you remember ...?

- We use a compass to draw a circle
- If  $d=8$  cm,  $r=4$  cm

- $d = 2 \times r$
- $r = d : 2$
- Circumference = diameter x 3.14**
- Area = (radius x radius) x 3.14**

Maria Xanthou 86

### A

- 1. You can see the base of a bottle in shape 1. Cut the circle in 8 **equal parts** and place them one next to the other like the example.
- 2. What is the **area** of shape 1? (about)
- 24 cm<sup>2</sup>

3. How did you find it?

**Explain**

- We used the pieces of the circle to make a **shape similar to the parallelogram**. Then, we found its area.

Maria Xanthou 87

### B

- 1. Look at the pieces of another circle. **Complete** the equation with the missing words.

- Area of circle (shape 2) = .
- Area of circle = half circumference of circle . radius
- 2. Use  $\pi$  in the **equation**
- Area of circle =  $\pi$  . radius . radius**

Maria Xanthou 88

### C. 1

- Measure and find the black and grey **areas**
- Big black circle
- $A = 3.14 \times 3 \times 3 = 28.26$  cm<sup>2</sup>
- Small grey circle
- $A = 3.14 \times 1.5 \times 15 = 7.065$  cm<sup>2</sup>
- 2 grey circles
- $2 \times 7.065 = 14.13$  cm<sup>2</sup>
- Black area
- $28.26 - 14.13 =$
- 14.13 cm<sup>2</sup>**

Maria Xanthou 89

### C. 2

- Big black circle
- $A = 3.14 \times 4 \times 4$
- 50.24 cm<sup>2</sup>
- Medium circle
- $A = 3.14 \times 1 \times 1$
- 3.14
- 6 medium circles
- $6 \times 3.14 = 18.84$  cm<sup>2</sup>
- Small circle
- $A = 3.14 \times 0.5 \times 0.5$
- 0.785
- 8 small circles
- $8 \times 0.785 = 6.28$  cm<sup>2</sup>

**Black area**

- $50.24 - (18.84 + 6.28)$
- $50.24 - 25.12$
- 25.12**

Maria Xanthou 90

• Show the **area** of a circle using your hands.

• Sing: Circle **area** equals **3.14** times the **square of radius**.

Maria Xanthou 91

### Extra activities (p.162)

Find the periphery of the shapes

- 1.  $C = d \times 3.14$
- $C = 3 \times 3.14$
- $C = 9.42 : 2 = 4.71 \text{ cm}$
- $4.71 + 3 = 7.71 \text{ cm}$
- 2.  $C = 2 \times 3.14 = 6.28$
- $C = 6.28 : 2 = 3.14$
- $3.14 + 3 + 3 + 2 = 11.14 \text{ cm}$
- 3.  $C = 8 \times 3.14 = 25.12$
- $25.12 : 4 = 6.28$
- $6.28 + 4 + 4 = 14.28 \text{ cm}$

Maria Xanthou 92

### Extra activities (p.162)

Find the area of the shapes

4 • Area  $\square = 6 \times 4 = 24$   
 • Area  $\bigcirc = 3.14 \times 2 \times 2 = 12.56$   
 $24 - 12.56 = 11.44 \text{ cm}^2$

5 • Area  $\square = 6 \times 6 = 36$   
 • Area  $\bigcirc = 3.14 \times 3 \times 3 = 28.26$   
 • Area ? =  $36 - 28.26 = 7.74 \text{ cm}^2$

Maria Xanthou 93

### Lets play bowling

- 1.  $r = 3 \text{ cm}$ . Area ?
- 28.26
- 2.  $r = 2$ . Area?
- 12.56

Response boards

Maria Xanthou 94

• Put the words in the right place:  
 radius radius area area  $\pi = x \times x$

• Area =  $\pi \times (\text{radius} \times \text{radius})$

Maria Xanthou 95

**Circle**

Area of circle = half circumference of circle . radius

Area of circle =  $\pi$  radius . radius

Big black circle  
 $A = 3.14 \times 3 \times 3 = 28.26$

Small grey circle  
 $A = 3.14 \times 1.5 \times 1.5 = 7.065$

$28.26 - 7.065 = 14.13$

**Estimate** the area of circular discs using the area of parallelogram (method of Archimedes)

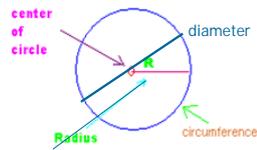
Calculate the area of circular discs when we know the radius

Solve problems (calculate the area of circle)

Maria Xanthou 96

- We use a compass to draw a circle
- If  $d=8$  cm.  $r=4$  cm

- $d = 2 \times r$
- $r = d : 2$



- Circumference = diameter  $\times$  3.14
- Area =  $\pi \times$  (radius  $\times$  radius)

## Lets play basketball



1.  $r = 1$ cm. Area ?  
3.14
2.  $r = 10$ . Area?  
31.4



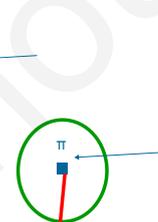
- **True or False (thumbs up/down)**
- If the radius is 10 cm then the area is 3140  $\text{cm}^2$

- **True or False (stand up if true)**
- If the area is 314  $\text{cm}^2$  the radius is 10cm

- Area

- The area is  $\pi \times$  the square of radius.
- I spy a word beginning with s
- **similar**
- pralaleolgarm
- parallelogram

- - q - - -
- equal



## Bingo

radius	similar	solve
area	complete	line segment
equation	parallelogram	medium

## Match

- $\pi \times$  the square of radius
- diameter
- area
- circumference

**new words**

- centre
- radius
- diameter
- circumference
- line segment
- join
- pass
- infinite
- chart
- equal
- circular
- object
- measure
- wheel
- square
- compass
- calculate
- length
- conclusion
- observation
- coin
- decoration
- relation
- shape

Maria Xanthou 103

- semicircle
- dotted
- distance
- discover
- cup
- tray
- tambourine
- cello tape
- tin
- ancient
- sprinkler
- stake
- outline
- surface
- hurricane
- rope
- calculator
- affect
- investigate
- carpet

Maria Xanthou 104

- equation
- estimate
- parallelogram
- complete
- similar
- explain
- solve
- medium

Maria Xanthou 105

- Enter information about circle area in writing journals
- Area =  $\pi \times (\text{radius} \times \text{radius})$



Maria Xanthou 106

## APPENDIX XII

### FURTHER STATISTICAL INFORMATION

Analyses of experimental data: Descriptive statistics

(1) The two geography experiments

#### Descriptive Statistics

	method	Mean	Std. Deviation	N
gevocpre	1	9,9756	6,13795	41
	2	10,4902	6,40116	51
	3	8,8864	9,12756	44
	Total	9,8162	7,30317	136
gevocpost	1	11,0488	6,81158	41
	2	15,0196	8,19144	51
	3	33,0682	17,08174	44
	Total	19,6618	14,85895	136
gecontpre	1	19,0488	12,46184	41
	2	21,4314	8,41726	51
	3	20,7727	10,03682	44
	Total	20,5000	10,26320	136
gecontpost	1	46,1220	16,08446	41
	2	39,6667	13,74288	51
	3	59,4545	17,48814	44
	Total	48,0147	17,72255	136

(2) The two science experiments

#### Descriptive Statistics

	method	Mean	Std. Deviation	N
scvocpre	1	6,8718	6,66167	39
	2	8,6047	8,71272	43
	3	9,4091	9,23673	44
	Total	8,3492	8,33337	126
scvocpost	1	8,1026	7,48259	39

	2	14,6047	10,88061	43
	3	32,0000	18,47185	44
	Total	18,6667	16,65077	126
sccontpre	1	27,7564	14,58635	39
	2	25,7267	10,17785	43
	3	23,2670	11,35198	44
	Total	25,4960	12,13165	126
sccontpost	1	64,4551	20,68680	39
	2	46,0756	15,35682	43
	3	61,6307	16,83655	44
	Total	57,1964	19,30678	126

(3) The two maths experiments

**Descriptive Statistics**

	method	Mean	Std. Deviation	N
mavocpre	1	18,1333	13,70733	45
	2	15,2000	9,64682	50
	3	15,5745	13,73625	47
	Total	16,2535	12,41792	142
mavocpost	1	18,3556	13,37765	45
	2	26,6400	14,41904	50
	3	50,2979	22,90236	47
	Total	31,8451	21,91806	142
macontpre	1	19,1556	12,90693	45
	2	19,6800	12,97476	50
	3	21,5957	14,40510	47
	Total	20,1479	13,38939	142
macontpost	1	68,0667	23,93400	45
	2	54,8200	29,65495	50
	3	78,6543	20,10310	47
	Total	66,9067	26,72921	142

### Skewness and kurtosis of the tests

Skewness and kurtosis of the tests were tested. Values range from -4 to +4, allowing assumption for normal distribution and therefore a MANOVA analysis was carried out.

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
gevocpre	136	1,890	,208	8,888	,413
gecontpre	136	-,040	,208	-,524	,413
gevocpost	136	1,946	,208	6,962	,413
gecontpost	136	-,017	,208	-,625	,413
gevocdelay	136	2,241	,208	9,104	,413
scvocpre	126	1,447	,216	2,529	,428
sccontpre	126	,553	,216	,577	,428
scvocpost	126	1,627	,216	3,641	,428
sccontpost	126	-,098	,216	-,798	,428
scvocdelay	126	2,108	,216	6,917	,428
mavocpre	142	,997	,203	1,615	,404
macontpre	142	,214	,203	-1,104	,404
mavocpost	142	,866	,203	,418	,404
macontpost	142	-,450	,203	-1,108	,404
mavocdelay	142	,972	,203	1,277	,404
Valid N (listwise)	70				

		Frequency	Percent
Valid	0	3	3.4
	3	4	4.6
	4	24	27.6
	5	56	64.4
	Total	87	100.0

CLELD students' views about the influence of the approach on L2 vocabulary learning (0=no development, 1= limited development, 5=great development)

		Frequency	Percent
Valid	0	22	23.4
	1	4	4.3
	2	4	4.3
	3	14	14.9
	4	15	16.0
	5	35	37.2
	Total	94	100.0

CLILnon-language-enhanced students' views about the influence of the approach on L2 vocabulary learning

		Frequency	Percent
Valid	0	5	5.7
	1	1	1.1
	2	1	1.1
	3	16	18.4
	4	20	23.0
	5	44	50.6
	Total	87	100.0

CLELD students' views about the influence of the approach on subject matter learning

		Frequency	Percent
Valid	0	29	30.9
	1	6	6.4
	3	8	8.5
	4	15	16.0
	5	36	38.3
	Total	94	100.0

CLILnon-language-enhanced students' views about the influence of the approach on subject matter learning

		Frequency	Percent
Valid	1	19	21.8
	2	24	27.6
	3	36	41.4
	4	5	5.7
	5	3	3.4
	Total	87	100.0

CLELD students' views about the potential difficulties posed by new vocabulary on the learning process

		Frequency	Percent
Valid	1	27	28.7
	2	12	12.8
	3	23	24.5
	4	15	16.0
	5	17	18.1
	Total	94	100.0

CLILnon-language-enhanced students' views about the potential difficulties posed by new vocabulary on the learning process

## APPENDIX XIII

### DEFINITION OF TERMS

The following terms are defined in order to elucidate the reader's understanding of their use in this study.

#### Acquisition

Acquisition is subconscious language development. Krashen (1982) declares that 'language acquirers are not usually aware of the fact that they are acquiring a language, but are only aware of the fact that they are using the language for communication' (p.10). Acquisition is the outcome of genuine interaction.

#### Affective filter

The filter is an internal processing factor which 'screens incoming language based on affective factors: the learner's motives, attitudes, and emotional states' (Dulay, Burt and Krashen, 1982: 71).

#### Analysis of variance (ANOVA)

'A statistical procedure for testing the difference between two or more means' (Nunan, 1992: 229).

#### Analysis of covariance (ANCOVA)

A statistical test which 'enables the researcher to statistically control for the effect on the dependent variable of variables other than the independent variable' (Nunan, 1992: 229).

#### Approach

The instructional methods following the same philosophy. It is a set of correlative assumptions concerning the nature of teaching and learning (Anthony, 1963: 63-67). An approach deals with theories and principles related to teaching and learning.

#### Basic Interpersonal Communication Skills (BICS)

The language ability required for verbal face-to-face communication ([www.ed.gov/about/offices/list/ocr/ell/edlite-glossary.html#dual\\_language](http://www.ed.gov/about/offices/list/ocr/ell/edlite-glossary.html#dual_language)).

#### Bilingual

Bilingualism is when two languages are represented almost equally as the student's first languages

#### CBI

Acronym for 'Content-based instruction'. It is 'an approach to teaching ESL that attempts to combine language with disciplinary learning' (Schlepppegrell, Achugar, & Oteiza, 2004: 67) assuming that learners can simultaneously develop both content and L2 knowledge (Brinton, Snow, and Wesche, 1989). CBI, 'also known in Europe as "content and language integrated learning" (CLIL) represents a curricular alternative to the traditional

form-focused and text driven curricula commonly used in mainstream K-16 FL programmes in the United States today' (Cammarata, 2009: 561).

### CLIL

Acronym of 'Content and Language Integrated Learning' which was coined by David Marsh of the University of Jyväskylä, in Finland. Its French equivalent is EMILE (Enseignement d'une Matière par 'Intégration d'une Langue Etrangère).

CLIL 'merely acts as an umbrella term under which many different methodological approaches... may be placed...' (Marsh and Marsland, 1999: 21). It refers to all 'diverse programmes, including some forms of immersion and bilingual education, where a foreign language is a medium of instruction' of a non-language subject 'affecting the entire learning process of the learner' (Jäppinen, 2005: 148). The 'acronym is a synonym of Content-Based Language Teaching' or CBI (Van de Craen, 2001: 209).

This study refers to the use of at least two languages to teach various subjects in the curriculum, one of which is the language used in mainstream education (the official State language), and the other a target language (in this case: English as a foreign language), independently of language lessons which do not aim at content and language integrated learning (European Commission, 2005a: 61).

### Cognitive Academic Language Proficiency (CALP)

The language ability required for academic achievement ([www.ed.gov/about/offices/list/ocr/ell/edlite-glossary.html#dual\\_language](http://www.ed.gov/about/offices/list/ocr/ell/edlite-glossary.html#dual_language)).

### Comprehensible input

A notion first formulated by Krashen (1982) that refers to providing foreign language learners with input in the target language which can be understood.

### Correlation

'A set of statistical procedures for testing the strength of association between sets of scores' (Nunan, 1992: 229).

### Differentiated Instruction

Differentiated instruction consists of the efforts of teachers to deal with the variance among students in the classroom. Teachers vary their teaching in order to respond to an individual or small group creating the best learning experience possible (Tomlinson, 2000: 1).

### EAL

English as an additional language.

### EFL

English as a foreign language. In EFL contexts, students live in their native language country. Students have exposure to the target language only during class time.

### ELL

English Language Learners are the students who are less than proficient in English. This term is preferred over Limited English Proficient (LEP) as it focuses on accomplishments rather than deficits ([www.ed.gov/about/offices/list/ocr/ell/edlite-glossaryhtml#esl](http://www.ed.gov/about/offices/list/ocr/ell/edlite-glossaryhtml#esl))

### ESL

English as a second language refers to a course or a curriculum developed to teach English to English language learners at different English language proficiency levels.

In ESL contexts students live in the target language environment (i.e. England, U.S.A.).

### ESOL

English for speakers of other languages is a course offered to improve learners' English language skills.

### Foreign Language

Foreign language refers to any non-indigenous language that has no roots on the territory of the State concerned and is in general the state language of another country (European Commission, 2005a: 61)

### Immersion

Immersion refers to 'a situation in which children from the same linguistic and cultural background who have had no prior contact with the school language are put together in a classroom setting in which the second language is used as the medium of instruction (Cummins & Swain, 1986: 8).

### Language proficiency

Language proficiency refers to the level of competence at which a person can use the language for communicative tasks and academic purposes.

### Learning

Conscious language development (Dulay, Burt and Krashen, 1982: 11).

According to Krashen (1982) learning refers to 'conscious knowledge of a second language, knowing the rules, being aware of them, and being able to talk about them' (p.10).

### Learning styles

An individual's learning preferences in relation to their perceiving and processing information.

### Lingua franca

Any language used as a means of communication between speakers of various native languages (Leman, 1993: 87, Baetens, Beardsmore, 1993: 126)

### Method

A method is an overall plan for the presentation of language material all of which is based upon a specific approach (Anthony, 1963: 63-67). It is related to the way the theory is put into practice. McArthur (1983: 97) reports that method comes from the Greek word 'μέθοδος' (methodos), which is μετά + οδός (meta+hodos), that is a way from one state to another.

### Multilingual Education

Multilingual education refers to a generic term 'indicating some form of plurilingual education whereby part of the curriculum is taught and learned in another language than the mother tongue' (Van de Craen & Mondt, 2003: 210).

### Official Language

Official language is a language used for legal and public administration purposes in a particular area of a State (European Commission, 2005a: 61).

### Pilot project

Pilot project is an experimental activity of short duration which is funded at least partly by the public authorities responsible for education. These experiments are always assessed (European Commission, 2005a: 61).

### Second Language Acquisition

Second Language Acquisition is defined as the process of learning another language after the basics of the first have been acquired, starting at about five years of age and thereafter (Dulay, Burt and Krashen, 1982: 10).

### Sheltered Instruction

Sheltered Instruction is a teaching method whereby 'a content curriculum is adapted to accommodate the students' limited proficiency in the language of instruction' (Crandall, 1993: 115). Specific strategies are used by teachers in order to teach a content area (e.g. social studies, mathematics or science) in comprehensible ways while promoting students' English language development. The language of the texts and the tasks is adapted and various techniques are used to make instruction accessible to learners such as visuals, demonstrations, graphic organizers, cooperative work (Crandall, 1993). The term was first used in U.S. settings where immigrant students are separated or 'sheltered' from English L1 native speaker students in order to be exposed to a learning environment that is more comprehensible by involving more linguistic adjustments (Brinton, Snow and Wesche,

1989; Räsänen & Marsh, 1994). Several bilingual programmes involving sheltered instruction have been developed in places where a sufficient number of learners share a common first language. Sheltered content instruction is the bridge between content area instruction in L1 and mainstreaming.

#### The Sheltered Instruction Observation Protocol Model (SIOP Model)

The Sheltered Instruction Observation Protocol Model (SIOP) is a tool providing specific examples of the features of sheltered instruction that can enhance and expand teachers' instructional practice. The protocol consists of thirty items grouped into three parts: Preparation, Instruction, and Review/Evaluation (Echevarria, Vogt & Short, 2004).

#### State Language

State language is the language having 'official status' throughout a country (European Commission, 2005a: 61).

#### Target language

Target language refers to the language being learned or taught (Dulay, Burt and Krashen, 1982: 11). In this study it refers to English language which is chosen to teach one or several subjects selected within the curriculum (independently of language lessons in their own right) as part of CLIL type provision. Target languages may be foreign languages, regional or minority languages, or official state languages in countries with several official languages (European Commission, 2005a: 61).