



**UNIVERSITY OF CYPRUS**

**DEPARTMENT OF EDUCATION**

**THE DYNAMIC MODEL OF EDUCATIONAL  
EFFECTIVENESS TESTED BY INVESTIGATING  
THE IMPACT OF  
CLASSROOM LEVEL FACTORS ON  
SLOW LEARNERS' OUTCOMES IN  
LANGUAGE:**

**AN EFFECTIVENESS STUDY ON  
A SPECIFIC STUDENT POPULATION**

**CHRISTINA IOANNOU**

**A Dissertation Submitted to the University of Cyprus in Partial Fulfillment of  
the Requirements for the Degree of Doctor of Philosophy**

**December 2017**



**UNIVERSITY OF CYPRUS**

**DEPARTMENT OF EDUCATION**

**THE DYNAMIC MODEL OF EDUCATIONAL  
EFFECTIVENESS TESTED BY INVESTIGATING  
THE IMPACT OF  
CLASSROOM LEVEL FACTORS ON  
SLOW LEARNERS' OUTCOMES IN  
LANGUAGE:**

**AN EFFECTIVENESS STUDY ON  
A SPECIFIC STUDENT POPULATION**

**CHRISTINA IOANNOU**

**A Dissertation Submitted to the University of Cyprus in Partial Fulfillment of  
the Requirements for the Degree of Doctor of Philosophy**

**December 2017**

CHRISTINA IOANNOU

## VALIDATION PAGE

**Doctoral Candidate: Christina Ioannou**

**Doctoral Thesis Title: The dynamic model of educational effectiveness tested by investigating the impact of classroom level factors on slow learners' outcomes in language: an effectiveness study on a specific student population**

*The present Doctoral Dissertation was submitted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy at the Department of Education and was approved on the 16<sup>th</sup> of December 2017 by the members of the Examination Committee.*

**Examination Committee:**

**Research Supervisor:** Leonidas Kyriakides, Professor  
Department of Education, University of Cyprus

.....

**Committee Members:** Simoni Symeonidou, Assistant Professor  
Department of Education, University of Cyprus (Chair)

.....

Charalambos Charalambous, Assistant Professor  
Department of Education, University of Cyprus

George Spanoudis, Professor  
Department of Psychology, University of Cyprus

Antonia Papastylianou, Professor  
Department of Psychology,  
National and Kapodistrian University of Athens

## DECLARATION OF DOCTORAL CANDIDATE

*The present doctoral dissertation was submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy of the University of Cyprus. It is a product of original work of my own, unless otherwise mentioned through references, notes, or any other statements.*

*Christina Ioannou*

.....

## **Abstract**

In the literature, a specific student population, with characteristics that pose challenges for teachers, is identified. Slow learners are reported as struggling in the classroom, achieving low school results and being at a high risk of drop-out. Nonetheless, it is also reported that they do not present any mental or learning disabilities. Although they are presented in the literature as a specific student population, there is no single, standard definition for these students, except for two main criteria accepted: their intelligence with an approximate IQ score of between 70-90 and below average school results. Furthermore, it is a student population that etiology could tie to either neurological reasons, such as ADHD, or to psychological reasons, such as abuse, neglect or traumatic experiences. Irrespective of the etiology of a slow learner student, there is a common learning profile reported in the literature, with five main learning characteristics: they appear to have serious difficulties in understanding, integrating, applying, generalising and developing critical thinking based on the new knowledge acquired. Different teaching approaches had been implemented, which were ultimately criticised either for the high cost of application or for their ineffectiveness. Previous studies had revealed that teachers had failed to deal with these students in the classroom and, thus, this specific student population should be further examined, in order to address their educational needs.

Taking into consideration that, during the last decades, teacher behaviours have been strongly associated with student outcomes in the educational effectiveness research field, this study aims to examine the impact of classroom level factors of the dynamic model on slow learners' outcomes. Specifically, this study aims to provide further support for the generic nature of the effectiveness factors referred to in the dynamic model, for the first time tested on a specific student population; with the effect of classroom level factors

being examined to explain the variation of slow learners' outcomes in language. Furthermore, this study searches for evidence of the extent to which each of these effectiveness factors are associated with slow learners' outcomes.

Thus, a sample of 40 classes was drawn and tests in the language lesson were administered to all Grade 4 and Grade 5 students ( $n=707$ ) at the beginning and end of the 2014-2015 school year. Further, a general cognitive ability test was also administered to the sample of students. Thereafter, a procedure to identify slow learners was established, with the test results evaluated based on criteria drawn from the Diagnostic Statistical Manual of Mental Disorders. Two groups were formed from the sample, one which met the criteria of slow learners and one which didn't present the elements associated with this group. Moreover, teacher behaviours in each class were examined twice during the school year in which the research took place, using two observational instruments, one high and one low inference, referred to in the dynamic model. Separate multi-level modelling analyses for each group of students were conducted, to identify the impact of the teacher factors on students' outcomes.

The results of these analyses reveal that some of the classroom level factors of the dynamic model explain slow learners' outcomes in language and provide support for the generic nature of these factors on a specific student population. Even though the effect is found to be small, the results are in line with other studies in the effectiveness field. It is also found that a specific measurement dimension of teacher factors was more associated with slow learners' outcomes. The contribution of this study to the concept of slow learners and to the teachers' effectiveness field is acknowledged by establishing a dynamic

learning profile by conducting a study on a specific student population. Implications of findings for theory, practice and teaching policy are drawn in regard to slow learners.

CHRISTINA IOANNOU



## Περίληψη

Έρευνες διαχρονικά αναφέρονται σε μαθητές με αργό ρυθμό μάθησης (slow learners) οι οποίοι αποτελούν ένα συγκεκριμένο μαθητικό πληθυσμό με σοβαρή δυσκολία να ακολουθήσουν το ρυθμό μάθησης της τάξης, με χαμηλές επιδόσεις σε όλα τα μαθήματα, με χαμηλά κίνητρα μάθησης και με υψηλό ποσοστό σχολικής αποτυχίας. Δυσκολεύουν την διδασκαλία στην τάξη και διαχρονικά αποτελούν σοβαρό πρόβλημα για την εκπαίδευση. Για τον εντοπισμό και την αναγνώριση τους επικρατούν δύο κύρια κριτήρια, το ένα αφορά την νοητική τους λειτουργία (IQ score) η οποία υπολογίζεται να κυμαίνεται περίπου στο 70 με 90 νοητικό δυναμικό με ψυχομετρική μέτρηση και το άλλο τη διαχρονικά χαμηλή μαθησιακή τους επίδοση σε όλα τα μαθήματα. Νοητικές και μαθησιακές αναπηρίες αποκλείονται από τον ορισμό.

Διάφορες διδακτικές προσεγγίσεις και μέθοδοι χρησιμοποιήθηκαν στις οποίες ασκήθηκε κριτική είτε για το ψηλό κόστος εφαρμογής τους είτε για την αναποτελεσματικότητά τους. Παρά τις προσπάθειες στήριξης των μαθητών αυτών μέσα στην τάξη, δεν υπάρχουν δεδομένα που να αναφέρονται στην αποτελεσματικότητα του εκπαιδευτικού. Συνεπώς, διαχρονικά στην πράξη οι εκπαιδευτικοί φαίνεται να μην γνωρίζουν τα στοιχεία της διδασκαλίας τα οποία πιθανόν να αυξάνουν τα μαθησιακά επιτεύγματα του συγκεκριμένου μαθητικού πληθυσμού. Επιπλέον από τις βιβλιογραφικές αναφορές διαφαίνεται ότι δεν υπάρχουν έρευνες που να συνδέουν το εύρος της επίδρασης των εκπαιδευτικών στα μαθησιακά αποτελέσματα των μαθητών με αργό ρυθμό μάθησης.

Στην έρευνα με βάση το θεωρητικό υπόβαθρο της Έρευνας Εκπαιδευτικής Αποτελεσματικότητας και συγκεκριμένα του Δυναμικού Μοντέλου Εκπαιδευτικής Αποτελεσματικότητας διερευνάται το μέγεθος της επίδρασης των παραγόντων αποτελεσματικότητας στο επίπεδο της τάξης στα μαθησιακά αποτελέσματα των μαθητών με αργό ρυθμό μάθησης. Επιπλέον το ΔΜΕΑ εξετάζεται για πρώτη φορά σε συγκεκριμένο πληθυσμό. Προωθείται η υπόθεση ότι κάποιοι παράγοντες στο επίπεδο του εκπαιδευτικού θα συνδέονται θετικά με τα μαθησιακά αποτελέσματα των μαθητών με αργό ρυθμό μάθησης.

Για την διεξαγωγή της έρευνας συλλέγηκαν δεδομένα από δύο επίπεδα, των εκπαιδευτικών και των μαθητών. Τα δεδομένα που αφορούσαν τους μαθητές (νοητικό επίπεδο και μαθησιακά επιτεύγματα) συλλέγηκαν αρχή και τέλος της σχολικής χρονιάς 2014-15. Τα δεδομένα που αφορούσαν τους εκπαιδευτικούς (ποιότητα της διδασκαλίας)

συλλέγηκαν με τη μέθοδο της παρατήρησης κατά τη διάρκεια της ίδιας σχολικής χρονιάς. Έγιναν δύο παρατηρήσεις για κάθε εκπαιδευτικό που συμμετείχε στην έρευνα. Τα δεδομένα που συλλέγηκαν από το γνωστικό δοκίμιο των Ελληνικών αναλύθηκαν με τη στατιστική μέθοδο του Μοντέλου Rasch (The Rasch Model). Στη συνέχεια εντοπίστηκαν οι μαθητές με αργό ρυθμό μάθησης εφαρμόζοντας δύο κριτήρια από το Διαγνωστικό Εγχειρίδιο DSM-V σχετικά με τη νοητική λειτουργία και τη μαθησιακή ικανότητα των μαθητών. Ο μηχανισμός εντοπισμού των μαθητών ελέγχθηκε με την διεξαγωγή πιλοτικής έρευνας κατά τη σχολική χρονιά 213-14.

Η ανάλυση της ποιότητας της διδασκαλίας έγινε με τα Μοντέλα Πολυεπίπεδων Στατιστικών Αναλύσεων (Multilevel Modeling Analysis). Διεξήχθησαν τρεις σειρές αναλύσεων με πολυεπίεδα μοντέλα, στο σύνολο του δείγματος των μαθητών της έρευνας, στους μαθητές που δεν ανήκαν στην ομάδα με αργό ρυθμό μάθησης και στους μαθητές με αργό ρυθμό μάθησης του δείγματος της έρευνας. Η κάθε σειρά ανάλυσης αποτελείτο από δύο αναλύσεις που προέκυψαν από τα αποτελέσματα των δύο διαφορετικών εργαλείων παρατήρησης (low και high inference) που χρησιμοποιήθηκαν στην έρευνα. Τα εργαλεία είχαν χρησιμοποιηθεί σε προηγούμενες έρευνες του ΔΜΕΑ.

Τα αποτελέσματα της έρευνας φανέρωσαν τέσσερις παράγοντες του ΔΜΕΑ να έχουν σημαντική επίδραση στα αποτελέσματα των μαθητών με αργό ρυθμό μάθησης. Επίσης, οι διαστάσεις μέτρησης Διαφοροποίησης και Συχνότητα φάνηκε να σημειώνουν την μεγαλύτερη επίδραση στα μαθησιακά αποτελέσματα των μαθητών με αργό ρυθμό μάθησης.

Η έρευνα προσφέρει νέα δεδομένα στον τομέα της αναζήτησης των αποτελεσματικών συμπεριφορών των εκπαιδευτικών στα μαθησιακά αποτελέσματα των μαθητών με αργό ρυθμό μάθησης συνδέοντας τα ευρήματα άλλες έρευνες εκπαιδευτικής αποτελεσματικότητας. Δίνονται εμπειρικά στοιχεία γιατί κάποιοι παράγοντες είναι σημαντικοί για το συγκεκριμένο πληθυσμό και η μεθοδολογία που χρησιμοποιήθηκε οδήγησε στον υπολογισμό για πρώτη φορά του μεγέθους της επίδρασης των συμπεριφορών των εκπαιδευτικών.

Η συνεισφορά των αποτελεσμάτων της έρευνας αφορά στον τομέα της χάραξης πολιτικής στο θέμα του εντοπισμού και της θεσμοθέτησης των αποτελεσματικών πρακτικών με στόχο την ανταπόκριση στις εκπαιδευτικές ανάγκες αυτών των μαθητών.

Τέλος τα ευρήματα της έρευνας συνεισφέρουν στον τομέα της εκπαίδευσης, επιμόρφωσης και επαγγελματικής κατάρτισης των εκπαιδευτικών. Υποδεικνύεται η ανάγκη για σχεδιασμό προγραμμάτων ενδοϋπηρεσιακής επιμόρφωσης και προγραμμάτων προπτυχιακών και μεταπτυχιακών σπουδών επιστημών της αγωγή τα οποία να ανταποκρίνονται τις εκπαιδευτικές ανάγκες των μαθητών με αργό ρυθμό μάθησης.

## Acknowledgments

Working on my thesis has taken me on a long journey, filled with new knowledge and personal challenges, allowing me to deepen my insight and powers of investigation.

Having now come to the end of this journey, I would like to express my sincere gratitude to my adviser, Prof. Leonidas Kyriakides, for his continuous support and patience. I especially thank him for teaching me how to identify and conduct research and to study educational issues in order to address students' educational needs.

My appreciation also goes out to the members of my committee: Assistant Prof. Simoni Symeonidou for her precious help and Assistant Prof. Charalambos Charalambous of the Department of Education, Associate Prof. Georgios Spanoudis of the Department of Psychology of the University of Cyprus, as well as Prof. Antonia Papastylianou of the University of Athens, for their time, their valuable input and, in particular, their constructive feedback regarding my study.

I also acknowledge the profound contribution of my late colleague, the educational psychologist Meropi Kapsali, who was the one who challenged me to begin this journey in the first place; she believed in me and gave me the necessary motivation for the work required.

Finally, I would like to thank my family (Yiannis and Maximos) and all of my dear friends (Eleni, Elena, Maria, Anastasia and Anita) who gave me their full support during the course of my research. Last, an especial salute to Felix, my cat, who, for long hours, sat next to me while I worked on this thesis, inspiring me with his focus and unbroken dedication.

To my late grandmother, Aristi Kazamia from Omodos,  
who wanted to be a teacher...

## TABLE OF CONTENTS

<b>LIST OF TABLES.....</b>	<b>xviii</b>
<b>LIST OF FIGURES.....</b>	<b>xix</b>
<b>CHAPTER 1: INTRODUCTION TO THE STUDY.....</b>	<b>1</b>
Introduction.....	1
Research Questions.....	5
Contribution to the Theory.....	7
Significance of the Study.....	10
Thesis Structure.....	12
<b>CHAPTER 2: LITERATURE REVIEW.....</b>	<b>13</b>
Introduction.....	13
An attempt to define the concept of Slow Learners.....	14
<i>Main characteristics drawn from available definitions.....</i>	<i>14</i>
<i>Teaching Slow Learners.....</i>	<i>18</i>
<i>Research context: the Cypriot educational system.....</i>	<i>21</i>
<i>Identification issues.....</i>	<i>25</i>
Learning profile of Slow Learners.....	29
<i>Learning behaviour in reading.....</i>	<i>30</i>
<i>Learning behaviour in writing.....</i>	<i>32</i>
<i>Learning behavior in mathematics.....</i>	<i>33</i>
<i>Summarising main characteristics of slow learners' profile.....</i>	<i>36</i>

The Dynamic Model: an attempt to examine Slow Learners.....	40
<i>Educational Effectiveness Research: an overview</i> .....	40
<i>The Dynamic Model of Educational Effectiveness</i> .....	42
<i>The Classroom Level Factors of the Dynamic Model</i> .....	44
<i>Cognitive abilities involved in the learning process</i> .....	57
<i>Classroom Level Factors promoting learning to Slow Learners: a     research assumption</i> .....	61
Research Agenda.....	67
<b>CHAPTER 3: METHODOLOGY.....</b>	<b>69</b>
Justification of the Research Design .....	69
Research Design .....	72
<i>Phase 1: Establishing a procedure to identify slow learners</i> .....	72
<i>Intelligence test</i> .....	73
<i>Curriculum based test</i> .....	75
<i>Pilot study</i> .....	76
<i>Phase 2: Main study</i> .....	78
<i>Participants</i> .....	81
Research Variables.....	84
<i>Dependant Variable: Students' achievements in Greek language</i> .....	86
<i>Explanatory Variable at student level: Students' initial achievement in Greek     language</i> .....	87
<i>Other explanatory variable at student level: background factor</i> .....	88
<i>Explanatory variables at classroom level: quality of teaching</i> .....	88
Data analysis on Research Variables.....	93
<i>Multilevel analysis</i> .....	94

<i>Equation</i> .....	96
Research Limitations.....	98
<b>CHAPTER 4: RESEARCH RESULTS.....</b>	<b>101</b>
Results from Items Response Theory (IRT) testing validity of the curriculum based test in language .....	102
<i>Results based on Grade-3 test</i> .....	103
<i>Results based on Grade-4 test</i> .....	104
<i>Results based on Grade-5 test</i> .....	105
Results of the identification procedure for slow learners.....	108
Descriptive statistics of teacher factors arising from the data.....	110
<i>With Low Inference observational instrument</i> .....	111
<i>With High Inference observational instrument</i> .....	114
Results from multilevel analysis: the impact of classroom level factors examined on students' outcomes in language.....	116
<i>Multilevel analysis on students outcomes (n=707)</i> .....	116
<i>Results with Low Inference observational instrument</i> .....	117
<i>Results with High Inference observational instrument</i> .....	122
<i>Multilevel analysis on non-slow learners' outcomes (n=638)</i> .....	125
<i>Results with Low Inference observational instrument</i> .....	125
<i>Results with High Inference observational instrument</i> .....	131
<i>Multilevel analysis on slow learners' outcomes (n=69)</i> .....	134
<i>Results with Low Inference observational instrument</i> .....	134
<i>Results with High Inference observational instrument</i> .....	140
<i>Effect size of classroom level factors - results</i> .....	142



<b>CHAPTER 5: DISCUSSION.....</b>	<b>144</b>
Summary of key findings.....	144
Classroom Level Factors of the Dynamic Model associated with Slow Learners outcomes in language .....	149
Contribution to the definition of Slow Learners by establishing a Dynamic Learning Profile.....	155
The importance of investigating the impact of Classroom Level Factors on outcomes of a specific student group.....	159
Implications for Policy and Practice in the Cypriot context.....	164
<i>Policy on quality of teaching</i> .....	164
<i>Policy on improving teachers' professional development</i> .....	167
Research Limitations and Suggestions for Further Research.....	169
 <b>REFERENCES.....</b>	 <b>174</b>
 <b>APPENDIX A.....</b>	 <b>198</b>
<b>APPENDIX B.....</b>	<b>204</b>
<b>APPENDIX C.....</b>	<b>212</b>
<b>APPENDIX D.....</b>	<b>220</b>
<b>APPENDIX E.....</b>	<b>229</b>
<b>APPENDIX F.....</b>	<b>235</b>

## LIST OF TABLES

### Table

2.1.	Learning profile of slow learners based on literature reviews.....	38
2.2.	The main elements of each teacher factor in the dynamic model.....	50
2.3.	The five principles of educating the developing mind.....	59
3.1.	Two phases of the study timeframe.....	81
3.2.	Overview of the sample of classes and students used to measure teacher effect on students' outcomes in language lesson.....	83
3.3.	Indicative items used to measure each factor with regard to the teacher factors effect of the dynamic model on slow learners' outcomes.....	91
4.1.	Statistics relating to the assessment test measuring Greek language skills based on the Rasch analysis of each grade group (fourth and fifth) at the beginning and at the end of school year separately.....	107
4.2.	Descriptive statistics with Low Inference observational instrument (n=707)	112
4.3.	Descriptive statistics with High Inference observational instrument (n=707).....	115
4.4.	Multilevel analysis results for Total students (n=707) with Low Inference Observation Instrument.....	120
4.5.	Multilevel analysis results for Total students (n=707) with High Inference Observation Instrument.....	124
4.6.	Multilevel analysis results of Typical students (n=638) with Low Inference Observation Instrument.....	129
4.7.	Multilevel analysis results for Typical students (n=638) with High Inference Observation Instrument.....	133
4.8.	Multilevel analysis results for Slow learners (n=69) with Low Inference Observation Instrument.....	138
4.9.	Multilevel analysis results for Slow learners (n=69) with High Inference Observation Instrument.....	141
4.10.	The effect sizes (Cohen's d) of teacher factors found to have differential effects.....	142

## LIST OF FIGURES

### Figure

- 2.1. The dynamic model of educational effectiveness..... 55

CHRISTINA IOANNIDOU

## **CHAPTER 1**

### **INTRODUCTION TO THE STUDY**

This chapter begins with an introduction to the topic of slow learners, and it goes on to present the research questions of the study. The significance of the study is then explained, and the research outline is briefly presented.

#### **Introduction**

Educational Effectiveness Research (EER) is a field that links research in teaching behaviour, school organisation, educational policy with student outcomes (Creemers, Kyriakides & Sammons, 2010). EER focuses on identifying reasons for variations in students' outcomes in terms of explaining why specific schools and teachers are more effective than others by considering students' background and other personal characteristics that may affect their learning (e.g. socioeconomic status and thinking style). Thus, EER can be seen as a combination of research findings in different areas: research on teaching, school organization, and educational policy. The main research question in EER concerns the factors that can directly or indirectly explain the differences in students' outcomes, taking into account their background characteristics, such as ability, socio-economic status (SES) and prior attainment (Creemers & Kyriakides 2008; Scheerens 2014).

The origins of EER stem mainly from the work on equality of opportunity conducted in the United States of America (USA). Initially, two studies concluded that variance in students' achievements could not be explained by educational factors and that "school does not make any difference" to students' outcomes (Coleman, 1966; Jencks, 1972). Historically, EER developed in four phases. The first phase was dedicated to introverts in the research findings of the two studies mentioned above, thereby showing that school matters. The second phase was dedicated to the search for factors associated with students' outcomes. The well-known "Carroll model 1963" is a representative example, since it relates students' outcomes to school factors. The first theoretical models were proposed in the third phase of EER research. These models referred to specific factors, such as student, teacher, schools and educational systems, which explain variation in students' achievements (Creemers, 1994; Sheerens, 1992; Stringfield & Slavin, 1992). The fourth phase, the research questions addressed were analysing in detail the complex nature of educational effectiveness by establishing evidence-based models (Creemers, Kyriakides & Sammons, 2010).

Arguably, EER became a well-established field over the last two decades, both in methodological (Goldstein, 2003), and theoretical terms (Levin & Lazotte, 1990; Scheerens & Bosker, 1997). The replacement of theoretical models with the established evidence-based models (Creemers & Kyriakides, 2006) and the methodological advances in EER, such as the development of multilevel models, could provide a more accurate understanding on the different effects of each level of education, and thus of student,

teacher, school and above-school factor links to the educational system (Sheerens, 2013; Teddlie & Reynolds, 2000).

Despite the progress made, the field of school and teachers' effectiveness research has been criticised as being empiricist, with little attention paid to theoretical foundations (Mortimore, 1992; Reynolds, Sammons, De Fraine, Townsend & Van Damme, 2011). In contrast, the dynamic model of effectiveness is an example of research using multilevel models based on theory (Scheerens, 2013). Scheerens (2013) revisited 109 school effectiveness theory-based studies and, he concluded that only 22 of them used explicit models. From those 20 studies, only 11 were theory-driven, and 5 were based on the models by Creemers (1994) and Creemers and Kyriakides (2008).

The dynamic model by Creemers & Kyriakides (2006) builds on the "comprehensive model" of educational effectiveness, developed by Creemers (1994). This model combines four levels of factors in order to explain the difference in students' outcomes. A significant number of studies were conducted over the last decade to establish the model and to examine factors of effectiveness at different levels (e.g. Creemers & Kyriakides, 2008; Creemers & Kyriakides, 2010; Vanlaar, Kyriakides, Panayiotou, Vandecandelaere, McMahon, De Fraine & Van Damme, 2016). In relation to teacher effectiveness, it is argued that teachers may be more effective with certain groups of students, in certain teaching and organisational contexts or in certain subjects (Campbell, Kyriakides, Muijs & Robinson, 2004; Brophy & Good, 1986; Fraser, 1991; Muijs & Reynolds, 2011; Opdenakker & Van Damme, 2006). Based on the main findings

of teacher effectiveness research, the dynamic model refers to factors which describe teachers' instructional role and are associated with students' outcomes. A number of studies were conducted, examining teachers' factors referring to the dynamic model on different aspects of education, such as curriculum issues, (Kyriakides & Tsangaridou, 2004), teachers' evaluation issues (Kyriakides, Demetriou & Charalambous, 2006) and teachers' professional development (Kyriakides, Creemers & Antoniou, 2009).

This kind of studies contributed to further development of EER by defining what works and why in education. Studies also contributed to teacher effectiveness research (TER) by examining the effects of teachers' factors on students' outcomes. Considering recent findings in relation to teacher effectiveness factors (Creemers & Kyriakides, 2008; Hattie, 2009; Seidel & Shavelson, 2007) it seems that teacher related factors have a greater impact on student outcomes compared to school related factors. The conclusions on teacher effectiveness referred to general student populations. TER has not yet examined factors that are relevant to specific student populations. This study aims to move a step forward by examining, for the first time, the impact of teacher related factors, included in the dynamic model, on a specific student population, namely the slow learners.

According to the literature, slow learners is a specific undiagnosed student population, who even though they do not have an intellectual disability, they have serious difficulties to follow the learning pace of their peers in a mainstream class (Shaw, 2008; Kaznowski, 2004). The term "slow learners" is reported to be associated with definition,

identification and teaching issues. These students are reported as being ignored by teachers and overlooked by the educational system. Moreover, few studies in the literature (Sebastian, 2016; Malik, Rehman & Hanif, 2012) are reported to have examined teacher effectiveness and slow learners. In this context, considering the importance of teacher effectiveness for each student, this study moves a step forward and examine classroom-level factors -as referred in the dynamic model- related to slow learners, which is a specific student population.

### **Research Questions**

This study is concerned with teacher effectiveness and the impact of classroom-level factors -as referred in the dynamic model- on slow learner' outcomes in language.

The first phase of the study aims to investigate slow learners' definition, identification procedure and learning characteristics, drawn from both psychology and educational research fields. Thereafter, the second phase of the study targets the establishment of a learning profile for these students with a cognitive perspective. The study's third phase aims to relate main learning characteristics of this student population with classroom-level factors. The generic nature of classroom-level factors of the dynamic model is tested in relation to slow learners. In particular, the study examines whether the dynamic model factors have an effect not only on the general student population, but also to a specific student population.



The study relies on two research hypotheses. First, it assumes that some classroom level factors of the dynamic model may have a greater impact on slow learners' achievements, given that they correspond to the main learning characteristics of slow learners. These factors are: Orientation, Structuring, Teaching Modelling and Application. Second, this study assumes that some of the measurements dimensions of the eight factors (Orientation, Structuring, Application, Teaching Modelling, Questioning, Management of Time, Classroom as a learning environment and Assessment) included in the dynamic model may have a greater impact on slow learners' achievements (e.g. differentiated instruction).

The study seeks to answer the following research questions:

1. Do classroom-level factors, included in the dynamic model of effectiveness, have any impact on slow learners' outcomes, and, if so, which of these factors explain variation of slow learners' outcomes in language?

Investigating if there is any impact of classroom-level factors on a specific group of students with different ability (i.e. slow learners) helps us examine one of the basic assumptions of the dynamic model: that teacher factors are generic in nature.

2. Are there any teacher factors which have differential effects on slow learners' outcomes?

According to the assumption made earlier, some factors may have a stronger effect in relation to slow learners' outcomes in language. Particularly, the study seeks to examine the differential effects of the factors in relation to the learning outcomes of a specific group of students. To investigate this question, the study explores whether classroom level factors have stronger or weaker effects on slow learners' outcomes compared to the outcomes of their peers in the mainstream classroom.

3. Which of the five dimensions (Focus, Stage, Frequency, Quality and Differentiation), if any, needs to be considered to measure the effect of each factor?

The assumption is that when differentiated instruction is in place, there may be a greater impact on slow learners' outcomes.

### **Contribution to the Theory**

The study mainly contributes to the question related to teacher factors considered generic as to whether they have an impact on slow learners' outcomes and to the shortage of evidence related to the impact of teacher factors on slow learners' achievements.

Findings could add to the teacher effectiveness theory by providing data related to slow learners' achievements in language for the first time. Studies conducted on teacher

effectiveness were related either to generic or to a specific domain, related to different subjects (language, mathematics). In this study, the generic nature of teacher effectiveness on a specific group of students is examined.

This study focusses on the classroom level factors referred to in the dynamic model, providing the opportunity to examine whether these factors are also generic in relation to a specific student population. Therefore, it may help clarify whether and to what extent the dynamic model can be used, not only in terms of measuring learning outcomes, but also for improving teaching for a specific group of students. If some factors are found to have a bigger effect on slow learners' outcomes, this would mean that specific factors are more important for a specific student population. Results would contribute to equity theory where methodological issues are raised. During the last two decades, an emphasis on investigating differential teacher and school effectiveness can also be observed (Strand, 2010), but this intended to examine the generic nature of effectiveness factors rather than to identify factors associated with equity (see Kyriakides, 2007). The EER field has not made much progress in understanding why and how schools can become more effective in terms of equity. This can partly be attributed to the fact that EER has not yet developed appropriate methodological tools to measure the effectiveness status in relation to equity (Kelly, 2012).

Differentiated instruction appears to be of high priority in the field of education (Brophy & Good, 1986; Campbell, Kyriakides, Muijs & Robinson, 2003; Creemers & Kyriakides, 2008). Despite the numerous attempts to establish a theoretical base in

relation to differentiation for slow learners, a research gap still exists on what constitutes effective differentiation practice for students with slow learning pace and how it translates into practice in a systematic way (Kearnes & Fuchs, 2013; Chen, Lian, Yang, Liu & Meng, 2017). Results could contribute to clarifying the blurred area of differentiation for slow learners by directly associating it to specific dimensions of the dynamic model of effectiveness, which enable teaching measurements to all students. Investigating which teaching activities of the classroom level factors, with their five dimensions, are likely to have a positive impact on students' outcomes, would also help define effective differentiated teaching to slow learners, and establish a theoretical background related to EER.

The contribution could be useful, taking into consideration also how little these students have been studied in the literature. Furthermore, the results of this study could provide significant insights into teachers' behaviour in the classroom concerning slow learners' achievements. Indeed, the review of the literature reveals that although teachers understand the need of some students to be taught in a specific instruction procedure, teachers lack the necessary knowledge, skills and methodology to effectively fulfill their role as educators for all students (Shaw, 2005). Most attempts to improve teachers' practice were related to teachers' behaviour in the classroom and focus on the use of teaching strategies (Kyriakides, Creemers & Antoniou, 2009).

## **Significance of the Study**

The significance of this research rests on the fact that the data collected, as well as the results, concern a population of students at high risk of dropping out and in a state of continuous school failure (Kaznowski, 2004). This study raises awareness in relation to a specific group of students that has been mainly ignored in educational settings and is still over-looked by teachers. Therefore, attempts to connect effective teaching to slow learners will increase information on their learning procedures (Campbell, Kyriakides, Muijs & Robinson, 2004; Kyriakides, 2005; Creemers & Kyriakides, 2008).

Moreover, the significance of this study rests on the fact that slow learners' achievement measurements are related to quality of teaching. The results of this study could be used to provide valuable insights as to whether the dynamic model of educational effectiveness considered generic can be used to measure teachers' effectiveness related to a specific group of students' achievements.

In addition, the results of this study not only raise awareness concerning teaching slow learners in an effective way but they also provide further support on how effective teaching practice can be achieved through a theory-based methodology. The significance of this research can be found in the way that its results can be used to bring about improvement in the field of teaching skills as well as the professional development of educators in relation to slow learners, in the level of theory and practice (school organisation and teacher instruction). Furthermore, the study could inform future

educational policies to move their focus from identification and assessment to intervention, based on the theory and methodology of EER.

In relation to Cyprus, where the study is conducted, it is important to mention that the results may inform the development of national policy concerned with quality of teaching. The results could also highlight the importance of having a mechanism by which to identify slow learners in the educational system (the study examines the existing identification and assessment mechanism). It is important in this study not only to suggest new teaching policies, but also to define what is offered to slow learners and to review it in order to address their educational needs in an effective way.

Therefore, the results could be used by the Cyprus Ministry of Education and Culture, offering guidelines toward adjusting teaching policy to provide adequate and appropriate instructions to better support educators' teaching skills and to improve students' learning outcomes. Moreover, the results could be used to inform educational policy to move forward the establishment of identification of, and intervention programmes for, slow learning students.

Overall, this study is in line with the Educational Reform being attempted in Cyprus. According to the official statements of the Educational Reform committee, professional development is considered a vital component of education for the benefit of all students in the classroom (Ministry of Education and Culture, 2010).

## Thesis Structure

The complete thesis consists of five chapters. The first chapter provides an introduction to the research background, the research problem addressed as well as the research questions this study aims to answer, leading to a justification of the significance of the study; both in terms of its practical, as well as its theoretical contribution in the field of EER. The second chapter provides a critical review of the literature elaborating on the theoretical framework upon which the study is based and on the fundamental issues regarding the purpose of the study. Specifically, it provides an overview of the concept of slow learners by presenting a definition of this specific population and a learning profile. The importance of establishing an identification procedure is also elaborated. Then, Chapter 3 describes the research methodology. In this chapter, a detailed description of the processes of sampling and data collection is provided with particular reference to the data collection instruments, and the statistical techniques used. Finally, the main limitations of the study are acknowledged and discussed. Chapter 4 presents the analysis of the data collected during the study. The analysis is made in order to provide answers to the main research questions, presented in Chapter 1. Finally, in the last chapter of the study, Chapter 5, the main results that occur from the analyses are discussed, with reference to each research question. Implications for theory, policy and practice are also drawn. The thesis ends with suggestions for further research.

## CHAPTER 2

### LITERATURE REVIEW

#### Introduction

This chapter presents the literature review in order to provide a theoretical framework of the fundamental concepts and issues related to the study. It locates the research problem in the wider theoretical context, recognising possible connections and relationships. It creates a frame of reference for the examination of the research problem and for the questions stated in the previous chapter. Therefore, it focusses on slow learners and educational effectiveness research. The chapter is divided into four sections.

In the first section, literature from the fields of psychology and education is presented to examine definition, learning characteristics, teaching approaches and teaching policies to slow learners. The Cypriot context of education is also examined in this section. Finally, identification procedures related to this specific student's population are presented.

The second section presents a focused examination of learning behaviours of slow learners in the tasks of reading, writing and mathematical ability. It attempts to establish a cognitive profile of slow learners, based on a theory of cognitive development. Specifically, cognitive abilities of slow learners are linked to the five principles of learning to acknowledge the educational needs of this student population.



The third section presents the dynamic model of educational effectiveness and its main assumptions. The classroom level factors of the dynamic model as well as the five measurement dimensions of each factor are presented in more detail.

Finally, the last section of the chapter summarises the main conclusions drawn from the literature review and describes the research agenda of the present study.

### **An attempt to define the concept of Slow Learners**

#### *Main characteristics drawn from available definitions*

Historically, references made for this group of students appear systematically in the decade spanning the sixties (Dietrich, 1965; Early, 1963; Miller, 1970; Smith, 1966). At that time, the terminology *slow learner* was used, even though diagnostic criteria were no clear. Teachers considered some children to be slow learners for hereditary reasons, since they found other slow learners in the students' family. Moreover, teachers believed that other slow learners suffered from "handicaps" of different kinds due to bad physical conditions, traumatic experiences and chronic illness (Norvig, 1959). As stated in articles of that time, it seems that this group was considered as "a major educational problem" who caused doubts among teachers (Doll, 1953). Furthermore, these students were stated as being those whose "needs differ from those of the majority of youngsters within the classroom", posing problems to which teachers could not easily respond (Dietrich, 1965).

Another dimension, expressed at the time, was that slow learners were a result of teachers' attitudes and expectations. If a teacher believed in the inherent worth of each child would provide experiences that would lead him/her to successful learning (Early, 1963; Miller, 1970; Norvig, 1959). The impression that effective learning depended on the teacher was linked to slow learners right from the start, but it was mainly connected to teacher's personality characteristics and not to his or her teaching behaviour in the classroom.

The inconsistency of the terminology led literature reports to a conflicting definition, and no one standardised definition of the slow learner exists (Kaznowski, 2004); however common characteristics indicated in the literature are drawn from the different definitions used. The first characteristic is related to their general cognitive ability. Slow learners are reported as children of relatively low intelligence (Kirk, 1993) with a measurable IQ somewhere between 75 and 90 (Madison, 1971). Although it is reported in the literature that some children, by nature, have limited general cognitive ability and are termed as slow learners, children cannot be called slow learners by considering their intelligence quotient alone (Pujar & Gaonkar, 2008). Other studies report that students who display a discrepancy between IQ and reading achievement, but not sufficiently enough to make them eligible for special educational services, are frequently labelled as slow learners (Jimerson & Kaufman, 2003; Lescano, 1995). Moreover, recent studies raise another issue; slow learners are referred as a specific group of students and it is mentioned that their teachers do not give special attention or effort to their particular problems (Khasnavis & Cain, 2001).

Different characteristics taken into consideration were related to the students' learning style. Slow learners were reported as students who may present difficulties in understanding concrete concepts and need repetition in their learning process (Miller, 1970). Other research reported limited attention and memory, difficulties in speech, language and social skills, as well as poor readiness (Lynam, Moffitt & Stouthamer-Loeber, 1993; Shaw, 2000). In addition, it is reported that these students preferred concrete material, had problems organising knowledge, generalising information, needed a slower pace of instruction and had no academic motivation (Shaw, 2008). Early references reported that a slow learner had a short attention span and was unable to concentrate voluntarily (Kirk, 1949; Doll, 1953). More recent references report in a more concrete way that slow learners face difficulties to store new information, retain new information and generalise information to new situations (Singh, 2004; Verguts & DeBoeck, 2001; Jensen, 1998, Madison, 1971; Shaw, 2008).

Furthermore, poor school performance was also related to slow learners. These students were reported to show low performance and inability to cope with the work expected from their age group (Pujar & Gaonkar, 2008). It is reported that slow learners struggled to cope with traditional academic demands of the regular classroom, and they often failed (National Association of School Psychologists – NASP, 1998).

Cognitive difficulties as well as school failure, led to negative personal feelings. It is reported that although slow learners did not have specifically observable emotional characteristics standing out, a dislike of school as well as truancy and dropping out were

often present (Kaznowski, 2004). They also appeared withdrawn and passive in school due to their difficulty in keeping up with school tasks (Miller, 1970). Moreover, teenager slow learners were reported to present low self-confidence (Karnes, 1970) high rates of teen pregnancy, illicit drug use, aggression and other health problems (Ahrens, Evans, & Barnett, 1990; Shaw, 1999).

The ambiguity in defining slow learners led to the use of many terms over the years that are now unacceptable. Some examples of outdated terms are “borderline, dull, dull-normal, dull-average, low achievers, mildly mentally handicapped, marginal learners, gray-area children, students at risk, etc.” (Dietrich, 1965; Forness, 1985; Kaznowski, 2004; Smith 1966). This mixture of terms further confused teachers who were not confident on how to approach these students (Early, 1963).

To sum up, the literature presented so far informs us of three key-information on the terms and definitions of slow learners. First, the first slow learners’ definitions referred to the general characteristics of this particular group or to their general state of development. Second, slow learners were discussed in relation to teachers’ personality traits in terms of patience and acceptance of all students in their classroom. Last but not least, they were defined by the way they behaved during the classroom teaching process, underlining their learning difficulties. Understanding this group emerged progressively, although there isn’t a standardised definition.

### *Teaching slow learners*

In the field of educational research, teachers' behaviour is considered a fundamental factor for school improvement (Creemers & Kyriakides, 2008; Slavin, 1987; Walberg, 1984). In the literature, researchers report a variety of methodologies that could benefit slow learners.

Traditionally, students believed to require additional individualized support in learning, were entitled to special education provision. Special education is a mechanism employed by schools to accommodate for children labelled as having "special needs". Special education provision takes many forms, with the most prominent being withdrawal from the mainstream class for individualized support. However, special education was criticised for how assumptions about difference in ability could produce dilemmas of access and equity in education (Tomlinson, 1982). In relation to slow learners, Kaznowski (2004) compared two groups of slow learners – those who received special education provision and those who did not. Her study aimed at determining which of the two groups of slow learners was more successful in school, in order to examine if special education or teaching in the mainstream class is the most appropriate for this student group. The results suggested that neither group of slow learners was successful in school and that both groups had low outcomes. The study suggests that neither special education programmes nor teaching in the mainstream class offered concrete help to slow learners, who continued to have poor outcomes compared to their classmates. Indeed, placing slow learners in the classroom without modifying teaching cannot be effective. Shaw (2008)

maintains that it is more important to study the way slow learners learn and master knowledge and then, based on those observations, help teachers adapt their teaching approach towards this student group.

Other research refers to instructional strategies such as individualised instruction, use of picture books, charts, models and peer tutoring, which were used to teach slow learners, indicating significant differences between pre-test and post-test scores of experimental groups of students (Pujar & Gaonkar, 2008). Others mentioned differentiated instruction in a heterogeneous ability classroom, including concrete instruction, pre-organised instruction, generalisation strategies and academic motivation development (Shaw, 2008).

Another line of research examines how the teacher can adjust his/her teaching to address this specific group of students. In 2004, a study conducted in India (Pujar & Gaonkar, 2008) examined instructional strategies to accelerate science learning among slow learners. The study compared the use of different instructional strategies with conventional methods of teaching in two groups of slow learners. The results clearly indicated that using instructional strategies such as charts, picture books, peer tutoring and individual instruction accelerated learning for the experimental group of slow learners in comparison to the control group where a conventional method was used. The results suggest that teachers should adapt instructional methodology to have better outcomes for this student group.

Adjusting teaching to meet specific students' needs is not an easy task. Teachers have difficulties responding to slow learners' educational needs, with the possibility of leaving them behind in the learning process. Kaznowski (2004) argues that political, social and economic reasons are to blame for leaving these students without any help. Many countries still use categorical descriptions of disability for the purpose of special education provision (Florian, 2007). Countries such as the United States, where special education is mainly defined by a student's level of intellectual ability, with an I.Q. score below 70, or where special education is considered the designed instruction to meet the unique needs of a child with a disability, students with some learning difficulties, based on their Code of Federal Regulations, are excluded from special education (34 C.F.R – 300.14). These educational systems assume that these students have enough learning dynamics to follow the classroom's pace of instruction. However, economic reasons seem not to be the only factor to blame that these students are left behind, since there aren't reports on how to handle their specific educational needs.

Although Kaznowski's research results point out important issues concerning slow learners' education programmes from a political, social and economic point of view, what teachers should do to improve learning outcomes of slow learners - both in the general classroom, as well as in the special education setting - is not adequately explained. Moreover, teachers' impact on promoting the learning outcomes of slow learners, irrespective of the learning context of the teaching, has not been measured. Furthermore, some of the instructions mentioned were not linked with any theory or methodology related to improving the quality of teaching. Therefore, examining the

quality of teaching slow learners, is the main aim of this study. Since the generic factors weren't examined on this specific population, we don't know whether they have the same impact on this specific group. Furthermore, an issue related to methodology is raised: since these students are a small number in each classroom, specific studies should be carried out to examine the effect of generic factors on slow learners.

Clearly, it is necessary to address the continuum of support that can be available for slow learners. Conversely, where teachers do not apply effective pedagogical practices, and where policy makers do not promote specific policies for identifying students who require support, this makes it even harder for teachers to adequately differentiate their teaching (Miller, 1970; Shaw, 2005).

In this part, it was argued that the quality of teaching slow learners has not been adequately examined and that teaching policy for slow learners is not supported in the general educational policy. The next part examines the Cypriot context on the topic.

*Research context: the Cypriot educational system*

In 2001, the Ministry of Education and Culture (MoEC) put into effect the integration law entitled the Education and Training of Children with Special Needs Law of 1999 [113(I)/1999], the Mechanisms for Early Detection of Children with Special Needs [185(I)/2001] and the Regulations for Education and Training of Children with Special Needs [186(I)/2001], which support the implementation of the Law. The law is



the legislative framework which regulates the identification of children believed to have “special needs”. The Code of Practice circulated by the Ministry of Education and Culture (MoEC 2003), and slightly amended in 2014, encouraged schools to work with students believed to have “special needs” prior to referring them for assessment. After their assessment, if a student is identified as having “special needs”, an individualised educational plan (IEP) is developed, including: placement in a special or mainstream educational setting, individualized or in-class support, educational resources to meet their needs, and ongoing evaluation of progress.

According to the aforementioned law, a child is considered to have “special needs” if he/she has a significantly greater difficulty in learning than most children of a similar age, or if a disability prevents or impedes him/her from using the standard educational facilities and resources available in mainstream schools. The term used “significantly greater difficulty” was not defined by any further criteria. Comment practice at the MoEC’s Educational Psychology Department, responsible for students’ assessments, have determined that students whose learning outcomes are two years behind the average and who have a cognitive level slightly below average should receive special education provision (MoEC, Annual Report 2016). Thus, in practice, students having a slower learning pace, or students with general learning difficulties, if they are identified in the educational system, are placed in a special education settings. Slow learners, fall under the umbrella of the term “special needs”, as defined in the Cypriot educational system. However, they are not always assessed and labelled as “special needs” students.

However, significant barriers are identified in relation to the quality of education offered to students labelled as having “special needs” in the Cypriot educational system. Practices and policies emanating from the existing law have been criticised for not ensuring inclusive education and rather legitimising exclusion on the basis of disability (Symeonidou, 2015). In addition, the national curriculum does not consider this student group, and this is evident in the nature of the learning goals, the content, suggested teaching methods, and assessment (Mavrou & Symeonidou, 2014; Symeonidou & Mavrou, 2014). Teachers report that although they recognise the right for placement in the mainstream school, they do not feel confident to teach this student group (Symeonidou & Phtiaka, 2009; 2014).

Cyprus has signed and ratified the United Nations Convention on the Rights of Persons with Disabilities - UNCRPD (United Nations, 2006) which calls for the right of children with disabilities to inclusive education. Inclusive education, as it is defined in Article 24 of the UNCRPD, is not merely about placement of students with disabilities in the mainstream class. Rather, it is about their right in quality education alongside their peers, accessibility in learning and participation in all school academic and social activities. Following the ratification of the UNCPD, Cyprus is expected to change its policy and practice to include, rather than exclude students with disabilities, and most importantly, to safeguard that they receive quality education.

The evaluation of teaching skills with factors of quality of teaching was the subject of research conducted in the Cypriot educational context (Kyriakides, Creemers

& Antoniou, 2009). This study demonstrated that teaching skills are separated into five levels of difficulty and the most effective teachers were the ones who demonstrated teaching skills of the fourth and fifth level. Almost half the skills included in the fourth and fifth level were related to differentiation. Therefore, the need to examine which of these skills have the same effect on slow learners' outcomes is further highlighted. Moreover, this study, as well as other recent studies, argues that although differentiated teaching increases the quality of teaching, at the same time, it is not an easy skill for teachers to acquire and apply in the teaching process. In this context, it is important to have a focused educational policy for teachers' professional development. This would improve their teaching, and benefit all students, including slow learners.

Furthermore, the Cypriot educational system could be criticised for not having developed a policy for establishing an efficient mechanism with which to identify slow learners. The existing mechanism is slow. Sometimes students are not referred for assessment early, and therefore they lack support. Moreover, even if this mechanism stems from a law, it is left to each teacher to judge whether a student must be referred to a specialist for assessment. The identification mechanism, as well as the criteria to determine "special needs", must be further examined and a national educational policy should be developed by policymakers. The literature on identification of slow learners will be presented in the following part.

The first section of this chapter was dedicated to defining the concept of a slow learner, and examined teaching for these students. The next section focusses on another important issue linked to slow learners, the identification procedure.

### *Identification issues*

According to Kaznowski (2004), the term describing the problematic common trait of these students, is kids who fall through the cracks, indicating that several slow learners wouldn't be identified and fail to receive the educational support needed. Slow learners differ from other children in the classroom only in their way of learning. Therefore, their specific dynamic of learning cannot be identified at the beginning of schooling, unless an educational system consistently runs early examining and prevention tests. England's special education is provided as additional or otherwise different from the educational provision based generally on children's age in schools (Department for Education and Employment, 1996, 312). Thus, the identification of slow learners is not made before conquering reading mechanisms and basic mathematic concepts, at which point these students are identified with low outcomes. As a result, they present a great risk of school failure because they cannot follow the classroom learning pace although they are capable of learning. Experience has shown that after some years in school, the educational gap gets bigger and so does the lack of motivation for learning. What is more, results have shown that even if these students are capable of learning, they usually don't learn as much as they could.

Although different methodological ways are reported to identify slow learners, assessments can be linked mainly to two fields, psychology and education. According to the literature, a slow learner is primarily, but not solely, defined by their cognitive development (Pecaut, 1991; Carroll, 1998).

From the psychology field, assessment of cognition seems to be the primary and main assessment to be carried out to measure intelligence. The most widely used criterion of identifying the slow learner is the use of an Intelligence Quotient (I.Q.) test. Students whose results are approximately between 70 and 90 in comparison with other children of the same age, are not considered as having any intellectual disabilities and are recognised as slow learners. For these students, a more general term relative to their mental state was usually used: students with borderline intelligence (Shaw, 2008). Others referred to a wider range of intelligence test scores between 50 and 80 (Jones, 1960). Whatever their exact range of intelligence, a student most commonly classed as a slow learner is one with low cognitive abilities (Ames, 1970). The percentage of people with “borderline intelligence” is considerable and is in the range of about 12.4% of the population (Neisser, 1998), based on studies and estimates from the normal distribution.

Research shows different reasons for having this level of intelligence score. Some place emphasis on the social and emotional environment (Ames, 1980; Jensen, 1970), and others on cognitive development (Silver-Pacuilla & Fleischman, 2006; Karande, Kanchan & Kulkarni, 2008; Levine & Barringer, 2008; Maehler & Schuchardt, 2009; Machek & Nelson, 2010; Demetriou, 2004; Demetriou, Spanoudis & Mouyi, 2011). Wherever emphasis is given, intelligence score and cognitive abilities constitute a major factor in the criteria for identifying a slow learner. If the child has an I.Q. of between 70 and 90, it is an indication that he/she might be a slow learner.

However, additional learning assessments are necessary because students cannot be identified as slow learners by considering their intelligence quotient alone (Pujar & Gaonkar, 2008). This can also be justified considering the accuracy factor of psychometric tools. Results of an intelligence test are best explained in combination with other information concerning a student, such as school results or other assessments linked to cognitive abilities. Moreover, even though intelligence is mostly defined in recent theories by two main cognitive functions, memory and digit span (Blair, 2006; Conway et al. 2002; Miller & Vernon, 1992), it nonetheless seems important to link these cognitive functions with the other factors involved in the process of learning. Thus, even though intelligence tests assess cognitive abilities designated by a score, we encounter research that concurrently draws results from other specific cognitive tests, such as reading tests (Beech, 2010; Tan, Wheldall, Madelaine & Wah Lee, 2007; Duffy & Atkinson, 2001; Shaw, 2008). Cognitive abilities involved in the learning process, such as reading comprehension, summarising and understanding main points and generalising and retaining information, must be assessed to draw a conclusion regarding the learning profile of a student. It is expected that a student who is assessed with mild intellectual difficulties will have difficulties at a cognitive level linked to memory and digit span functions (Kyllonen & Christal, 1990).

However, despite the level of intelligence, terms such as “intellectual disabilities” and “specific learning disabilities” are excluded from the definition and identification criteria of a slow learner (Kaznowski, 2004; Shaw, 2008; Pujar and Gaonkar, 2008). Nevertheless, as argued in the literature, cognitive difficulties could be found in specific

learning disorders, presenting a satisfactory intelligence quotient (Diagnostic and Statistical Manual of Mental Disorders- Fifth Edition, *DSM-5*, 2013). Thus, to identify slow learners, information on cognitive abilities is necessary in order to exclude students with specific learning disabilities.

Low cognitive abilities would probably lead to negatively impact on academic outcomes. Thus, in some research, school performance as well as class teachers' assessments, are also used for identification purposes. In particular, the teacher considered students' curricular and overall performance in the classroom to be below average (Kaznowski, 2004; Pujar and Gaonkar, 2008). However, even though school outcomes tests are considered by researchers as a necessity, it is not clarified in the literature as to whether or not classroom performance or curriculum-based assessments are best to use.

In summary, the identification process is defined by variability, with an intelligence, a cognitive and a school performance assessment as the three possible, main ways to be combined to identify slow learners (Nelson, 2010; Catts, Bridges and Little, 2008; Pujar and Gaonkar, 2008). Beyond that, although the literature is not explicit on the ways that can be best combined for more accurate results in identification, all test domains seem to involve cognitive functioning evaluation of decoding, comprehension, working memory, digit span, processing speed and organising information (Rasinski, Homan and Biggs, 2009; Karande, Kanchan and Kulkarni, 2008). Furthermore, literature references show students' performance in cognitive and scholarly domains, were linked

to the learning process of reading, writing and maths, as well as to the pace of learning (Nelson, 2010).

This study is not concerned with the etiology of a slow learner, but with the methodology of addressing their educational needs. Therefore, it is important to note that although different etiological categories of slow learners are identified in the literature, the educational needs of these students do not differ (Karnes, 1970).

The above main characteristics of this specific student population do not lead to systematic criteria to support their learning process in the classroom. The main characteristics drawn from the literature are important, but they are mostly descriptive. Thus, further examination of factors determining a slow learner is needed in order to enable us respond to their educational needs rather than leaving them behind in the learning process.

Next, the learning profile of this specific group of students is described, as reported in the literature.

### **Learning profile of Slow Learners**

Learners are not the same and it is the literature's interest to study how learners differ and which ways they can be helpful for them to overcome difficulties experienced in the learning process (Florian, 2006). The learning profile of slow learners is examined



next by referring to literature reviews on their learning behaviour, linked to the three high-order learning tasks of reading, writing and mathematical ability.

### *Learning behaviour in reading*

Reading is a high-order task and one of the most complex of human abilities as it mainly relies on cognitive functions of decoding and comprehension. Recent research describes how reading relies on decoding and comprehension of printed materials and involves the activation of different areas of the brain. In particular, word reading requires decoding that involves perception of the word in the visual modality and recoding of its sounds in the auditory phonological system, after which the semantic representation of the word from the mental lexicon is evoked (Breznitz, 1987; Seidenber & McClelland, 1989).

Moreover, another proposition on reading but in line with the above statements, proposes a model which is widely accepted by professionals and research - the model claims that the function of reading can be broken down into two basic components: **decoding** and **linguistic comprehension** (Gough & Tunmer, 1986, Hoover & Gough, 1990). In this context, decoding refers to the ability to translate a sequence of graphemes into their corresponding representations as phonemes, which are then used to access word meaning in the reader's memory. And linguistic comprehension, which is basically the same as reading comprehension, refers to the ability of obtaining the meaning of words and interpreting sentences and discourse.

Slow learners, as reported in the literature, present difficulties with reading fluency, which is the result of decoding and comprehension (Gough, 1972; Rumelhart, 1978), and which has long been considered an important factor in reading development and outcomes (Allington, 1983). Moreover, many students with difficulties in reading, as well as the slow learners, lack alternative strategies in their reading process (Beech, 2010). This means that when they are faced with reading decoding and comprehension difficulties, they fail to generate a relationship between developing phonology and reading ability, as well as to break down words and sound out their constituent sounds. The issue of using strategies in reading was developed also from Cantrell and Carter (2009), who wrote that good readers reported using global and problem-solving strategies in contrast to poor readers. Slow learners' reading difficulties are also defined by the fact that they fail to rapidly and efficiently respond to basic stimuli. They have problems with processing speed, which is responsible for the completion of a task with reasonable accuracy and fluency in reading (Rucklidge & Tannock, 2002). Slow learners finally require help in the interpretation skills and should be given guided practice in critical reading; study skills of selection and evaluation, organisation, location of information and following directions (Willcutt, 2010). This could be explained because students with reading difficulties have poor meta-cognitive skills (Alfassi, Weiss & Lifshitz, 2009).

Over the past three decades, reading comprehension research has been conducted mainly through cognitive approaches. This is due to the fact that students with reading

difficulties experience very little use of meta-cognitive considerations (Alfassi, Weiss & Lifshitz, 2009).

Slow learners' reading difficulties in decoding and comprehension processes could possibly mean a cognitive difficulty concerning working memory, conceptual change, reasoning, knowledge acquisition and critical thinking.

### *Learning behaviour in writing*

The skill of writing is a complex cognitive activity, which involves solving problems and deploying strategies to achieve communicative goals, drawing from a combination of cognitive skills such as reasoning, verbal and text production skills, knowledge transforming to writing and handling various stimuli simultaneously (Bereiter & Scardamalia, 1987). Writing is also defined by cognitive models in terms of problem-solving (McCutchen, Teske & Bankston, 2008).

Four basic applications of writing skills are emphasised by the Common Core State Standards (CCSS, 2010) to improve the teaching of writing. Firstly, writing skills are employed for multiple purposes, using supported opinions and clear explanations. Secondly, they are used to produce and publish well-organised texts, appropriate to task and purpose through planning, revising, editing and collaborating with others. Thirdly, writing skills refer to the use of writing to recall, organise, analyse, interpret and build knowledge about a topic. Finally, writing skills concern the application of both extended

and shorter writing tasks to facilitate learning in a range of discipline-specific subjects, including learning the language art (Graham & Harris, 2013).

When it comes to writing, slow learners face difficulties in activities like tracing, copying words or phrases and dictation writing (Sugasawara & Yamamoto, 2009). These students face challenges to compose and self-regulate their behaviour before, during and after writing. In particular, these students often lack knowledge about the writing process, experience difficulties in generating topics and ideas, do little planning, lack strategies in organising texts, struggle with the mechanics of writing and engage in little to no revision. Struggling writers present difficulties in applying evaluation criteria and making revisions to improve work (MacArthur, 2009).

Another difficulty in managing more than one task simultaneously, binding and manipulating information with a strategy, meta-representing new reasoning and identifying central issues and assumptions.

An integrated instructional approach for writing that considers their cognitive characteristics can be effective (Harris, Schmidt & Graham, 1998).

#### *Learning behaviour in mathematics*

The study by Johnson and Myklebust (1967) was the first to posit the existence of nonverbal disorders of learning, by using a classification of brain function. In this group

of learning disorders, factors such as the ability to follow directions, play music, or understand the behaviour of others, were also considered. In an interesting way, Johnson and Myklebust, categorised the difficulty in learning arithmetic as a disability of verbal learning and not as a nonverbal disorder of learning, opposing other first studies of nonverbal learning disabilities which included students who were referred because of their teachers' inability to teach them maths (Rourke, 1987, 1993, 1995). Recent studies, however, support that not all students with nonverbal disabilities exhibit poor maths ability (Pennington, 1991; Semrud-Clikeman and Hynd, 1990) and report other abilities that contribute to the development of mathematics skills (Keller and Sutton, 1991). These abilities were visuo-motor, visuo-perceptual, visual sequential memory, verbal association of sequential information and abstract concept formation. It is reported that deficits in these abilities may lead to problems with decoding symbols, writing and copying numbers, fact mastery, memory, monitoring performance, linguistic competencies, applied reasoning, abstract conceptual abilities and conveyance of multistep cognitive operations.

Moreover, although numerous studies suggest that students with reading disabilities can be separated from students with math disabilities on cognitive measures (Jordan, Hanich & Kaplan, 2003; Landerl, Fussenegger, Moll & Willburger, 2009), it is important for the present study to report the results of a recent meta-analysis which indicates common difficulties in both learning disabilities to verbal problem solving, naming speed, verbal working memory, visual-spatial working memory and long-term

memory (Swanson & Jerman, 2006). It seems that students with reading or maths difficulties present a similar learning profile.

Also mentioned in relevant literature, slow learners appear to present difficulties with visual-spatial processing and working memory (Geary, 2003, Swanson & Jerman, 2006). It is also reported that students with maths and reading disabilities, were slower in processing information, including both phonological and executive processing (Swanson & Sachse-Lee, 2001). Another cognitive element is given for slow learners in maths, concerning problems with distraction and attention to detail in contextual situations (Gold, Ewing-Cobbs, Cirino, Fuchs, Stuebing & Fletcher, 2013). It appears that these students have more difficulty alerting and orienting their attention in a cognitive assessment of attention.

Although the role of general intelligence in mathematics outcomes is widely acknowledged (Hale, Fiorello, Kavanaugh, Hoepfner & Gaithere, 2001), recent studies emphasise specific cognitive skills in maths outcomes, such as, **working memory, as well as verbal and reasoning skills** (Geary, Brown & Samaranayake, 1991; Passolunghi & Siegel, 2004; Wilson & Swanson, 2001; Delgado & Prieto, 2004; Fuchs et al., 2006; Nunes, Bryant & Evans, 2007). It is further reported that slow learners tend to generally progress at a slower pace in comparison to students who do not present difficulties in working memory, verbal and linguistic skills, and other cognitive skills involved in learning (Hanline, Milton & Phelps, 2010; Sabornie, Cullinan & Osborne, 2005; Turner & Alborz, 2003). If maths abilities require students to apply knowledge, skills and

strategies to novel problems as well as reasoning, then this justifies why slow learners are often characterised as poor mathematical problem-solvers.

Reading, writing and mathematics literature from the psychology field provides information about the learning profile of a slow learner in terms of examining how a student processes these cognitive tasks. The main cognitive characteristics related to slow learners mentioned in the literature are mild intellectual disabilities, with difficulties in attention and memory skills, speech and language skills, as well as readiness. There is a preference for concrete material. Also, problems in organising knowledge, generalising information, needing a slower pace of instruction, inability to retain new information and difficulty in generalising material in new situations (Jensen, 1998; Kough & de Haan, 1955 Lynam, Moffitt & Stouthamer-Loeber, 1993; Madison, 1971; Shaw, 2000, 2008; Singh, 2004; Verguts & DeBoeck, 2001).

The literature reviews from the three, main high-order tasks of learning in terms of reading, writing and maths ability lead to a specific learning profile of this student group. The main characteristics of their profile are next presented.

#### *Summarising main characteristics of slow learners' profile*

First, a slow learner needs to receive information in a concrete way, avoiding abstract material and concepts. These students face difficulties with their working memory (Verguts & DeBoeck, 2001) which is the capacity to hold information in mind.

They also present difficulties when they complete complex tasks (Sandberg, 2001), and when they have to bind, hold and manipulate information in real time with attention.

Second, slow learners present difficulties in integrating new and old information and recognising the relationship between newly-taught and previously-learned information, as compared to their average functioning peers (Verguts & DeBoeck, 2001). This difficulty is about conceptual changes, that is the procedure of bridging, differentiating and eliminating concepts. A student will have difficulty in organising new information and creating new knowledge.

Third, whereas the ability to generalise strategies is a major component of deep learning, slow learners lack this ability (Alessi, 1987). They present difficulties in reacting to a novel situation, as well as in reflecting on and selecting a strategy in order to respond to a new learning situation.

Fourth, these students are extremely inefficient in their ability to understand and apply new academic information (Bateman, 1991), require more examples and take more time before they effectively understand and apply new concepts. They present difficulties in decontextualising inference by interpreting information, spotting contradictions, meta-representing new reasoning and evaluating arguments to form general knowledge.

Fifth, slow learners seem to benefit from increased time of engagement with academic tasks and often require extra practice and more time on task to develop the



same level of academic skills as their typically developing peers. They need more time to identify central issues and assumptions, to take in new information and make decisions based on this information, to link information to old material. In this case, students' learning function fails to provide satisfactory critical thinking in order to form new knowledge after receiving information. The five main learning characteristics of slow learners based on the literature reviews are presented in the following table.

Table 2.1 *Learning profile of slow learners based on literature reviews*

<b>Learning difficulties of a slow learner</b>	<b>Teachers' behaviour in response to slow learners' educational needs</b>
<b>1) Receiving information</b>	(1) A slow learner presents difficulties <b>in receiving information</b> due to slow pace of manipulating information in real time with attention (Verguts & DeBoeck, 2001; Sandberg, 2001). The teacher should give more time and include repetitions during teaching process.
<b>(2) Integrating knowledge</b>	(2) A slow learner has difficulties <b>expanding/developing his knowledge</b> due to difficulties in integrating new with old information, recognising the relationship between newly-taught and previously-learned information, eliminating concepts, organising new information and creating new knowledge (Verguts & DeBoeck, 2001). Teaching should be applied with concrete concepts and by giving more time to comprehend information.
<b>(3) Handling information with strategy</b>	(3) A slow learner has difficulty <b>in handling information with a strategy</b> and to generalise strategies (Bateman, 1991). The teacher should demonstrate strategies with examples, so that slow learners can receive information effectively and respond to new learning situations.

---

**(4)  
Developing  
strategies**

(4) A slow learner is inefficient in organising information (Alessi, 1987) due to their difficulty **handling strategies**. S/he needs to be taught possible new strategies in order to understand and to apply new academic information, to interpret information, to spot contradictions, to meta-represent new reasoning, to evaluate arguments and to form general knowledge.

**(5) Meta-  
representing  
knowledge**

(5) A slow learner presents difficulties on **reflecting to new knowledge** and needs increased academically engaged time and more time on task to meta-representing knowledge and to apply critical thinking function to form new knowledge from receiving information.

---

The teaching approaches proposed for slow learners were to spend more time repeating information and tasks, engage with more examples with applied knowledge, demonstrating learning strategies, and differentiating given information. Our assumption to the above teaching approaches is that teachers' behaviour proposed in the dynamic model could be presented as an alternative to teach and to measure teachers' impact on slow learners' outcomes. This study is mainly concerned with this issue: do teacher factors, included in the dynamic model, have an effect on slow learners' outcomes, and, if so, to what extent? Which teaching skills are more effective for slow learners? A presentation of the eight classroom level factors as proposed in the dynamic model of effectiveness is approached next in this study.

## **The Dynamic Model: an alternative to examine Slow Learners**

Little empirical evidence exists that supports the effectiveness of educational approaches in promoting effective teaching to slow learners. In this context, the use of a dynamic integrated approach (Creemers et al., 2012) and the dynamic model of educational effectiveness (Creemers & Kyriakides, 2008) set the framework upon which teacher behaviour towards slow learners can be measured. Thus, before presenting teacher factors as proposed in the model, a brief overview of the literature on Educational Effectiveness Research over the past years is provided.

### *Educational Effectiveness Research: an overview*

Educational Effectiveness Research (EER) addresses questions on what works in education and why. The term “educational effectiveness” is used to emphasise the importance of conducting joint school and teacher effectiveness research, since neither level can be adequately examined without the other (Reynolds et al., 2002) or identify interactions between school, classroom and individual student levels and their impact on student performance (Creemers & Kyriakides, 2008).

Following the rather pessimistic results of studies suggesting minimal impact of educational factors on student outcomes (Coleman et al., 1966; Jencks et al., 1972), attempts were made to demonstrate the potential of schools and education in general to make a difference to students’ attainment (Brookover et al., 1979; Rutter et al. 1979) thus

setting the scene for establishing a scientific domain dealing with effectiveness in education (Kyriakides, 2006).

Progress in the field of educational effectiveness over the past years can be recognised in relation to the methodology used. This concerns the use of multilevel effects on student outcomes (Creemers & Kyriakides, 2008; Kyriakides & Creemers, 2006) and the reach of a common consensus concerning methods and data required (Goldstein, 1997; Teddlie et al., 2000). Progress is also recognised in relation to the theoretical framework with the definition of involved concepts and the relations between them (Creemers, 1994; Levine & Lezotte, 1990; Scheerens, 1992).

Recognising the lack of theory-based research (Creemers, 2002) educational effectiveness models were also developed to provide the basis for theory to be developed. Carroll's model (1963) is considered one of the most influential models. The model argues that the degree of student mastery is a function of the ratio of the amount of time spent on learning tasks to the total amount of time needed. The model accounts for variations in school learning with five classes of variables, three of which can be expressed in terms of time, the other two in terms of outcomes. Another model with major influence on EER is Creemers' comprehensive model of educational effectiveness (1994). Creemers (1994) developed Carroll's model further by addressing the factor of "quality of instruction", a factor recognised by Carroll himself as needing further elaboration (Carroll, 1989). Creemers' comprehensive model distinguishes curriculum, grouping procedures and teacher behaviours as components of the quality of instruction

and uses a multi-level approach to effectiveness factors, arguing their joint impact on student outcomes. Empirical support for the model has been provided through several studies (De Jong et al. 2004; Driessen & Sleegers, 2000; Kyriakides et al., 2000; Kyriakides & Tsangaridou, 2004). However, these studies have also pointed out several weaknesses in Creemers' model such as its focus on frequency and the fact that it does not take into consideration the dynamic nature as well as the differential aspect of effectiveness. Most importantly, Creemers' model was not used for improvement purposes.

In this context, the dynamic model of educational effectiveness was developed (Creemers and Kyriakides, 2008). The dynamic model takes into consideration the dynamic perspective of educational effectiveness and was developed in order to contribute to promoting improvement of education. A brief review of the model's basic characteristics is described next.

#### *The dynamic model of Educational Effectiveness*

The development of the dynamic model is based on the results of a critical review of the main findings of EER, the critical analysis of theoretical models of educational effectiveness developed during the 1990s (e.g. Creemers, 1994; Scheerens, 1992; Stringfield & Slavin, 1992), and on effectiveness studies' results that have suggested that the influences on student outcomes are multi-level (Teddlie & Reynolds, 2000).

Taking the above into consideration, the dynamic model of EER refers to multiple factors of effectiveness that operate at different levels. Specifically, the model is multi-level in nature and refers to factors operating at four levels: student, classroom, school, and context. The dynamic model emphasises classroom-level factors, but, at the same time, it considers that higher levels are expected to provide conditions for lower levels (Creemers & Kyriakides, 2008). This means school-level factors are expected to have an effect on classroom-level factors of effectiveness.

Even though the four levels are important, the dynamic model relies on the fact that learning, especially in terms of differences in learning outcomes, should be explained by the primary process at the classroom level (Creemers & Kyriakides, 2008). Therefore, the emphasis is on teaching and the description of the classroom level mainly refers to the behaviour of the teacher in the classroom. In this context, testing classroom-level factors on slow learners would contribute in examining teachers' effectiveness on this specific student population.

Taking into consideration the main findings of teacher effectiveness research (e.g. Brophy & Good, 1986; Kyriakides, Campell & Christofidou, 2002; Muyjs & Reynolds, 2001), the dynamic model suggests eight effectiveness factors operating at teacher level. These factors describe teachers' instructional role and were found to be related to student outcomes. The model does not refer only to one approach of teaching since an integrated approach in defining quality of teaching was adopted. According to Creemers and Kyriakides (2008) the eight factors recognised at the teacher level cover at least the main

approaches in learning and teaching. Teacher factors refer to observable instructional behaviour of teachers in the classroom, rather than on factors that may explain such behaviour (e.g. teacher beliefs, knowledge, and interpersonal competences).

The eight factors included in the model are as follows: orientation, structuring, questioning, teaching modelling, applications, time management, teachers' role in making the classroom a learning environment and classroom assessment. These eight factors were found to be associated with student outcomes (e.g. Brophy & Good, 1986; Darling-Hammond, 2000; Muijs & Reynolds 2003). A description of each teacher factor follows.

#### *The Classroom Level Factors of the Dynamic Model*

##### *Orientation*

This refers to teacher behaviour in providing students with explanations with regard to reasons for which a particular activity or lesson or series of lessons occurs. The teacher actively involves students in identifying the reasons for which a lesson includes a specific task. Through this process, it is expected that the activities taking place during lessons, will become meaningful to students and eventually, it will increase their participation and engagement in the lesson (e.g. De Corte, 2000; Paris & Paris, 2001). It is, therefore, supported that orientation tasks should take place in not only one part of the

lesson, but instead they should be evenly distributed among the different parts of a lesson or series of lessons (e.g. beginning, middle, and end).

### *Structuring*

It refers to a factor for which research in the field of educational effectiveness has had early indications with regard to its contribution toward student learning. Even from the mid-Eighties, attention was drawn to the fact that student learning is positively influenced when teachers actively present materials and structure them by: (a) beginning with overviews and/or review of objectives; (b) outlining the content to be covered and signaling transitions between lesson parts; (c) calling attention to main ideas; (d) reviewing main ideas at the end (Rosenshine & Stevens, 1986). In addition, research has shown that student outcomes can be amplified when teachers provide them with summary reviews, as they are expected to contribute to the grouping and outlining of main points (Brophy & Good, 1986). The aforementioned structuring tasks aim to assist student memorisation of information and developing links between the different parts of lessons, instead of dealing with them as isolated units. Finally, it is important to note that the structuring factor also refers to the ability of teachers to increase the lesson's level of difficulty (Creemers & Kyriakides, 2006).

### *Questioning*

Considering that research has shown that teacher questioning skills are closely associated with student outcomes; this factor was included in the dynamic model and



consists of five elements. First, effective teachers are expected not only to provide a large amount of product questions which require students to respond in a single way, but also focus on expecting students to elaborate on their answers and provide details indicating the mental route they followed to reach their answer (i.e. by also posing process questions) (Askew & William, 1995; Evertson, Anderson, Anderson, & Brophy, 1980). Second, it is anticipated that teachers grant students enough time to think before calling for their answers, with the amount of time given depending on each question's level of difficulty. Third, it should be established that the questions posed by the teacher are clear and easily understandable by the students, so that no misconceptions or misinterpretations are caused. Fourth, when posing a question, the teacher should keep in mind the students' given ability to respond, avoiding too-difficult questions that will inevitably cause a complete failure to respond (Brophy & Good, 1986). Finally, it is outlined that an important aspect of this factor is the way teachers deal with student responses. Specifically, correct responses should be acknowledged so as to establish that all students are aware of the correct answer at the end of the discussion. In case a student's answer is not fully correct, then the teacher should acknowledge whichever part is correct, and assist the student in discovering the correct answer or coming to an improved response, through the provision of clarification or helpful guidelines (Rosenshine & Stevens, 1986).

### *Teaching-modelling*

An aspect of education that has received increased attention in the last two decades is that of self-regulated learning (SRL). Arguably, extensive policy emphasis was given on the outcomes of the new goals of education (Muijs et al., 2014). However, even though SRL has received major attention in educational research (Winne, 2005), it has not received as much attention as other aspects. Taking the above into consideration, the teaching-modelling factor which is related to SLR is included among the classroom

level factors of the dynamic model. This factor anticipates that effective teachers promote students' use of strategies and/or development of their own strategies in order to address different types of problems (Grieve, 2010) and develop skills promoting active learning. Thus, depending on the problem addressed, teachers may follow two alternative approaches. The first approach concerns the teacher's presentation of a problem-solving strategy without asking for any student input. The second approach demands more active student participation and works backward, given that students are encouraged to describe ways that they themselves would address a specific problem. Thereafter, the teacher is expected to make use of that information for promoting the idea of modelling and encouraging the development of the students' own problem-solving strategies (Aparicio & Moneo, 2005; Gijbels, Van de Watering, Dochy, & Van den Bossche, 2006).

### *Application*

It is assumed that providing students with practice and application opportunities can enhance learning outcomes (Borich, 1992). Learning new information cannot be a nonstop process, since, according to the Cognitive Load Theory, the working memory can only process a limited amount of information at a time (Kirschner, 2002; Paas, Renkl, & Sweller, 2003). It is also argued that application tasks should not only repeat the material that students were taught in class, but should move a step further, adding more complex and mentally-stimulating elements. Thus, application activities should contribute to drawing the links between the units taught in one lesson or series of lessons with the units that will follow. Effective teachers are expected not only to observe

students engaging in application tasks, but also to contribute by supervising their progress and providing them with corrective and constructive feedback (Brophy & Good, 1986).

### *Classroom as a learning environment*

This factor, as described in the dynamic model, consists of five components: a) teacher-student interaction; b) student-student interaction; c) how students are treated by the teacher; d) competition between students; e) classroom disorder. These five elements stem from classroom environment research which considers them significant. Specifically, the first two of these elements can be seen as important for measuring classroom atmosphere (for example, see Cazden, 1986; Den Brok, Brekelmans, & Wubbels, 2004; Harjunen, 2012), while the other three elements refer to teachers' efforts to create a well-organised and accommodating learning environment in the classroom (Walberg, 1986). The dynamic model also supports that both the types of interactions in a classroom, and teachers' actions promoting such interactions that relate to learning (on-task behaviour) should be examined. The classroom can be established as a learning environment by looking at the teacher's behaviour in developing and maintaining rules, and by ensuring student respect and cooperation.

### *Management of time*

To address this factor, the amount of time used per lesson for on-task behaviour is investigated. It is anticipated that effective teachers are able to organise and manage the

classroom environment, make use of learning time, and maximise engagement rates. Thus, the main interest of this factor is whether students are on task or off task and whether the teacher is able to deal effectively with any kind of incidents without wasting teaching time. It is also important to investigate whether or not the teacher manages to decrease loss of time for different groups of students by taking into consideration their different learning needs and abilities (e.g. by allocating supplemental work to gifted students who finish work earlier than others).

### *Assessment*

Assessment is essential and interconnected to teaching (Stenmark, 1992). In particular, formative assessment is one of the most important factors associated with effectiveness at all levels, especially at the classroom level (e.g. De Jong, Westerhof, & Kruiter, 2004; Kyriakides, 2008; Shepard, 1989). In fact, several studies (e.g., Brookhart, 2001; Tunstall & Gipps, 1996; Wiliam et al., 2004) as well as the meta-analysis of Bangert-Drowns, Kulik and Kulik (1991) regarding research on formative assessment, have shown that the frequency of assessment is related to students' academic outcomes (Marzano, 2007). Therefore, the dynamic model places emphasis on student assessment and assumes that the information collected through assessment is expected to be used by the teacher for at least two purposes. The first purpose is related to the identification of particular student needs so as to proceed with the provision of feedback and corrective measures where needed. The second purpose is for teachers' self-evaluation, given that students' outcomes may reflect possible weaknesses in teaching practice and indicate

areas for improvement. It is thus stressed that assessment data should be examined in terms of quality (i.e. whether they are reliable and valid) in order to promote the formative rather than the summative purpose of assessment. The dynamic model also examines whether teachers possess the necessary skills to respond efficiently to each of the main phases of the assessment process (planning/construction of tools, assessment administration, recording, reporting) (Black & Wiliam, 2009).

The main elements of each effectiveness factor are presented in Table 2.2

Table 2.2 *The main elements of each teacher factor in the dynamic model.*

<b>Factors</b>	<b>Main elements</b>
<b>(1) Orientation</b>	(a) Providing the objectives for which a specific task/lesson/series of lessons take(s) place; (b) challenging students to identify the reason for which an activity takes place in the lesson.
<b>(2) Structuring</b>	(a) Beginning with overviews and/or review of objectives; (b) outlining the content to be covered and signalling transitions between lesson parts; (c) calling attention to and reviewing main ideas.
<b>(3) Questioning</b>	(a) Raising different types of questions (i.e. process and product) at appropriate difficulty level; (b) giving time to students to respond; (c) dealing with student responses.
<b>(4) Teaching Modelling</b>	(a) Encouraging students to use problem-solving strategies presented by the teacher or other classmates; (b) inviting students to develop strategies; (c) promoting the idea of modelling.
<b>(5) Application</b>	(a) Using seatwork or small-group tasks in order to provide needed practice and application opportunities; (b) using application tasks as starting points for the next step of teaching and learning.

**(6) The classroom as a learning environment**

(a) Establishing on-task behaviour through the interactions they promote (i.e. teacher-student and intra-student interactions); (b) dealing with classroom disorder and student competition through establishing rules, persuading students to respect and apply the rules.

**(7) Management of time**

(a) Organising the classroom environment; (b) maximising engagement rates.

**(8) Assessment**

(a) Using appropriate techniques to collect data on student knowledge and skills; (b) analysing data in order to identify student needs and reporting the results to students and parents; (c) evaluating their own practices

---

Given that the dynamic model of EER acknowledges effectiveness factors as multi-dimensional and constructs and proposes a measurement framework upon which each factor can be measured, a description of how each factor is measured in the present study follows.

The model suggests the measurement of each factor using five dimensions: Frequency, Focus, Stage, Quality and Differentiation.

*Frequency*

Frequency is a quantitative way to measure the functioning of each factor. It refers to the amount of times that an activity takes place in a classroom. Thus, frequency is measured, for example, in terms of the number of orientation tasks that

teachers administer to students. On the other hand, the remaining four dimensions examine qualitative characteristics of classroom factors.

### *Focus*

Focus is measured by looking at the ability of a teacher to use different ways of measuring student skills rather than using only one technique. It is also important to examine whether or not the teacher makes more than one use out of the information s/he collects (e.g. identifying needs of students, conducting self-evaluation, adopting his/her long-term planning, using evaluation tasks as a starting point for teaching) (Black & William 1998).

### *Stage*

Stage is measured by investigating the period at which a task takes place (e.g. at the beginning, during, and at the end of a lesson/unit of lessons) and the time lapse between collecting information, recording the results, reporting the results to students and parents, and using them for planning his/her lessons.

### *Quality*

Quality is measured by looking at the properties of the factor instruments used by the teacher, such as the different forms of validity, the internal and external reliability, the

practicality and the extent to which the instruments cover the teaching content (Cronbach 1990). The type of feedback the teacher gives to his/her students and the way students use the teacher feedback is also examined.

### *Differentiation*

Differentiation is examined in relation to the extent to which teachers use different techniques to measure student needs and/or different ways to provide feedback to different groups of students by considering their background and personal characteristics. Using this measurement framework implies that the classroom-level factors should not only be examined by measuring how frequently a factor occurs (i.e. through a quantitative perspective), but also by investigating specific aspects of how each factor functions (i.e. looking at qualitative characteristics of the factor's functioning).

The validity of the model has been examined by a number of studies. Specifically, a longitudinal study measuring teacher and school effectiveness in three different subjects (i.e. mathematics, Language lesson and religious education) was conducted to test the main assumptions of the model (Kyriakides & Creemers, 2008). Using Structural Equation Modelling (SEM) techniques, the study demonstrated that classroom and school factors can be defined by reference to the five dimensions of the dynamic model (see Kyriakides & Creemers, 2008; Creemers & Kyriakides, 2010). Another study investigating the impact of teacher factors on outcomes of Cypriot students at the end of pre-primary school was also conducted (Kyriakides & Creemers, 2009). In this study, the



assumption that factors included in the dynamic model are generic was mainly supported. Furthermore, the validity of the dynamic model at the school level was supported by the results of a quantitative synthesis of 67 studies exploring the impact of school factors on student outcomes (Kyriakides, Creemers, Antoniou & Demetriou, 2010). A follow-up study testing the validity of the dynamic model was conducted during the school year 2008-2009 (Creemers & Kyriakides, 2010). The methods used were identical to those followed by the original study testing the validity of the model. They support for the generalisability of the original study. The dynamic model of educational effectiveness is next presented in figure 2.1.

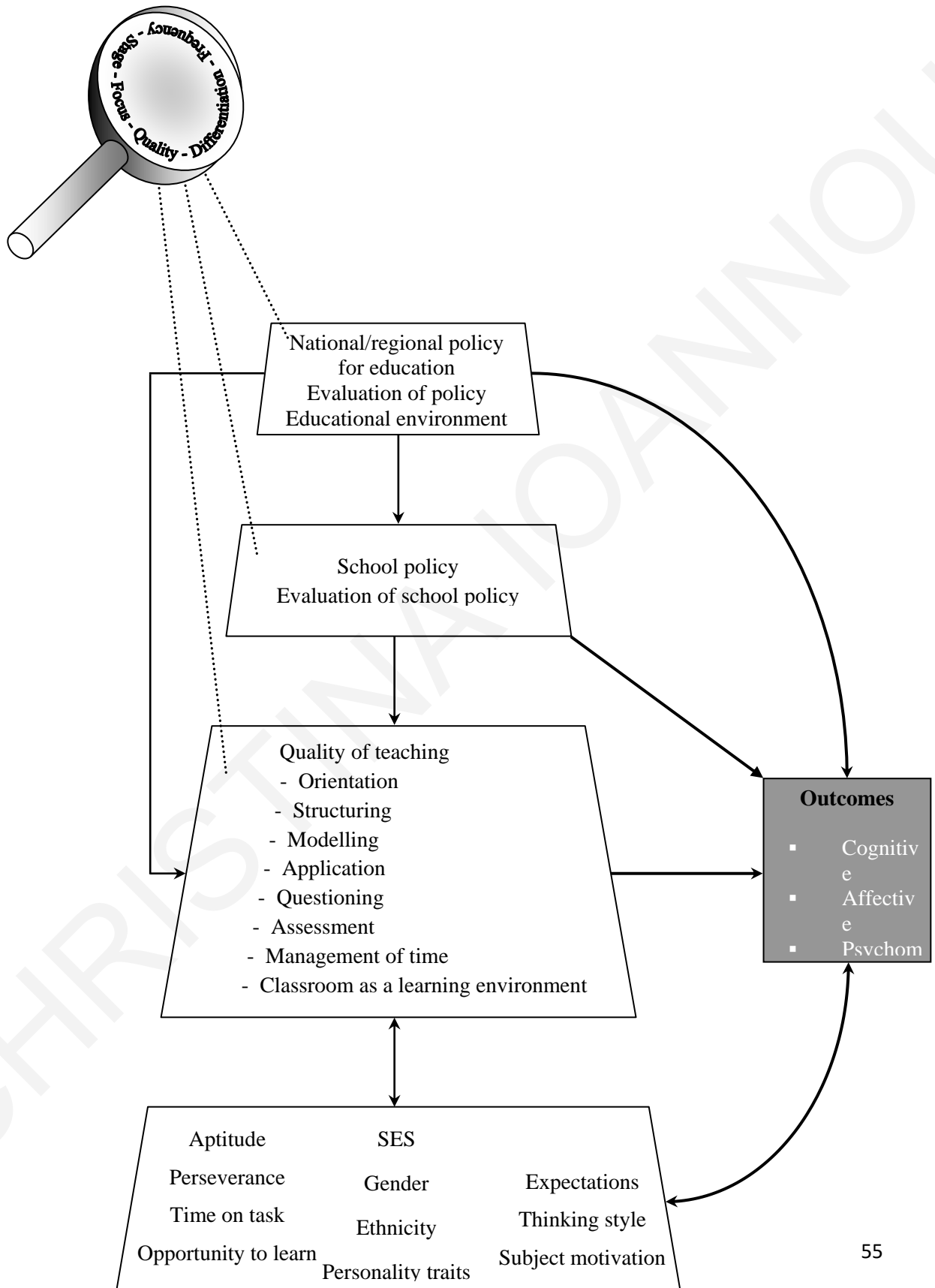


Figure 2.1 The dynamic model of educational effectiveness

Studies testing the validity of the model also revealed that classroom level factors are interrelated and can be grouped into five types of teacher behaviour (Kyriakides, Creemers & Antoniou, 2009). These types of teacher behaviour are discerned in a distinctive way and move gradually from skills associated with direct teaching to more advanced skills concerned with new teaching approaches and differentiation of teaching. Teachers exercising more advanced types of behaviour have better student outcomes. Given that the dynamic model was developed to establish stronger links between EER and improvement of practice, these findings were employed to develop teachers' professional development. The dynamic model is established in a way that helps policymakers and practitioners improve educational practice. It encourages rational decision-making concerning the optimal fit of the factors within the model and the present situation of the factors in schools or educational systems (Vanlaar, Kyriakides, Panayiotou, Vandecandelaere, McMahon, De Fraine, & Van Damme, 2016). Bearing in mind the ambiguity in defining, identifying, as well as teaching effectively slow learners, could this theory-based approach possibly contribute also to the effective teaching of these group of students?

The dynamic model has adopted an integrated approach in defining quality of teaching, based on direct teaching and constructivist teaching theories; Creemers (2007) has demonstrated that the eight classroom-level factors of the dynamic model cover partly all of these teaching approaches. Taking into consideration that teaching is based on cognitive theories of learning, effectiveness models and theories were developed on the link between learning outcomes and learning theories (Creemers, 1994; Slavin 1996;

Scheerens, 1993; Slater & Teddlie, 1992). In this context, it is important to present how cognitive abilities interfere in the learning process. The learning profile of slow learners presented above in this chapter demonstrated that their learning is related to teachers' behaviour. In order to identify which of the teaching behaviours are more effective for this specific student population, a presentation of cognitive abilities involved in learning follows.

#### *Cognitive abilities involved in the learning process*

Cognitive ability is related to the term "intelligence" (Diagnostic Statistical Manual V-*DSM-V*, 2013). Considering that an important criterion for identifying slow learners is their cognitive results, a brief literature review on intelligence follows.

Intelligence theories are one of the most talked-about subjects within the field of psychology. However, there is no standard definition as to what exactly constitutes "intelligence". Some researchers have suggested that intelligence is a single, general ability as first introduced by the British psychologist Charles Spearman (1863-1945). He then described a concept he referred to as "general intelligence", or the "g factor". After using a technique known as factor analysis to examine many mental aptitude tests, Spearman concluded that scores on these tests were remarkably similar. People, who performed well on one cognitive test tended to perform well on other tests, as well as in school performance, while those who scored badly on one test tended to score badly on others. He concluded that intelligence is general cognitive ability that could be measured and numerically expressed.

The new theorists of cognitive development (Case, 1992; Demetriou, 2004; Halford, Wilson & Phillips, 1998; Pascual-Leone, 1988) also suggested, based on Piaget's theory, that cognitive development increases processing efficiency. The latter is defined in terms of speed of processing and working memory capacity. Overall, this approach suggests there is a general intelligence factor. Moreover, differences between individuals may come from differences in their predispositions or facility with different areas of knowledge and problem-solving.

In more recent research, according to the theory of the five principles of educating the developing mind (Demetriou, Spanoudis & Mouyi, 2011), it is highlighted that school has a major role in the development of cognitive processes of learning. Studies using systemic methodology showed that the way the brain is trained, especially by schools in same ages, is crucial to the development of mind. The theory can be useful for education policymakers as well as teachers, who could employ activities leading to effective learning for all students.

The theory that draws the links between cognitive development and education is a challenge and is in line with educational effectiveness research. The Educational Effectiveness Research (EER) has developed over the last decades from the starting point made by Coleman (1966) and Jenks (1972), arguing that schools were not having any impact on students' learning process. The theory of educating the developing mind is another step closer to achieving effective schools. It is also in line with research carried out over the past four decades in the EER field. The link between schooling and cognitive

development was found to be related; more school experience accelerates cognitive development (Kyriakides & Luyten, 2009). Thus, skilled teachers could have a strong dynamic effect on students' ability to learn, even on those with low outcomes. Every child could develop cognitively depending on stimuli received from the environment (Demetriou, Spanoudis & Mouyi, 2011). This theory gives teachers a very important role. Teachers and teaching policies are at the centre of the developing mind. Teachers in moment-to-moment interaction with the student in the instruction process become students' guides in terms of their cognitive development, according to Demetriou, Spanoudis & Mouyi (2011). A continuous process of emergence, differentiation and integration of new representations, goes along with complexity, abstraction and flexibility and, as students mature, they become able to deal with increasingly more representations simultaneously. This procedure describes how students become able to learn and accumulate knowledge as they grow older. Finally, Demetriou, Spanoudis & Mouyi (2011) conclude that learning is shaped by the principles of educating the developing mind, i.e. working memory, conceptual change, reasoning, learning to learn and critical thinking.

The five principles of educating the developing mind are presented in the next table.

Table 2.3. *The five principles of educating the developing mind by Demetriou, Spanoudis and Mouyi (2011).*

<b>Principles</b>	<b>Main elements of student behaviour</b>
<b>(1) Working memory</b>	Monitoring ongoing performance, keeping track of the flow of information and update, managing more than one task simultaneously, binding items according to type and time of presentation and inhibiting irrelevant terms. For a student concerning the learning function this means s/he has the

---

capacity to hold and manipulate information “on-line” in real time with attention.

**(2) Conceptual change** Classification, mental number line, arithmetic operations, for visualisation or spatial coordinates. Bridging, differentiating and eliminating concepts. Meta-representing new concepts and symbolising. Related learning function to a student is the ability to anticipate and sequence information in order to plan and execute a goal by implying knowledge in a new area.

**(3) Reasoning** Decontextualise inference by interpreting the premises analytically and differentiating them from their content and the conclusion. Resisting certainty about conclusions unless really logically necessary. Spotting contradictions between premises and conclusions. Meta-representing new reasoning patterns and symbolisations. Students’ learning function related to his/her capacity to reason about concrete items, analysing and evaluating arguments in order to form more general knowledge.

**(4) Learning to learn** Learning as knowledge acquisition, conceptual change and acquisition of problem-solving skills. Students’ learning function is related to the capacity of asking, reading, evaluating in order to respond and react to a novel situation, as well as the ability to reflect and select a strategy in order to respond to a new learning situation.

**(5) Critical thinking** Identifying central issues and assumptions. Reflecting on the nature of knowledge (what is evidence and what is truth), meta-representing new decisions and symbolising. Tolerating ambiguity. Protecting judgment from his/her own biases. Students’ learning function will be related to his/her ability to take in new information and make decisions based on this information, as well as to recognise and link information to earlier material in order to think about oneself in relation to the new material.

The above cognitive factors are related to slow learners’ main learning characteristics as drawn from the literature presented earlier in this chapter. This specific

student population needs more time to comprehend, and more examples. It also needs to be taught strategies that can be used during the learning process. Our assumption is that the classroom level factors of the dynamic model could support learning for slow learners since these factors are based also on cognitive theories of learning. Furthermore, our assumption is that some of these factors may more effectively support learning for this specific student population. Factors of structuring, application, teaching-modelling, questioning and orientation have common figures/characteristics with the cognitive theory and the learning profile of this specific student population. The research assumption is next presented based on the literature findings on slow learners, on the main elements presented on classroom-level factors of the dynamic model and the cognitive theory of learning.

*Classroom Level Factors promoting learning to Slow Learners: a research assumption*

The dynamic model relies on the fact that learning should be explained by the primary processes at the classroom level (Creemers & Kyriakides, 2008). Emphasis is given to teachers' behaviour in the classroom and especially to their contribution in promoting learning at the classroom level. The role of educators is also emphasized in the literature of cognitive development. Educators are expected to lead students develop and refine cognitive skills: focus on information; scan, compare and choose according to goals; ignore irrelevant information; represent what is chosen and associate with existing knowledge; meta-represent new knowledge (Demetriou, Spanoudis & Mouyi, 2011).



Based on the perspective that every child could develop cognitively depending on environmental stimuli, skilled teachers could have a dynamic impact on students' learning, even on those with low outcomes.

Effective teachers are expected to structure their lessons to respond to all students and to their different learning and affective needs, by providing more structuring tasks to those students who need them most (Creemers & Kyriakides, 2008). Their instructional behaviour will enable them to provide equal opportunities to students with different learning characteristics.

So far, a learning profile for slow learners was identified. Then eight classroom level factors were presented as proposed in the dynamic model. Considering the findings of Kyriakides' and Creemers' research (2006), the teaching skills proposed influence student outcomes but also operate differentially in relation to students' characteristics. A correlation is next proposed, supporting the main argument in this study.

The first learning characteristic identified concerns difficulties in integrating new and old information, recognising and identifying the relationship between newly-taught and previously-learned information. The second learning characteristic concerns the need to receive information in a concrete way, thereby avoiding abstract material and concepts, so as to review main ideas and to reinforce the learning of major points. The third characteristic concerns difficulties related to reaction to a novel situation as well as in reflecting on strategy and selecting a strategy to respond to a new learning situation. The

fourth learning characteristic concerns students' inability to understand and apply new academic information, the time-cost need for more examples to maximise comprehension and apply new knowledge and new concepts. And the fifth characteristic concerns the increased academically-engaged time, extra practice, repetition and more time spent on task.

In this study, classroom level factors are assumed to empower students in their learning process. Specifically, instructional activities from the factor Orientation may help these students when the teacher provides the objectives for which a specific task, lesson or series of lessons take place. He/she challenges the student to identify the reason why an activity occurs in the lesson, to link, differentiate and eliminate concepts and organise new information to create new knowledge. Thereafter, the factor Structuring will have an impact on these students (e.g. if the teacher begins with overviews and reviews of objectives, outlining content to be covered, signalling transitions between lesson parts and calling attention and reviewing main ideas, after which s/he then facilitates students in memorising information). Structuring elements will allow students with poor working memory to maintain their attention and, at the same time, hold and manipulate information.

Furthermore, teaching activities correlated to the teaching-modelling factor are assumed to have an impact on this student population. Teachers who support slow learners' learning usually encourage students to use problem-solving strategies, invite them to develop strategies, and promote the idea of modelling,

Thereafter, it is assumed that teachers using application tasks as starting points for the next steps in teaching and learning would probably support slow learners facing difficulties in decontextualising inference by interpreting information, meta-representing new reasoning and evaluating arguments to form general knowledge.

Lastly, regarding activities correlated to the factor of Questioning, it is assumed that teachers support students learning when they organise and manage the classroom by allocating time for different groups of students and differentiating the information delivered. In this way, they would probably support slow learners in taking in new information and linking information to earlier material to form new knowledge after receiving information. This specific group of students will probably be benefited when the teacher poses different types of questions (i.e. process and product) at an appropriate difficulty level, allowing more time for students to respond.

Finally, each of the five factors identified in relation to slow learners' learning profile would be measured, as suggested in the dynamic model, by using the following five dimensions: frequency, focus, stage, quality and differentiation. The dimension of differentiation is directly related to the main assumption of this study. Differentiation is examined in relation to the extent to which teachers use different techniques for measuring student needs, different ways to provide feedback, considering their background and personal characteristics.

Teachers' behaviour is defined in a concrete way by the eight factors proposed by the dynamic model. Additionally, an empirically-proven measurement framework is

proposed with five dimensions. Limited research in slow learners measures the effect of teacher behaviour on students' outcomes gains. However, extensive research connects the impact of teacher behaviour on students' cognitive development. In general, the relation between cognition and education is bidirectional: cognition shapes and affects learning in schools, and schooling shapes and affects cognition (Shayer & Adey, 2002; Shayer & Adhami 2003; Kyriakides & Luyten, 2009; Artman et al. 2006).

In this study, the learning profile of slow learners was linked with a cognitive theory to avoid a descriptive definition of learning characteristics based on observations in the classroom. Furthermore, this study is not concerned with the etiology of slow learners, but with the methodology of addressing their educational needs. Therefore, what is important is that while different etiological categories of slow learners are identified, the educational needs of these students seem not to differ. Classroom-level factors, orientation, structuring, teaching-modelling, application and questioning linked to the five main learning characteristics of slow learners are expected to simultaneously promote students' cognitive development. Teachers' behaviour, as defined by the eight factors in the dynamic model, and it is relevant to cognitive development, described by the five principles of educating students.

Slow learners' critical thinking would be supported by providing objectives for which specific tasks take place, identifying central issues in order to integrate new and old information (Ernis, 1987; Furedy & Furedy, 1985; Pascarella & Terenzin, 2005; Siegel, 1988; Watson & Glaser, 1980). Reinforcing working memory to slow learners

involves monitoring ongoing performance, managing more than one task simultaneously and receiving information in a concrete way, avoiding abstract material and concepts and reviewing main ideas. Conceptual change will be achieved by providing more examples in order to apply and integrate new information. Difficulties related to reaction of a novel situation and to reflecting on and selecting a strategy can be tackled by teachers. Specifically, teachers who encourage students to use problem-solving strategies and who invite students to develop strategies and promote the idea of modelling and learning to learn. And finally, reasoning will be supported by teachers who will allocate more time on task, as well as extra practice and repetition for slow learners, to form new knowledge from the information received.

Furthermore, the literature review presented in this chapter, referred to the findings of studies that point out important issues concerning slow learners; these issues were related to educational programmes, through political, social and economic perspectives. It seems that the findings of those studies have failed to propose what teachers should do in the classroom as well as in special education more broadly in order to improve learning outcomes of slow learners. Moreover, teachers' impact on promoting the learning outcomes of slow learners was not measured, and the instructions mentioned were not linked with any theory or methodology related to improving quality of teaching.

## **Research Agenda**

The literature review presented in this chapter has shown that research investigating teachers' impact on slow learners is limited. Although this specific student population has been generally examined in terms of their learning style, research conclusions have not been incorporated into studies investigating teachers' effectiveness. Additionally, although attempts to define this specific student population have long been made within the educational community, teaching practices as well as educational policies still vary. This can be partly attributed to the fact that teachers' impact on slow learners' outcomes gains have not been measured based on an educational effectiveness theory. As a result, there is still a lot to examine in relation to teaching behaviours that may improve slow learners' outcomes.

Furthermore, the literature review presented in this chapter has shown that the concept of slow learners could be defined by many learning characteristics based on a cognitive perspective. The main learning characteristics could be correlated to the classroom-level factors of the dynamic model. Thus, another conclusion drawn from the literature is that, even though slow learners were part of the population studied establishing the dynamic model, they have never been examined in the framework of classroom-level factors and of the five dimensions of measurements.

Based on the literature review, the present study makes the argument that prior to making any attempt to improve educational practices and policies for slow learners, teachers' effect on slow learners' outcomes must be examined. Thus, drawing on teacher

effectiveness research (Campbell, Kyriakides, Muijs & Robinson, 2004; Creemers & Kyriakides, 2008), it examines whether classroom-level factors proposed in the dynamic model impact slow learners' outcomes gains. Furthermore, it examines whether classroom-level factors would have the same effect or whether a factor with a specific measurement referred could have a bigger impact on slow learners' outcomes gains in language. In addition, classroom-level factors of the dynamic model in nature generic (Creemers and Kyriakides, 2008), are tested for the first time on a specific student population.

To sum up, this study concentrates on questions arising from the literature review which require further investigation. In particular, this research aims to investigate the following questions, related to the generic nature of classroom-level factors as proposed in the dynamic model: (a) can teachers support slow learners in the classroom, based on the teaching behaviours proposed in the dynamic model and to what extent? (b) which of the eight classroom-level factors have a bigger effect on slow learners' outcomes? (c) which of the five measurement dimensions of the factors have differential effect on slow learners' outcomes?

A study with two measurements was conducted seeking answers to the research questions stated above. The research design, the participants and the research methodology of the study are presented in the following chapter.

## CHAPTER 3

### METHODOLOGY

This chapter presents the methodology followed to examine the research questions set in Chapter 1. It elaborates on the research design, and the two research phases. It also provides details on the participants of the study. The chapter presents the types of research variables and it describes the instruments. It refers to the data analysis with multilevel models: the statistical technique used to provide answers to the research questions set. Finally, it addresses the limitations of the study.

#### **Justification of the Research Design**

This study, as presented in Chapter 2, attempts to measure teachers' effectiveness as regards a specific student population, contributing to quality of teaching. Specifically, and based on the theory of the dynamic model, the study attempts to examine whether some teachers are more effective than others in promoting better learning outcomes for slow learners. Furthermore, the study is concerned with the development and validation of the theoretical framework of the dynamic model linked, for the first time, with a specific student population.

The research questions are examined with two-time points measurements of students' outcomes in language and measurements on quality of teaching. This type of



research design offers important benefits to the research results, compared to studies with one-time point measurement. For example, PISA (Programme for International Student Assessment) collects data on several factors concerned with student background, achievement, as well as factors operating at different levels (i.e., teacher and school). An important methodological limitation is the effect of these factors upon student outcomes. Similar studies follow a cross-sectional research design, meaning that they collect data only at one-time point. Collecting data at one-time point may allow for comparisons among student populations and different countries/districts, but not for more in-depth analyses and/or investigating cause and effect relations. It is also not possible to examine changes over time and the way they are related with changes in the functioning of specific factors (Creemers, Kyriakides & Sammons, 2010). Thus, it should be noted that the main advantage of having more than one-time point measurement lies in the efficiency of the estimation of change.

In this context, having data at two-time points, cause and effect relations may contribute to comprehending slow learners with teacher effectiveness factors. The research questions demanded more than a single time measurement to examine the effects of teachers on slow learners. This type of research design is considered a non-slow learners approach to measure short-term effect of teachers and schools in promoting students' outcomes within a school year (Creemers, Kyriakides & Sammons, 2010). The approach applied allows the investigation of issues pertaining to the development of teacher effects on slow learners over a short time. Therefore, only short-term effects are examined in this study.

However, it should be acknowledged that, only two-time measurement points have been used in this study due to practical difficulties. In the Cypriot educational system, there is an issue in terms of continuity. The most common practice is that every school year, teachers move to other classes or other schools. This makes it impossible to examine teacher effectiveness in relation to the outcomes of the same students for a long period of time (more than one school year). Teachers' increased mobility acted as a barrier for the study, as it made it difficult to extend it for more than one school year.

Hence, the two-time point measurements, were analyzed to assist hypothesis development relating to the factors that may lead to variation. Experimental studies are considered to be a safe and a widely-acceptable research method for examining causal relations. Experimental studies allow us to determine whether changes in the variable that is considered the cause may lead to changes to the variable that is considered the possible outcome (Cook, Shadish & Wong, 2008; Slavin, 2010). However, in the case of this study, experimental design was not possible to use, as there is no data on teacher factors having an effect on slow learners. Having no research evidence for the effect of classroom level factors included in the dynamic model on outcomes of slow learners, teachers wouldn't know what would be effective in their behaviours.

The decision of the chosen research method was primarily based on the possible ways to study teacher factors in the Cypriot context, and the nature of the research questions addressed in this study.

## Research Design

The research design entails two phases. The first phase serves the preparation of the study. The aim was to make decisions on the procedure of identifying slow learners. The second phase concerns the main study, where data was collected from students and teachers. Multilevel statistical analyses examined the impact of teacher factors on slow learners' outcomes.

### *Phase 1: Establishing a procedure to identify slow learners*

Based on the literature review presented in Chapter 2, among the main criteria for identifying slow learners are students' cognitive general ability and learning achievements (Kaznowski, 2004; Shaw, 2008). These students have a high possibility of school failure. This possibility consisted to be my motivation and interest to examine this population in depth. As I am working as an educational psychologist in Cypriot public schools I often come across to these students. I realized that the Ministry of Education and Culture did not have any educational policy upon which these students could have been educationally supported. Students' school results below average were left unaddressed. Also, most of these students were either not identified early or were not identified at all. The absence of an identification procedure is the second main issue related to this student population. This element in the Cypriot educational system consisted the first issue to be addressed in this study.

Based on these elements, a procedure was established in order to identify these students from the research sample (n=707) of the study. In what follows, the instruments used to this end are presented.

### *Intelligence test*

The Raven's Standard Progressive Matrices (Raven's SPM, 1966) was used in order to measure general cognitive ability. Raven's SPM was developed in 1936 by J. C. Raven, for use in research into the genetic and environmental determinants of intelligence. It is a test measuring observation skills and clear-thinking ability, offering insights into a person's capacity to observe, solve problems and learn. The test has a total of 60 items presented in five sets, with 12 items per set. Every test item comprises of a shape from which a piece is missing. The missing piece is mixed with five or seven other possible pieces from which the student must select the correct one. Every test item becomes progressively difficult. Each set of items contains more difficult items than the preceding set. Students are given a time limit of 45 minutes to complete the test. Ravens' test was developed with the aid of the Item Response Theory.

The test has a number of advantages. First, it can be administered to individual children, as well as in a group of children. The option of a group assessment is important for identifying slow learners. Due to the small number of slow learners in the total student population (14%, based on the attribution of intelligence scores) a significant number of students must be tested to identify them. Second, it has clear and simple test

instructions that are helpful for the researcher who assesses a group of students. Third, the test can be administered to all students, regardless their cultural, linguistic, ethnic and socioeconomic characteristics because it is nonverbal, and its tasks are not relevant to school curricula. Fourth, the test is worldwide applied since its development (1936) and it has been improved based on the experiences. In the literature, regarding its reliability one can find previous references on group administration (Kaplan & Saccuzzo, 2009).

At the same time, the test is not without its disadvantages. It does not belong to the group of tests assessing intelligence in a comprehensive way, such as the WISC intelligence test. The test measures general cognitive ability. Specifically, it measures the non-verbal cognitive abilities. Verbal cognitive abilities are not examined with this test. Thus, the identification procedure of slow learners in this study was based only on a non-verbal general cognitive ability test.

And, the opportunity for group administration of the test involves the risk of student collaboration and therefore, careful supervision during administration is necessary. Finally, although this test has been widely used for research purposes in the field of Psychometry, an ethical matter has been raised concerning the categorization of students on the basis of tests. On the other hand, information collected through such tests may be used as a tool from teachers aiming to respond to all students in their class.

### *Curriculum based test*

The literature review presented in Chapter 2 reveals that reading comprehension tests, school performance or curriculum based tests should be administrated as complementary to intelligence tests. Therefore, a decision had to be made concerning which learning test would be the most appropriate to use in the study.

The chosen curriculum based test was the Greek Language test referred to the dynamic model. The test included reading comprehension, writing, responding to language skills and grammar rules. A time limit of 60 minutes to complete the test was set. The test was developed and validated in other studies conducted in Cyprus (Kyriakides, 2005; Kyriakides & Creemers, 2008; Antoniou, 2009). It was subject to controls for validity and reliability. Structural equation modelling procedures were used to examine if the *construct validity* of the test and the fit statistics for the Greek language test were acceptable (scaled  $X^2(32) = 93.1$ ,  $p < 0.001$ ; RMSEA=0.034 and CFI=0.962). The *concurrent validity* of the test was examined by considering data from teachers' reports and, with the use of the Spearman Correlation Coefficient, it was deemed satisfactory, since all values were higher than 0.35 (Cohen et al., 2000). Also, *predictive validity* was tested, with multiple correlations as to which values were satisfactory, thus they were higher than 0.60 (Kyriakides, 2005). Finally, the *reliability* of the data of the assessment was measured by calculating the relevant values of Cronbach Alpha (Cronbach, 1990) for scales used to measure students' knowledge in language. All relevant values were higher than 0.82, implying satisfactory reliability of data collected from students concerning cognitive skills in language.

The two research instruments (the general cognitive ability and curriculum based tests) chosen to identify slow learners were tested in a pilot study.

### *Pilot study*

The pilot study was conducted in four classes (two classes in Grade 4 and two classes in Grade 5) located in two schools with a sample of 41 students: 20 students in Grade 4 and 21 students in Grade 5 (over October and November 2013). Students' parents were informed and their approval was needed. Moreover, parents who needed more information about the pilot study were encouraged to contact the researcher, and more details about the purpose and the procedure were given. Both the Raven's SPM and the curriculum based test were administered. Following DSM-V (2013), students were identified based on two criteria. According to the first criterion, students' scores in the intelligence test should be approximately between 1 and 2 standard deviations below the population mean, including a margin of measurement error (generally +/-5 points). According to the second criterion, students' scores in the curriculum based test should be approximately between 1 and 1.5 standard deviations below the population mean. Students who met both criteria were considered slow learners.

Eventually, nine students were identified as slow learners: four students from Grade 4 and five students from Grade 5. Only two of the nine slow learners identified

were already diagnosed with a learning difficulty and they had been receiving special education provision.

Students with low scores in the language test were not all qualified as slow learners. Many had succeeded a good cognitive result at the Raven's SPM test, and thus, they could not be considered slow learners. However, almost all students having a borderline result in the assessment of intelligence were identified as slow learners. None of the non-Greek speaking students who participated in the pilot study qualified as slow learners, although some of them had below average scores in the language test. Due to their performance in the Raven's SPM test, they could not be identified as slow learners, even though they faced some difficulties in learning due to poor language skills.

It is acknowledged that the choice of an intelligence test as the prime method of identifying slow learners raises questions regarding the validity of the data. Therefore, a semi-structured interview with the classroom teacher was conducted to support the results of both tests. The teachers were asked to provide information on their students' way of learning, based on their five main learning characteristics (comprehension difficulties, difficulties generalising knowledge, more time to learn, frequent repetitions and provision of concrete information). Moreover, teachers were asked whether students received special education provision. The results of the Raven's SPM test and the Greek language test were discussed with the teachers of the four classes of the pilot study. In the interview, teachers were asked to identify slow learners and define their difficulties before they were informed of the test results. Teachers could identify most of the cases of



slow learners. Specifically, teachers could distinguish students who had some learning difficulties, from those who presented learning disabilities. It is interesting to note that the teachers referred to the first group of students (students with some learning difficulties) as unable to follow the class learning pace, needing more time and repetition, presenting low self-esteem, but being “overall ‘good students’ who, in most cases, are trying, putting extra effort in the classroom”. After the interviews, most of the teachers decided to encourage the parents of those students to consider a formal assessment leading to special education provision. Even though they believed their teaching helps those students, they considered special education provision as necessary for students’ academic improvement.

The methodology applied in this first phase led to the establishment of the identification procedure which was used on the sample of the main study.

### ***Phase 2: Main study***

During the second phase of the study, data collection was carried out in 12 primary schools, randomly selected, during the school year 2014-2015. In each participating school, teachers of Grade 4 and Grade 5 were drawn (n=40). In two cases, teachers did not want to participate in the study. In total, 40 teachers gave their consent to participate. Next, students’ parents (whose children attended the classes of the 40 teachers) were asked to give their consent. A small number of parents (5) did not want their child to participate in the study. These students were excluded from the sample.

Moreover, parents had the opportunity to ask more details about the study by phone. Eight parents called and more information and details were given about the purpose and the procedure of the study. Data was collected from 707 students, from 40 participating classes.

Initially (October-November 2014), the intelligence test was administered. As mentioned above, the Ravens' SPM was administered to all students in order to examine their general cognitive ability. In addition, a test assessing students' knowledge and skills in language, in accordance with the Cypriot curriculum was also administered. The test measured students' achievements in language at the beginning of the school year. It involved reading comprehension, writing and language skills (grammar exercises, vocabulary).

This study also attended to examine teacher behaviour in the classroom. So, the second part of the study consisted of teachers' observations. Each teacher was observed twice over three to four months (December-April 2015). The observation instruments were based on teacher factors referred to the dynamic model of educational effectiveness. Specifically, one low and one high inference instrument was used to collect data concerning teacher factors of the dynamic model. These instruments have already been used in a series of studies conducted in Cyprus to test the validity of the dynamic model. The construct validity of these instruments has already been tested by using SEM approaches (Creemers & Kyriakides, 2008). Given that students are nested into classrooms and classrooms are nested into schools, a two-stage sampling was used. This means that from the schools of the study, randomly selected, data were collected from

every teacher of fourth and fifth grade. Then, data were collected from all students of these classes selected (fourth and fifth grade).

The last part of the main study consisted of administering to the same classes the Greek curriculum-based test at the end of the school year (May 2015). This test aimed to measure the final achievements of the students. The examination between initial and final outcomes of students, will help to determine the extent to which teachers behaviours are associated with slow learners' outcomes.

Finally, at the end of the main study, data analyses were conducted. The analyses were conducted to define the extent to which each classroom level factor may be associated with slow learners' outcomes, revealing generic and differential factors operating at different levels. Given the nature of the data collected from the three parts of the study, multilevel analyses were conducted. These analyses were necessary in the research examining educational effectiveness, since it offers a wider field of data analysis (Kyriakides & Charalambous, 2005). The results of these analyses will help to determine the impact of teacher factors on slow learners' outcomes, and identify which of those factors have a greater impact on this specific group of students. The two main phases of the study are presented next in the timeframe.

**Table 3.1** *Two phases of the study timeframe*

Study phases	Timeframe	Actions
<b>Phase 1:</b> <i>Pilot study</i>		
	November 2013	Administration of intelligence test (Raven's SPM) and Greek language test
	December 2013	Marking the tests
	January 2014	Semi-structured interviews with teachers
<b>Phase 2:</b> <i>Main study</i>		
	October–November 2014	Administration of the Greek language test to students (initial achievement data), and administration of Raven's Standard Progressive Matrices
	December 2014–April 2015	Two teachers' observations
	May 2015	Greek test administered to students (final achievement data)

### **Participants**

In each participating school, a stage sampling procedure (Cohen, Manion, & Morrison, 2000) was used to select data. First, a formal letter was sent to the head of

the Ministry of Education and Culture in Cyprus, asking for permission to conduct the research in primary schools. Upon approval, schools were formally informed of the study. The rationale of the study was explained to head teachers and teachers. Some schools did not want to participate to the study.

Twelve schools participated in the research. Then, 40 of the 42 teachers of Grade 4 and Grade 5 of these schools, agreed to participate in the research study after being presented with the main goals of the study. In total, they were 40 teachers, 20 teaching in classes Grade 4 and 20 teaching in Grade 5. All students of Grade 4 and 5 students participated in the study ( $n=707$ ). Greek language tests were administered to them at the beginning and in the end of the school year 2014-2015. Students were also administered the Raven's SPM test, assessing their general cognitive ability, at the beginning of the school year. Furthermore, each teacher was observed in his/her classroom twice, over three months. Lastly, a questionnaire concerning the behaviour of the teacher in the classroom was completed by the observer at each observation, regarding the eight factors of the dynamic model included at the classroom level.

Table 3.2 shows an overview of the sample students and their gender distribution. A comparison of the gender distribution in the sample and in the population, is also shown, with a Fisher's exact test having been performed. The results show that the gender distribution in the sample does not deviate statistically significant from that of the population. The chi-square test did not reveal any statistically significant difference between the research sample and the population in terms of students' gender (Grade 4:

$X^2=3.56$ ,  $p=0.056$ ; Grade 5:  $X^2=0.861$ ,  $p=0.35$ ), hence we can assume that the sample, with regards to gender, is representative of the population. The results are presented next in table 3.2.

**Table 3.2** *Overview of the sample of classes and students used to measure teacher effect on student outcomes in Language.*

Grade	Gender	<u>Sample</u>		<u>Population</u>	
Grade 4 (20 classes)					
	Girls	11	3.4	920	8.6
	Boys	84	6.6	153	1.4
	<i>Total</i>	95		073	
Grade 5 (20 classes)					
	Girls	62	1.9	980	9.2
	Boys	50	8.1	102	0.8
	<i>Total</i>	12		082	
<b>Grand Total</b>		<b>07</b>		<b>6155</b>	

*Note: Population in the 2014-2015 school year. Proportions shown are across gender. The difference in the gender distribution between sample and population is not statistically significant in either grade (Grade 4: Fisher's exact  $p=0.0634$ , Grade 5:  $p=0.356$ )*

A number of data analyses were carried out on the data collected. Using the SPSS programme, a descriptive statistics procedure was applied in order to summarise the data. The data was categorical, so frequencies procedures were also applied. The results showed that 707 cases of students were valid to use concerning the language test to examine the effect of teachers' factors of the dynamic model on students' outcomes.

Thereafter, the procedure to identify slow learners was implemented to the sample as explained earlier in this chapter. The results of the identification procedure applied will be presented in Chapter 4.

All the other students who did not meet the criteria were considered as *non-slow learners* or students responding to a typical situation of learning. This category of students includes students with high and normal general cognitive ability, as well as students with special needs. The meaning of non-slow learners' students refers to students clearly belonging to a category of learning, either those of special education or those with no learning disabilities. Thus, the results of data analysis presented in Chapter 4 concerns with three series of multilevel analysis, one the total number of participants in this study and two on the groups of students formed from the data: that of slow learners and of non-slow learners' students.

### **Research Variables**

The research variables of the study are drawn from data on student outcomes in the Greek language test (initial and final achievements), from the psychometric test and from observing teachers' quality of teaching using two instruments employing to the dynamic model.

The variables related to initial and final scores in Greek language stem from three different curriculum-based tests. The tests are *grade-3*, *grade-4* and *grade-5* and they all assess students' knowledge of Greek language. *The grade-3* test measures students'

language knowledge acquired by the end of the third grade. On this basis, this test may be administered to students either at the end of Grade 3 or at the beginning of Grade 4. The *grade-4* test measures students' knowledge in the Greek language acquired by the end of the fourth grade. On this basis, the test may be administered to students at the end of Grade 4 or at the beginning of Grade 5. Finally, the *grade-5* test measures students' knowledge in Greek language acquired by the end of the fifth grade, thus, the test may be administered to students either at the end of Grade 5 or the beginning of Grade 6. As mentioned earlier in this chapter, the three tests were tested for their validity and reliability in other research with reference to the dynamic model.

Concerning the administration of the tests, two persons were involved. They were provided training support in giving both the psychometric and the language tests. As far as the data on quality of teaching is concerned, the instruments of the dynamic model were used. As indicated in Chapter 2, the instruments have been validated in longitudinal studies conducted in Europe (Creemers & Kyriakides, 2009). It is important to note that only one person was involved in the classroom observations. This person was trained and had experience using these instruments. The experience stemmed from her participation in other effectiveness researches conducted in Cyprus using the same observational instruments. All observations conducted were discussed with her and she was provided guidance on the timeframe of the observations. All the variables related to the research questions of the study are presented next.



*Dependent Variable: Students' achievement in Greek language*

To examine the research questions set, as mentioned in Chapter 2, data on students' outcomes in the Greek language were collected with a curriculum-based written test. The written test was administered to all year grade 4 and grade 5 students of the school sample at the beginning and at the end of the school year 2014-2015. These tests were designed to assess knowledge and skills in Greek language in accordance with the Cyprus Curriculum (Ministry of Education, 1994). The construction of the tests was subject to controls for reliability and validity. Specifically, the Extended Logistic Model of Rasch (Andrich, 1988) was used to analyse the emerging data from the subject and two scales which refer to student knowledge in language were created. The main purpose of this methodology is to provide a framework for evaluating the degree of fitness of the assessment work of tests, and the degree of fitness of individuals on the assessment work of tests. So, the IRT methodology gives the probability that a person with a given ability level will answer correctly (Hambleton, Swaminathan, Rogers, 1991). For example, students with higher abilities are more likely to get a test item correct.

The scales were analysed for reliability, fit to the scale, meaning and validity. Analysis of the data revealed that each scale had satisfactory psychometric properties. Thus, for each student, one score for his/her achievement at the beginning of school year was generated by calculating the relevant Rasch person estimate in the scale. The same approach was used to estimate student achievement at the end of the school year in relation to the outcome of schooling.

*Explanatory variables at student level: initial achievement in Greek language*

As mentioned above, the curriculum-based test was administered at the beginning of the school year. For the initial achievement measurements, two different tests were administered: grade-3 for the fourth grade and grade-4 for the fifth grade. Furthermore, the initial student outcomes were used in the procedure for identifying slow learners. Thus, examining the items' fitness and the degree of difficulty of this test was important for this study. Applying the Extended Logistic Model of Rasch model strengthened our methodology of identifying slow learners.

The Rasch model provides a mathematical framework against which test developers can compare their data. The model is based on the idea that useful measurement involves examination of only one human attribute at a time (i.e. unidimensionality), on a hierarchical "more than/less than" line of inquiry (Bond & Fox, 2001). The basic assumption of the model is that all persons have a higher probability of giving the right answer to easier items and a lower probability of giving the right answer in more difficult items. The extended logistic model of Rasch (Andrich, 1988) is an extension of the dichotomous model, in the case where items have more than two response categories, and is, therefore, used to analyse data emerging from students' responses to the language test.

Therefore, under the Rasch model, misfitting responses required diagnosis of the reason for the misfit, and some were excluded from the data after finding the explanation

as to why certain answers did not address the latent trait. Furthermore, some items were recoded to fit the model. Descriptive statistics and frequencies with the SPSS programme helped identify where the misfit was or where a recode was needed. For example, if the answers to a question in the test were noted from 1 to 5, then if only one student reached the note 5, it was recoded and the answers were regrouped from 1 to 4. Thus, the Rasch approach worked as a confirmatory approach in this study and revealed that the scales had satisfactory psychometric properties. The results are presented in Chapter 4.

*Other explanatory variables at student level: background factor*

The sample contained one variable concerning students' background. The factor concerned the gender of each student and, as mentioned earlier in this chapter, the number of girls reached 373 or 52.8%, with the boys at 334 or 47.2% of the sample. No other background factors were examined in this study.

*Explanatory variables at classroom level: quality of teaching*

This section is concerned with the research instruments used for measuring teacher level factors. The research instruments used in the study concerned the eight factors of the dynamic model and they were used in various studies testing the validity of the model (Creemers & Kyriakides, 2010; Kyriakides & Creemers, 2008, 2009).

The dynamic model specifies one high-inference observational instrument, two low-inference observation instruments and a student questionnaire for data collection on quality of teaching, developed to test the validity the model (Kyriakides & Creemers, 2012). The two low-inference observation instruments generate data for all eight factors of the dynamic model and their five dimensions. Specifically, the two low-inference observation instruments enable us to generate data about teacher-student and student-student interaction and the time management factor.

In the current study, two instruments were used: the High Inference Observation Instrument and one Low Inference Observation Instrument. It was assumed that using the two instruments which were comparable would enable an explanation as to whether similar dimensions of teaching behaviours can be identified as effective classroom practices for slow learners.

The first Low Inference observation instrument is based on Flanders' system of interaction analysis (Flanders, 1970). However, a classification system of teacher behaviour was developed, based on the way each factor of the dynamic model is measured. The instrument is exclusively concerned with 17 types of interactions that may be observed in a lesson. It also helps generate management of time and classroom learning environment factor scores, as well as their dimensions included in the dynamic model. Using the 17 codes for teacher and student behaviour on the left of the page, recordings of the type of teacher-student interaction were made in specific time intervals (e.g., every 10 second).

For this study, the second Low and the High Inference Observation Instruments were selected. This Low-Inference Observation Instrument referred to the five factors of the model: a) orientation, b) structuring, c) teaching modelling, d) questioning, and e) application. It was designed to enable the collection of more information in relation to the quality dimension of these five factors. A classification system of student behaviour was also developed. In this system, the observer is not only expected to classify student behaviour when it appears, but also to identify the students who are involved in each type of behaviour. Thus, the use of this instrument allows for teacher-student and student-student interaction data to be generated. The measurement of the impact of teacher activity is based on observations of students' reactions and not on interpretation of the quality of teacher activity. As far as the measurement of the stage is concerned, the instrument-generated data takes into account the phase at which each interaction took place at the time of instruction.

The reason that the second Low Inference Observation Instrument was selected for this study relates to the nature of the research questions set. This study aims to examine if teachers' factors influence slow learners and, if so, which factors have a bigger effect than others on slow learners. The second Low-Inference Observation Instrument examines the factors set as research hypothesis, namely as factors influencing in greater extent slow learners' outcomes.

The High Inference Observation Instrument covers the five dimensions of all eight factors of the model. Observers are expected to complete a Likert scale to indicate how often each teacher-behaviour was observed. The instrument also indicates how often each teacher-behaviour was observed. For example, an item concerned with the frequency dimension of orientation, asks observers to indicate how often the teacher explained the aims of the teaching activities (item 2). Similarly, to measure the quality dimension of this factor, one of the items of the High Inference Observation Instrument asks observers to indicate the extent to which orientation activities, organised during the lesson, helped students understand the new content.

All teacher behaviours examined in this study as explanatory variables to slow learners' outcomes are presented next.

**Table 3.3** *Indicative items used to measure each factor with regard to the teacher factors effect of the dynamic model on slow learners' outcomes*

<b>Teacher factor</b>	<b>Indicative items per factor</b>
1) Orientation	When teaching an activity in the language lesson, it is explained to students why they are doing it.
2) Structuring	When the teacher is teaching, the students always know which part of the lesson (beginning, middle, end) they are in.
3) Application	At the end of each lesson, the teacher sets students practice on what they have just learned.
4) Time Management	There are times when students do not have the necessary materials for the lesson to take place (e.g., dictionaries, vocabularies, rulers)

- |  |  |
|--|--|
| 5) Questioning   | When students do not understand a question, the teacher says it in a different way so they can understand it.  |
| 6) Modelling   | The teacher encourages students to find ways or tricks to solve the exercises or work that s/he gives to them.   |
| 7) Classroom as Learning Environment/Teacher-Student Student-Student Interaction | The teacher gives all students a chance to participate in the lesson.  |
| 8) Classroom as Learning Environment/Dealing with Misbehaviour                   | When the teacher talks to a student after they have misbehaved, in some cases, after a while, that student misbehaves again. Generally, how the teacher handles student behaviour. |
- 

Observations were carried out as mentioned earlier in this chapter by one person trained to use these instruments. Between October 2014 and May 2015, the observer visited each school and observed lessons given by the teachers for an average of 80 minutes. Each teacher was observed twice, over three months, mostly during the Greek lesson. The data collected was cleaned up and prepared using the SPSS statistic programme. During the preparation procedure, a recode was required to summarise the results. The final data prepared presented one result for each teacher, for each factor examined.

After this procedure, data on quality of teaching, collected with the Low Inference Observation Instrument, were examined by conducting statistical analysis. Additionally, data on quality of teaching, collected with the High Inference Observation Instrument,

were also examined. The results of both statistical analysis conducted are presented in Chapter 4.

The variables of quality of teaching, measured with the Low Inference Observation Instrument (factors x dimensions) were a total of 30 results for each teacher, and the variables obtained with the High Inference Observation Instrument were a total of nine results for each teacher.

Summarising the research factors, to examine the research questions, the variables examined in this study are grouped into three categories: final student achievements (dependent variable), quality of teaching (explanatory variables at classroom-level factors) and student factors (explanatory variables at student-level factors).

### **Data analysis on Research Variables**

After having tested the validity and reliability of the data collected and having completed the identification procedures of slow learners, the data was then analysed in a multilevel modelling. Student and teacher level variables were analysed by using multilevel models. These statistical methodologies of analysis were applied to the two groups formed from the data: Non-slow learners ( $n=638$ ) and Slow Learners ( $n=69$ ).



The methods used investigated, firstly, teacher factors' effect on slow learners (multilevel, with MLwiN programme) and then, the effect size of classroom-level factors on slow learners' outcomes.

### *Multilevel analysis*

This study is mainly concerned with examining whether classroom level factors of the dynamic model have any effect on slow learners' outcomes. The multilevel analysis is considered significant.

Longitudinal data could be mainly analysed in five ways: fixed-effects regression models, mixed-effects regression models, multilevel regression models, growth models and structural models (Gustafson, 2010). For this study, two-level modelling was used to investigate the effects of classroom level factors on slow learners. In this case, the data was hierarchically structured, having units at the lower levels nested within the higher-level units; students were nested within classrooms constituting the lowest level in the hierarchy. The score gains of the students ( $N=707$ ) are linked to their teachers ( $N=40$ ). The hierarchical structure of the data makes multilevel modelling the appropriate technique for analyzing the data (Goldstein, 2003). Moreover, multilevel modelling enables an efficient identification of variables at the student and teacher level that are associated with student learning outcomes (Snijders, 2011). The main advantage of multilevel analysis is its flexibility and capacity to deal with imbalanced data (Luyten & Sammons, 2010). In the event of not having data per individual during two-time points in

the longitudinal study, this statistical technique could handle data with incomplete records on the outcome measures.

Furthermore, the statistical technique chosen in this study is highly useful for the analysis of data derived from multi-stage sampling. Methodologically, a two-stage sampling design with classes as the primary sampling units was carried out. It has already been mentioned that, in the first phase, a random sample of schools was drawn and, thereafter, a sample of teachers within the schools was selected, thus of Grade 4 and Grade 5. All students of Grade 4 and Grade 5 participated in the study. The methodological benefit is that a selection of certain primary sampling units increases the chance of selecting lower level primary units, where slow learners are found.

In addition, multilevel analysis, based on the notion of hierarchical structures in data, sets an interesting phenomenon, and presents distinct sources of variation to research questions in this study. For many decades, the EER field presented methodological difficulties in measurements concerning teacher effects on students' outcomes. Slow learners' outcomes, as examined in the literature, still present a blurred picture regarding teacher effects on slow learners' outcomes. This issue is also examined in this study. Obtaining results on teacher effectiveness for slow learners will be considerably beneficial, since a slow learner is a high risk drop-out student, or a high-risk student presenting emotional difficulties due to continuing school failure.

Summarising, the research design and methodology of this study draws upon the benefits of using multilevel modelling. Due to the fact that research interest is targeted to institutional effects, specifically those of teachers' instructional behaviour, using multilevel modelling was expected to give answers to the research questions about slow learners posed in Chapter 2. Using a two-level unit, considering the role of clustering in educational data and identifying variances at different levels in hierarchical structures, constitutes the methodological contribution of this research for slow learners. Investigating teachers' effects on slow learners' outcomes, is the core of the research, examined for the first time with the conceptual framework of the dynamic model. Thus, slow learners are examined for the first time in the specific research field of EER.

Therefore, to test the effect of teacher factors on students' outcomes in Greek language, a two-level model - with the classroom/teacher as the higher and the student as the lower level - was used. Firstly, a null model was deployed where no explanatory variables were modelled, just the intercept and the random effect of Students and Classes. The equation used for the multilevel models follows.

*Equation*

The null model used in the two-level regression analysis is expressed by the following equation:

$$Y_{ij} = \beta_{00} + u_{0j} + r_{ij}$$

Where:

$Y$ : is the dependent variable: in this case the student's final outcomes in language

$j$ : is level-2 units (i.e., number of classes)

$i$ : is level-1 units (i.e., number of students)

$\beta_{00}$ : is the intercept

$u_{0j}$ : is the random part

$r_{ij}$ : is the residual

Following the null model, additional explanatory variables, both at the student and class/teacher level are introduced. In the next equation, the model is presented where an explanatory variable measured at the student level (e.g., student's initial achievement in the language test, Gender) and at the Class level (e.g. Structuring Frequency) are introduced:

$$Y_{ij} = \beta_{00} + \beta_1 X_{ij} + \beta_2 Z_j + u_{0j} + r_{ij}$$

In this case  $\beta_1$  represents the regression coefficient (regression slope) for the explanatory variables  $X$  at student level, and  $\beta_2$  represents the regression coefficient for the explanatory variables at class level.

Multilevel analysis results, applied on the three groups formed from the data, total of the sample ( $n=707$ ), on the group of Non-slow learners Students ( $n=638$ ) and finally on the group specific to this study, Slow learners ( $n=69$ ), will be presented in Chapter 4, as well as the effect size calculated for each factor. These results may lead to conclusions linking teacher effectiveness factors with slow learners' outcomes.

## **Research Limitations**

As the literature indicates, several conditions may put the validity of the research at risk (Gustafsson, 2010). As described above, systematic and consistent efforts have been made to eliminate, to the best possible extent, threats to the internal and external validity of the study. However, some limitations of the study are acknowledged.

Firstly, this study repeats observation of the same units at two-point time. General agreement among researchers point out that a design with observations at two points may be qualified as longitudinal. However, it has been observed that when there are only two-time points, the information available for studying individual change and development is very limited (Rogosa, Brandt & Zimowski, 1982). The literature recommends having observations from more time points. Even though the two-time point observation is limited, it is generally agreed among researchers that this type of design may still be qualified as longitudinal.

The second limitation is that while longitudinal research provides a satisfactory basis for inference about causality, it is considered weaker compared to experimental research. This limitation on the research design could be supported by a strong substantive theory, which is considered a necessary condition in this study. This study concerning slow learners' outcomes has been supported on the evidence-based theory of the dynamic model that could offer a strong comparable field to the research results.

Another limitation of the study concerns the research tools used. The instruments administered to students measuring cognitive ability are not statistically tested in the Cypriot student population. This limitation, though, concerns all intelligence psychometric tests used in Cyprus. None has been statistically tested in the Cypriot population. Results are usually compared with the Greek population, as we share the same language. However, in this study, the Raven's SPM is used which, as mentioned above, has two strong benefits concerning its results: it has been administered worldwide, having a large amount of data, comparable to population. Further, due to its long administration, the test has undergone important improvements regarding its interpretation results.

Another limitation related to the psychometric test administered was that it measures general cognitive ability and specifically non-verbal abilities. The study did not collect any data on students' verbal cognitive abilities.

Finally, it should be acknowledged that this study had a specific group of students examined. Although the sample consisted of 707 students at the beginning, some results from the analysis of the data referred only to slow learners which is a small group ( $n=69$ ). This number of students could not provide statistical power to the data. Having this limitation, some results related to teachers' effect on slow learners were examined under Type 1 statistical error of 0.10 instead of 0.05. In the same vein, some measurement dimension of teacher factors gave no results - not because they did not have an effect, but probably because the sample of teachers did not give us enough statistical power to reject

the null hypothesis. This could be attributed to the difficulty of having to study a specific group of students identified from a larger sample of students. Identification procedures are primarily needed to apply in order to identify slow learners from the total number of the students' sample. The fact that students were eliminated so that a specific group could be studied reduced the statistical power of the sample.

This chapter has outlined the research design, methods and analysis followed in this study. The next section presents how data collected in the main phase of the study was analysed in order to address the research questions.

## CHAPTER 4

### RESEARCH RESULTS

This chapter presents the analysis of the data. The findings address the research questions set in Chapter 1. This chapter is divided into five sections.

The first section presents the findings from the analysis conducted using the Rasch Model on the data collected from 707 students during the second phase of the study. Specifically, the results concern the investigation on item difficulty of the curriculum-based test in relation to fourth and fifth grade students' outcomes in the Greek language. The second part of the chapter presents the results of the identification procedure of slow learners from the research sample. The results concern the identification of slow learners, after using specific criteria on the outcomes from both Greek language and intelligence tests administered to students. The third part of the chapter deals with descriptive statistics of the teacher factors as observed and measured with two observational measurement instruments, thus of Low and High Inference, both referring to the dynamic model. Lastly, in the fourth part, the results of multilevel modelling analysis are presented, revealing the extent to which teacher factors are associated with students' outcomes in the Greek language. Moreover, in this last part, the effect size of each teacher factor will be presented.



## **Results from Items Response Theory (IRT) testing validity of the curriculum-based test in the Greek language**

Students' responses to the Greek language assessment (measuring students' outcomes in reading comprehension and writing skills) were analysed to provide answers regarding the fitness of the test and its ability to distinguish students' outcomes at different levels. Specifically, the extended logistic model of Rasch (Andrich, 1988) was used to identify the extent to which the Greek language assessment, measured by the curriculum-based test, could be reduced to a common scale.

The extended logistic model of Rasch was applied to all students' outcomes and to all items of the three curriculum-based tests used at the beginning (Grade 3 and Grade 4 test) and at the end of school year (Grade 4 and Grade 5 test). The application was carried out by using the computer program Quest (Adams & Khoo, 1996). This model (Andersen, 1977; Wright, 1985) is an extension of the dichotomous Rasch model to the case in which items have more than two response categories and it was therefore used to analyse the data that emerged from students' responses to each curriculum-based test item in the Greek language. Since each item has more than one response, it can be modelled as having various thresholds. Each threshold has its own difficulty estimate and this estimate is modelled as the threshold at which a person has a 50% chance of choosing one category over another (Andersen, 1977).

These thresholds are calculated in log odds (otherwise called logits) and should be ordered to represent decreasing probability of each score occurring. Thresholds that do not increase monotonically are considered disordered. The magnitudes of the distances

between the threshold estimates are also important. Threshold distances should indicate that each step defines a distinct position on the variable and therefore they should be neither too close together nor too far apart on the logit scale (Bond & Fox, 2001). Specifically, guidelines indicate that thresholds should increase by at least 1.4 logits (i.e. to show distinction between the items) but no more than 5 logits (i.e. to avoid large gaps in the variable) (Linacre, 1999).

#### *Results based on Grade 3 test*

As mentioned in Chapter 3, the Grade 3 test measures students' knowledge in Greek language acquired by the end of the third grade. Based on this fact, the test was administered to students at the beginning of the fourth grade, evaluating their acquired knowledge of the Greek language. The test was administered to 395 students (184 boys, 211 girls). The scale demonstrated the results of the 33 measures of the curriculum-based test with item difficulties and students' measures calibrated on the same scale. The item threshold values were found to be ordered from low to high, indicating that the students answered consistently within the ordered response format.

The threshold distances range from 0.14 to 0.57 logits; thus, the results show that the 33 items of the test, measuring students' outcomes, were a good fit with the measurement model, indicating a strong agreement among the 395 students located at different positions on the scale, across all 33 items. Moreover, the curriculum-based test items are

well targeted against the students' measures, since students' scores range from -3.14 to 3.28 logits and item difficulties range from -2.38 to 2.26 logits.

*Results based on Grade 4 test*

The Grade 4 test measures students' knowledge in Greek language acquired by the end of fourth grade. Based on this fact, the test was administered to 707 students; to 395 students (184 boys, 211 girls) at the end of the fourth grade and to 312 students (150 boys, 162 girls) at the beginning of fifth grade. The scale demonstrated the results for the 44 measures of the curriculum-based test with item difficulties and students' measures calibrated on the same scale.

The item threshold values were found to be ordered from low to high, indicating that the students answered consistently within the ordered response format. The threshold distances range from 0.12 to 0.75 logits. The results also show that the 44 items of the test, measuring students' outcomes, were a good fit with the measurement model, indicating a strong agreement among the 707 students located at different positions on the scale, across all 44 items. Moreover, the curriculum-based test items are well targeted against the students' measures since students' scores range from -3.68 to 3.84 logits and item difficulties range from 3.5 to -2.64 logits.

*Results based on Grade 5 test*

The Grade 5 test measures students' knowledge in Greek language acquired by the end of the fifth grade. Based on this fact, the test was administered to students at the end of fifth grade, evaluating their knowledge of Greek language. The test was administered to 312 students (150 boys, 162 girls). The scale demonstrates the results of the 46 measures of the curriculum-based test with item difficulties and students' measures calibrated on the same scale. The item threshold values were ordered from low to high, indicating that the students answered consistently with the ordered response format.

The threshold distances range from 0.14 to 0.42 logits; thus, the results show that the 46 items of the test, measuring students' outcomes, were a good fit with the measurement model, indicating a strong agreement among the 312 students located at different positions on the scale, across all 46 items. Moreover, the curriculum-based test items are well targeted against the students' measures, since students' scores range from -3.42 to 3.56 logits and item difficulties range from -1.70 to 2.42 logits.

Furthermore, Table 4.1 below provides a summary of the scale statistics for the whole sample and the two subgroups (Grade 4 and Grade 5). Reliability is calculated by the Item Separation Index and the Person Separation Index. Separation indices represent the proportion of the observed variance considered to be true. A value of 1 represents high separability in which errors are low and item difficulties and students' measures are

well separated along the scale (Wright & Masters, 1981). It can be observed that for the whole sample and each subgroup the indices of cases and item separation are higher than 0.92, indicating that the separability of the scale is satisfactory (Wright, 1985). In addition, the infit mean squares and the outfit mean squares were found to be near one and the values of the infit t-scores and the outfit t-scores are approximately zero.

The results of this specific statistical analysis revealed that, in this assessment, there was a good fit to the model of students' performance in Greek language. In particular, Grade 4 students' outcomes were found to have a mean infit for item in the range of 0.04 at the test given at the beginning of the school year and a mean infit for item in the range of -0.08 at the test given at the end of the school year. Both tests given at students of Grade 4 (grade-3 and grade-4 tests) were found to have a score of 0.07 for mean infit for persons. Moreover, Grade 4 students' outcomes had a mean outfit for item in the range of -0.12 at the test given at the beginning of the school year, and a mean outfit for item in the range of -0.21 at the test given at the end of the school year. Both tests given at students of Grade 4 (grade-3 and grade-4 tests) were found to have a mean score of 0.06 outfit for persons.

Similarly, Grade 5 students' outcomes were found to have a mean infit for item in the range of -0.12 at the test given at the beginning of the school year, and a mean infit for item in the range of 0.01 at the test given at the end of the school year. Both tests given at students of Grade 5 (grade-4 and grade-5 tests) were found to have a score in the range of 0.21 and 0.16 at the mean infit for persons. Moreover, Grade 5 students'

outcomes were had a mean outfit for item in the range of -0.13 at the test given at the beginning of the school year, and a mean outfit for item in the range of -0.24 at the test given at the end of the school year. Both tests given at students of Grade 4 (grade-4 and grade-5 tests) had a mean score in the range of 0.05 to 0.01 outfit for persons.

The results mentioned above are presented separately for each test so the means are not comparable. All the results are presented below in table 4.1.

Table 4. 1.

*Statistics relating to the assessment test measuring Greek language outcomes based on the Rasch analysis of each grade group (fourth and fifth) at the beginning and at the end of school year separately based on the initial analysis.*

Statistic	<u>4th Grade (n=395)</u>		<u>5th Grade (n=312)</u>	
	Beginning	End	Beginning	End
N items	33	44	44	46
Mean				
items	0.00	0.00	0.00	0.00
persons	0.63	0.19	0.39	0.87
Standard Deviation				
items	1.00	1.17	0.88	0.91
persons	1.01	1.14	0.96	1.35
Reliability of estimates				
items	0.97	0.96	0.96	0.97
persons	0.86	0.92	0.90	0.92
Mean Infit mean square				
items	1.00	1.02	1.01	1.00
persons	1.02	1.00	1.05	1.02
Mean Outfit mean square				
items	1.01	1.01	0.99	0.95
persons	1.00	0.98	0.99	0.95
Mean Infit				
items	0.04	-0.08	-0.12	0.01
persons	0.07	0.07	0.21	0.16
Mean Outfit				
items	-0.12	-0.21	-0.13	-0.24
persons	0.06	0.06	0.05	0.01

## **Results of the identification procedure for slow learners**

The second part of this chapter presents the results of the criteria used to identify slow learners. As mentioned in the two previous chapters, at least two criteria are necessary to identify slow learners.

The psychometric Raven Standard Progressive Matrices test was administered to 707 students, 395 at fourth grade and 312 at fifth grade. From the sum of the tests, 697 results were valid. The results of the data collected were valued between superior level and very low level of general cognitive ability. Specifically, the results revealed 86 cases (12.1%) with higher abilities, 417 (58.9%) with normal abilities, 192 cases (27.1%) with low to normal abilities, 2 cases (0.28%) with mild intellectual disability and 10 cases (1.41%) did not complete the test. Cases (192 students) presenting approximately between 1 and 2 standard deviations below the population mean, including a margin for measurement error (generally +/- 5 points), were selected according to the first criterion of cognitive development.

Thereafter, these cases were examined against the second criterion referring to the learning outcomes. Students with results between 1 and 1.5 standard deviation below average were selected. Only 69 out of 192 students had scores at the curriculum-based test level between one and two standard deviations below average. Some students were excluded from the sample either because they had low general cognitive ability (more

than 2 standard deviations) or because they had specific learning difficulties. This specific population responded to both criteria defining slow learners, as presented in literature. It is also important to mention that of the 69 cases of slow learners drawn from the research sample of this study, only 17 students were receiving special education provision. This fact proves that not all slow learners are identified, and thus, they do not receive educational support. Moreover, from their learning results it seems that receiving special education did not support their learning needs since these students did not show statistically significant progress in their learning outcomes.

Thus, at the end of the identification process, two groups of students emerged: the total sample of 707 of students' cases was split between a group of 638 cases of students characterised as *non-slow learners* and a second group of data of 69 cases of students identified as *slow learners*. As mentioned in Chapter 3, the term *non-slow learners* represented students who did not meet the criteria and they belong to the group of non-slow learners, either those labelled as 'students with special needs' and receive special education provision or those with no learning difficulties.

Furthermore, the sample of 69 slow learners was examined and it was found that 43 cases were boys, 62.3% and 26 cases were girls, 37.7%, in the slow learners group. A statistical comparison with the total number of the students in this study, it has indicated that 26/373 girls (7%) were found to be slow learners, while 43/334 (12.9%) of the boys were found to be slow learners ( $X^2=6.974$ ,  $p=0.008$ ). Boys have nearly double the odds



of being slow learners compared to girls. References support these results by indicating that boys learn differently from girls who seem to handle verbal approaches better. Boys, generally, require a more structured approach, more orientation and usually girls seem to handle verbal approaches better (Bartlett, 2002).

Last, predictive validity of this group was checked by examining both their results in Greek language. The students found as slow learners based on the curriculum test at the beginning of the school year, they also presented low results at the test given at the end of the school year, fitting the criteria established.

There is a moderate and positive correlation between the pre- and post-test results of the curriculum based test for the non-slow learners ( $r=0.388$ ,  $p<0.001$ ) and a moderate and positive correlation in the post test results ( $r=0.453$ ,  $p<0.0021$ ).

After having identified slow learners and examined the two different groups formed from the data, classroom level factors were then analysed. They were examined with the two instruments referring to the dynamic model of educational effectiveness. The results are presented below.

### **Descriptive statistics of teacher factors arising from the data**

Before examining the extent to which teacher factors are associated with slow learners' outcomes in the Greek language, descriptive statistics analyses were carried out for all teacher factors referred to by the dynamic model. The teacher factors were examined with two observational instruments, one of Low Inference and one of High

Inference. This particular analysis on teacher factors revealed elements of quality and quantity of teaching which helped to support in more detail the results found on the measurement of each factor, as well as its impact on the outcomes of both groups of students examined in this study. The results of the descriptive statistical analyses for both instruments are next presented.

*With Low Inference observation instrument*

As mentioned in Chapter 3, this instrument measures five classroom-level factors in five different dimensions. The classroom level factors are Structuring, Orientation, Application, Modelling and Questioning and their five measurement dimensions are Stage, Frequency, Focus, Quality and Differentiation. The results indicate the total number and sequence noted by the observer of the teaching activities related to each of the five factors under each of the measurement dimensions for each teacher. The time used in minutes for each teaching activity is also recoded (Creemers & Kyriakides, 2006).

It is important to mention that three different analyses were carried out, one for the total of the data and one for each group formed: non-slow learners and slow learners. The results didn't reveal important differences in the observations on the three different groups, thus, in Table 4.2, the results concerning the total number of students who participated in the study are presented. These results are representative of the two groups formed from this data. The results of teachers' behaviours are presented next in Table 4.2.

Table 4.2

*Descriptive statistics with Low Inference observational instrument (n=707)*

Classroom-level factor	Minimum	Maximum	Mean	SD
<b>Structuring</b>				
Stage	0	3.5	1.85	.71
Frequency	0	22	9.99	5.09
Focus	0	3	1.82	.59
Quality	0	3	1.56	.48
Differentiation	0	3	.34	.48
<b>Orientation</b>				
Stage	0	1	.21	.32
Frequency	0	4	.39	.90
Focus	0	3	.51	.83
Quality	0	2	.31	.51
Differentiation	0	0	.00	.00
<b>Application</b>				
Stage	0	3.5	1.85	.71
Frequency	0	22	9.82	4.93
Focus	0	3	1.81	.56
Quality	0	2	1.51	.48
Differentiation	0	3	.35	.49
<b>Modelling</b>				
Stage	0	1	.06	.19
Frequency	0	4.5	.22	.79
Focus	0	1.5	.11	.34
Quality Teachers' Role	0	2	.11	.36
Quality Appropriateness	0	2	.12	.38
Quality Type Reaction to Students	0	1	.06	.19
Differentiation	0	2	.31	.42
<b>Questioning</b>				
Stage	4	20	12.65	4.08
Frequency	0	15	1.13	2.38
Focus	1	2.5	1.79	.33
Quality Type	.5	2.2	1.26	.34
Quality Reaction	1.7	4.0	3.44	.42
Quality Feedback Reaction to Students	2	4	3.84	.42
Quality Feedback Reaction	1	3	1.94	.28
Differentiation	0	0	.00	.00

*Note:* SD=Standard Deviation

As observed in the table, teachers seem to allocate more time for Structuring, Application and Questioning activities. The factors Structuring and Application are the most observed, with a maximum rate of 22 in the Frequency dimension and a mean of 9.99 (SD=5.09) and 9.82 (SD=4.90) respectively. The Questioning activity, observed from the Stage dimension, was also high with a maximum score of 20 and a mean of 12.65 (SD=4.08). Lastly, Questioning measured within the Frequency dimension was also high, observed with a maximum score of 15 times and a mean of 1.13 (2.38).

It was noticed that in some activities, namely those of Orientation and Questioning, teachers allocate almost no time to the dimension Differentiation. This is an interesting result knowing that activities with Differentiation are the most difficult ones for teachers to implement, as other research has proved (Kyriakides, Creemers & Antoniou 2009; Antoniou, 2010).

Of all factors, the factor Modelling in the dimension of Focus, the factor Modelling in the dimension of Quality as well as the factor Orientation in the dimension of Stage recorded the lowest mean values of 0.12 (SD=0.34), 0.11 (SD=0.36) and 0.2 (SD=0.32) respectively, which is an indication that the teachers did not vary a great deal with respect to those factors, as compared to the rest of the factors.

*With High Inference observation instrument*

This particular instrument measures the effect of classroom-level factors of Managing Classroom Disorder, Classroom as Learning Environment (Teacher-Student Interactions, Student-Student Interactions), Application, Questioning, Orientation, Structuring, Teaching Modelling and Management of Time. A different picture emerges from the second questionnaire as compared with the previous measurement instrument used. As presented in Table 4.3, teacher activities of Managing Classroom Disorder, Teacher Student Interaction, Questioning and Management of Time received the highest mean with a score of 4.01 (SD=0.27), 4.64 (SD=0.30), 4.07 (SD=0.28) and 4.65 (SD=0.43) respectively. The Teaching Modelling and Orientation activities are once again observed with the lowest mean, that of 1.79 (SD=0.37) and 2.95 (SD=0.37) respectively. As shown in the table, the standard deviations from the means range between 0.27 (Managing Classroom Disorder) to 0.65 (Student-Student Interaction) indicating a higher variability for those factors between the teachers.

It is also observed that the minimum and maximum values reveal another pattern. For Orientation, while the minimum value is 1.99, the maximum value is 3.50, which is an indication of a considerable variation between the teachers' behaviours with respect to the factor. A similar pattern can be observed for Teaching Modelling and Structuring, which reveals a considerable variation in the teachers' behaviours for those factors. Of all factors, Teaching Modelling and Orientation recorded the lowest mean values of 1.79 and

2.94 respectively, which is an indication that the teachers did not vary a great deal with respect to those factors as compared to the rest of the factors. All the results mentioned above are presented in Table 4.3.

Table 4.3

*Descriptive statistics with High Inference instrument (n=707)*

Factor	Minimum	Maximum	Mean	SD
Managing Classroom Disorder	3.3	4.2	4.01	.27
Student-Student Interaction	2.33	4.33	3.12	.65
Teacher-Student Interaction	3.75	5.00	4.64	.30
Application	2.37	4.37	3.43	.43
Questioning	3.5	4.8	4.07	.28
Orientation	1.99	3.50	2.95	.37
Structuring	2.00	4.25	2.99	.48
Teaching Modelling	1.41	3.66	1.79	.37
Management of Time	3	5	4.65	.43

*Note:* SD=Standard Deviation

After having examined the variations in teachers' behaviours with respect to each factor referred to by the two observational instruments, measurements results of teacher factors' impact on students' outcomes in Greek language are presented. The results refer to three groups of data: the total number in the student population which participated in the research, and then the non-slow learners and slow learners' groups formed from the data after the identification procedure.

**Results from multilevel analysis: the impact of classroom level factors examined on students' outcomes in language**

To provide evidence for the assumption regarding the generic nature of the teacher factors of the dynamic model on slow learners, three separate series of multilevel analysis were conducted. Results regarding the total number of the students who participated in this study, followed by the results of the non-slow learners (638) and finally, results of slow learners (69) is presented. The results of the three series of multilevel analysis are next presented. Furthermore, due to the fact that two different measurement instruments were used for quality of teaching (one low inference and one high inference), separate multilevel analyses were conducted for each of the two instruments used.

*Multilevel analysis on students' outcomes (n=707)*

The results below present the impact of classroom level factors on the number of students (n=707) participated in the study first with the Low inference and then with the High Inference observational instrument.

- *Results with Low Inference observation instrument*

The first step was to run a two-level model (classroom/teacher and student level) with no explanatory variables (i.e. empty model) to determine if there was any variance at each level. The variance for Greek language was 16.38 % at classroom level and 83.61% at student level. The results revealed a statistical significance in each level (40 classes. 707 students). Thus, based on the empty model in language on 707 students, one may realise that the effect of the classroom level is significant.

Then in Model 1, the context variables of students' prior outcomes and students' gender were added to the empty model. With the two variables, a statistically significant effect at level .05 was found ( $p < 0.001$ ). In addition, as seen in Table 4.4, Model 1 explains more than 22% of the total variance of student outcomes and most of the explained variance is at student level, which is consistent with previous research (Muijs, Kyriakides, van der Werf, Creemers, Timperley, & Earl, 2014; Reynolds, Sammons, De Fraine, Van Damme, Townsend, Teddlie, & Stringfield, 2014).

In the next phase of the analysis, different versions of models were established, examining the impact of teacher factors in five dimensions referring to the dynamic model. Statistical significance was found in relation to the teacher factors of Structuring, Application and Teaching Modelling.



Regarding the teacher factor of *Structuring*, Model 2, different versions were established (i.e. Models 2a-2d for Greek language, as shown in Table 4.4), examining the impact of the teacher Structuring in five dimensions. In each version of Model 2a-d, the factor Structuring was added one by one to Model 1. Thus, the fitting of each of these models was tested against Model 1 and the likelihood statistic ( $\chi^2 = 2,525.05$ ) shows a significant change between Model 1 and each version of Model 2 ( $p < 0.001$ ). This implies that variables measuring the teacher factor Structuring have a significant effect on students' outcomes in the language. Table 4.4 shows that four of the five dimensions of the factor had a statistically significant result (Frequency, Focus, Quality and Differentiation) explaining from 22% to 24% of the student variance in language.

Regarding the factor of *Application*, Model 2e-g, different versions were established (i.e. Models 2e-2g for the Greek language, as shown in Table 4.4) examining the impact of the teacher factor Application in five dimensions. In each version of Model 2e-g, the factor Application was added one by one to Model 1. Thus, the fitting of each of these models was tested against Model 1 and the likelihood statistic ( $\chi^2 = 2,524.834$ ) shows a significant change between Model 1 and each version of Model 3 ( $p < 0.001$ ). This implies that variables measuring the teacher factor Application had a significant effect on students' outcomes in the language. Table 4.4 shows that three of the five dimensions of the factor had a statistically significant result (Frequency, Quality and Differentiation) explaining 23% of the student variance in language.

Regarding the factor of *Teaching Modelling*, Models 2h-m, different versions were established (i.e. Models 2h-2m. for the language as shown in Table 4.4) examining the impact of Teaching Modelling in seven dimensions. In each version of Model 2h-n, the factor Teaching Modelling was added one by one to Model 1. Thus, the fitting of each of these models was tested against Model 1 and the likelihood statistic ( $\chi^2 = 2,521.071$ ) shows a significant change between Model 1 and each version of Model 2h-m ( $p < 0.001$ ). This implies that variables measuring the teacher factor Teaching Modelling have a significant effect on student outcomes in language. Table 4.4 shows that six of the seven dimensions of the factor had a statistically significant result (Stage, Frequency, Focus, Appropriateness, Quality, and Quality Stage) explaining 24% of the student variance in language.

Three of the five factors examined with the Low Inference observation instrument were found to have a statistically significant effect on students' outcomes in the Greek language (Structuring, Application and Teaching Modelling). The factors of Orientation and Questioning, which were not found to have a statistically significant effect on outcomes in any of the dimensions measured, are not included in the two Table 4.4.

Table 4.4 *Multilevel analysis results for all students (n=707) with Low Inference Observation Instrument*

	Model 0	Model 1	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e	Model 2f	Model 2g
Fixed Part	0.156(0.129)	0.149(0.125)	0.152(0.123)	0.144(0.123)	0.132(0.119)	0.144(0.121)	0.151(0.123)	0.136(0.122)	0.145(0.122)
<b>Student Level</b>									
Gender		-0.354(0.108)	0.356(0.108)	0.355(0.108)	0.351(0.108)	0.350(0.108)	0.356(0.108)	-0.351(0.108)	-0.351(0.108)
Prior Achievement		0.754(0.052)	0.752(0.052)	0.753(0.052)	0.751(0.052)	0.755(0.052)	0.752(0.052)	0.751(0.052)	0.754(0.052)
<b>Classroom Level</b>									
<b>Factors</b>									
<u>Structuring</u>									
Frequency			0.028(0.010)						
Focus				0.262(0.11)					
Quality					0.518(0.249)				
Differentiation						0.396(0.15)			
<u>Application</u>									
Frequency							0.032(0.015)		
Focus									
Quality								0.406(0.19)	
Differentiation									0.367(0.17)
<b>Variance components</b>									
Class Level	16.38%	16.54%	15.93%	15.77%	14.48%	15.32%	15.80%	15.35%	15.44%
Student Level	83.61%	61.18%	61.18%	61.18%	61.18%	61.15%	61.18%	61.18%	61.15%
<b>Explained</b>		<b>22.27%</b>	<b>22.85%</b>	<b>23.05%</b>	<b>24.33%</b>	<b>23.52%</b>	<b>23.01%</b>	<b>23.46%</b>	<b>23.40%</b>
<b>Singificance test</b>									
Log-likelihood	2.740.468	2.526.294	2.525.050	2.524.892	2.522.215	2.523.631	2.524.834	2.523.951	2.523.921
Reduction		214174	1244	1402	4079	2663	1460	2343	2373
Degrees of Freedom		2	1	1	1	1	1	1	1
<i>p</i> value		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Table 4.4 (continue) *Multilevel analysis results for all students (n=707) with Low Inference Observation Instrument*

	Model 0	Model 1	Model 2h	Model 2i	Model 2j	Model 2k	Model 2l	Model 2m
Fixed Part	0.156(0.129)	0.149(0.125)	0.134(0.118)	0.133(0.118)	0.134(0.118)	0.134(0.118)	0.134(0.118)	0.134(0.118)
<b>Student Level</b>								
Gender		-0.354(0.108)	-0.349(0.107)	-0.347(0.107)	-0.350(0.107)	-0.349(0.107)	-0.349(0.107)	-0.349(0.107)
Prior Achievement		0.754(0.052)	0.755(0.052)	0.757(0.052)	0.754(0.052)	0.756(0.052)	0.755(0.052)	0.755(0.052)
<b>Classroom Level Factors</b>								
<i>Teaching Modelling</i>								
Stage			1.342(0.570)					
Frequency				0.300(0.133)				
Focus					0.751(0.324)			
Quality						0.693(0.299)		
Appropriateness							0.671(0.285)	
Quality Stage								1.342(0.570)
<b>Variance components</b>								
Class Level	16.38%	16.54%	14.61%	14.35%	14.22%	14.25%	14.61%	14.61%
Student Level	83.61%	61.18%	61.15%	61.15%	61.15%	61.15%	61.15%	61.15%
Explained		22.27%	24.68%	24.49%	24.62%	24.59%	24.68%	24.68%
<b>Singificance test</b>								
Log-likelihood	2.740.468	2.526.294	2.521.071	2.521.434	2.521.210	2.521.231	2.521.071	2.521.071
Reduction		214174	5223	4860	5084	5063	5223	5223
Degrees of Freedom		2	1	1	1	1	1	1
<i>p</i> value		0.001	0.001	0.001	0.001	0.001	0.001	0.001

- *Results with the High Inference observation instrument*

The two-level model with no explanatory variables, as well as Model 1 with the two context variables of students' prior outcomes and gender, added to the empty model, were also used for the multilevel statistical analysis. For Model 0 the statistical significance of 16.54% was found at the teacher level and 83.46% at the student level.

In the next step of the analysis, different versions of models were established examining the impact of teacher factors referring to the dynamic model. In particular, statistical significance was found concerning the teacher factors of Structuring, Teaching Modelling and Management of Time.

The teacher factor *Structuring*, Model 2a, as shown in Table 4.5, examined the impact of teachers on students' outcomes in language. In this model, the factor Structuring was added to Model 1. Thus, the fitting of this model was tested against Model 1 and the likelihood statistic ( $\chi^2 = 2,523.53$ ) shows a significant change between Model 1 and Model 2a ( $p < 0.001$ ). This implies that variable measuring the teacher factor Structuring had a significant effect of 23.59% on students' outcomes in language.

The teacher factor *Teaching Modelling*, Model 2b, as shown in Table 4.5, examined the impact of teachers on students' outcomes in language. In this model, the factor Teaching Modelling was added to Model 1. Thus, the fitting of this model was tested against Model 1, and the likelihood statistic ( $\chi^2 = 2,519.141$ ) shows a significant change between Model 1 and Model 2b ( $p < 0.001$ ). This implies that variable measuring the teacher factor Teaching Modelling had a significant effect of 25.55% on students' outcomes in language.

The teacher factor *Management of Time*, Model 2c, as shown in Table 4.5, examined the impact of teachers on students' outcomes in language. In this model, the Management of Time factor was added to Model 1. Thus, the fitting of this model was tested against Model 1 and the likelihood statistic ( $\chi^2 = 2,524.724$ ) shows a significant change between Model 1 and Model 2c ( $p < 0.001$ ). This implies that variable measuring the teacher factor Management of Time had a significant effect of 23.11% on students' outcomes in language.

Three of the nine factors examined with the High Inference observation instrument (Structuring, Teaching Modelling and Management of Time) were found to have a statistically significant effect on students' outcomes in Greek language from 23% to 25%. The factors without a statistically significant effect on outcomes (Orientation, Classroom Order, Student Interactions, Teachers-Students interactions, Application and Questioning) are not included in Table 4.5.

Table 4.5 *Multilevel analysis results for all students (n=707) with High Inference Observation Instrument*

	Model 0	Model 1	Model 2a	Model 2b	Model 2c
Fixed Part	0.156(0.129)	0.149(0.125)	0.145(0.121)	0.133(0.115)	0.140(0.123)
<b>Student Level</b>					
Gender		0.354(0.108)	0.354(0.108)	-0.349(0.107)	0.352(0.108)
Prior Achievement		0.754(0.052)	0.753(0.052)	0.756(0.052)	0.752(0.052)
<b>Class Level Factors</b>					
Structuring			0.419(0.19)		
Teaching Modeling				0.813(0.291)	
Management of Time					0.378(0.16)
<b>Variance components</b>					
Class Level	16.54%	16.54%	15.22%	13.26%	15.70%
Student Level	83.46%	61.18%	61.18%	61.18%	61.18%
Explained		22.27%	23.59%	25.55%	23.11%
<b>Singificance test</b>					
Log-likelihood	2.740.468	2.526.294	2.523.530	2.519.141	2.524.724
Reduction		214174	2764	7153	1570
Degrees of Freedom		2	1	1	1
<i>p</i> value		0.001	0.001	0.001	0.001

### *Multilevel analysis for non-slow learners' outcomes*

The results below present the impact of classroom level factors on non-slow learners (n=638) first with the Low Inference and then with the High Inference Observational Instrument.

- *Results with the Low Inference observation instrument*

The first step was to run a two-level model (classroom/teacher and student level) with no explanatory variables (i.e. empty model) to determine if there was any variance at each level. The variance for language was 17.24% at classroom level, and 83.75% at the student level. It was statistically significant at each level (40 classes, 638 students, non-slow learners). Thus, based on the empty model in the Greek language on 638 students, one realises that the effect of the classroom level is significant.

Then, in Model 1, the context variables of the students' prior outcomes and gender were added to the empty model. With the two variables, a statistically significant effect at level .05 was found. In addition, as seen in Table 4.6, Model 1 explains more than 15% of the total variance in student outcomes and most of the explained variance is at student level.



In the next steps of the multilevel analyses, different versions of models were established, examining the impact of the five teacher factors in five dimensions referring to the dynamic model. Statistical significance was found concerning the teacher factors of *Structuring, Application and Teaching Modelling*. These three factors were found to have a statistically significant impact on the first series of analysis made on the total number of students.

Regarding the factor of *Structuring*, different versions were established (i.e. Models 2a-2d for the language, as shown in Table 4.6) examining the impact of the teacher factor Structuring in five dimensions. In each version of Models 2a-2b, the factor Structuring in different dimensions measured was added one by one to Model 1. Thus, the fitting of each of these models was tested against Model 1 and the likelihood statistic ( $\chi^2 = 2,292.359$ ) shows a significant change between Model 1 and each version of Model 2 ( $p < 0.001$ ). This implies that variables measuring the teacher factor Structuring have significant effects on student outcomes in Greek language. Table 4.6 shows that four of the five dimensions of the factor had a statistically significant result from 16.26% to 18.23% (Frequency, Focus, Quality and Differentiation).

Regarding the factor *Application*, different versions were established (i.e. Models 2e-2h for the Greek language, as shown in Table 4.6) examining the impact of the teacher factor Application in five dimensions. In each version of Models 2e-2h, the factor Application in different dimensions measured was added one by one to Model 1. Thus, the fitting of each of these models was tested against Model 1 and the likelihood statistic

( $\chi^2 = 2,292,144$ ) shows a significant change between Model 1 and each version of Model 2e-2h ( $p < 0.001$ ). This implies that variables measuring the teacher factor Application have significant effects on student outcomes in language. Table 4.6 shows that four of the five dimensions of the factor had a statistically significant result from 16.25% to 17.19% (Frequency, Focus, Quality and Differentiation).

Regarding the factor of *Teaching Modelling*, different versions were established (i.e. Models 2i-2n. for the Greek language, as shown in Table 4.6) examining the impact of the teacher factor Modelling in seven dimensions. In each version of Models 2i-2n, the factor Teaching Modelling in different dimensions measured was added one by one to Model 1. Thus, the fitting of each of these models was tested against Model 1 and the likelihood statistic ( $\chi^2 = 2,288,156$ ) shows a significant change between Model 1 and each version of Models 2i-2n ( $p < 0.001$ ). This implies that variables measuring the teacher factor Modelling have a significant effect on student outcomes in the Greek language. Table 4.6 shows that six of the seven dimensions of the factor had a statistically significant result of 18% (Stage, Frequency, Focus, Appropriateness, Quality and Quality Stage).

Three of the five factors measured with the Low Inference observation instrument were found to have a statistically significant effect on the outcomes of the group of non-slow learners in Greek language (Structuring, Application and Teaching Modelling). The

factors of Orientation and Questioning that were not found to have a statistically significant effect on outcomes in any dimension measured are not included in Table 4.6.

CHRISTINA IOANNOU

Table 4.6 *Multilevel analysis results of non-slow learners (n=638) with Low Inference Observation Instrument*

	Model 0	Model 1	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e	Model 2f	Model 2g	Model 2h
Fixed Part	0.319(0.128)	0.319(0.124)	0.323(0.122)	0.316(0.122)	0.302(0.116)	0.314(0.121)	0.322(0.122)	0.316(0.122)	0.307(0.120)	0.316(0.121)
<b>Student Level</b>										
Gender		-0.315(0.114)	-0.318(0.114)	-0.316(0.114)	-0.310(0.114)	-0.311(0.114)	-0.319(0.114)	-0.317(0.114)	-0.310(0.114)	-0.312(0.114)
Prior Achievement		0.6828(0.063)	0.679(0.064)	0.681(0.063)	0.678(0.063)	0.682(0.063)	0.679(0.063)	0.681(0.063)	0.678(0.063)	0.681(0.063)
<b>Classroom Level Factors</b>										
<u>Structuring</u>										
Frequency			0.028(0.013)							
Focus				0.262(0.12)						
Quality					0.568(0.244)					
Differentiation						0.391(0.17)				
<u>Application</u>										
Frequency							0.031(0.014)			
Focus								0.249(0.11)		
Quality									0.461(0.21)	
Differentiation										0.362(0.16)
<b>Variance components</b>										
Class Level	17.24%	16.92%	16.30%	16.12%	14.32%	15.71%	16.19%	16.30%	15.36%	15.84%
Student Level	82.75%	67.44%	67.43%	67.44%	67.44%	67.43%	67.43%	67.44%	67.44%	67.43%
Explained		15.61%	16.26%	16.43%	18.23%	16.85%	16.37%	16.25%	17.19%	16.73%
<b>Singificance test</b>										
Log-likelihood	2.421.832	2.293.589	2.292.359	2.292.155	2.288.526	2.290.993	2.292.144	2.292.459	2.290.499	2.291.272
Reduction		128.243	1230	1434	5063	2596	1445	1130	3090	2317
Degrees of Freedom		2	1	1	1	1	1	1	1	1
p value		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Table 4.6 (continue) *Multilevel analysis results for non-slow learners (n=638) with Low Inference Observation Instrument*

	Model 0	Model 1	Model 2i	Model 2j	Model 2k	Model 2l	Model 2m	Model 2n
Fixed Part	0.319(0.128)	0.319(0.124)	0.303(0.117)	0.301(0.117)	0.304(0.117)	0.303(0.117)	0.303(0.117)	0.303(0.117)
<b>Student Level</b>								
Gender		-0.315(0.114)	-0.310(0.114)	-0.308(0.114)	-0.311(0.114)	-0.309(0.114)	-0.310(0.114)	-0.310(0.114)
Prior Achievement		0.6828(0.063)	0.683(0.063)	0.685(0.063)	0.682(0.063)	0.685(0.063)	0.683(0.063)	0.683(0.063)
<b>Classroom Level Factors</b>								
<u>Teaching Modeling</u>								
Stage			1.372(0.572)					
Frequency				0.311(0.134)				
Focus					0.767(0.323)			
Quality						0.710(0.301)		
Appropriateness							0.686(0.286)	
Quality Stage								1.372(0.572)
<b>Variance components</b>								
Class Level	17.24%	16.92%	14.42%	14.59%	14.49%	14.49%	14.42%	14.42%
Student Level	82.75%	67.44%	67.39%	67.39%	67.39%	67.39%	67.39%	67.39%
Explained		15.61%	18.18%	18.01%	18.11%	18.11%	18.18%	18.18%
<b>Singificance test</b>								
Log-likelihood	2.421.832	2.293.589	2.288.156	2.288.462	2.288.280	2.288.335	2.288.156	2.288.156
Reduction		128.243	5433	5127	5309	5254	5433	5433
Degrees of Freedom		2	1	1	1	1	1	1
<i>p</i> value		0.001	0.001	0.001	0.001	0.001	0.001	0.001

- *Results with the High Inference observation instrument*

The two-level model with no explanatory variables, as well as the Model 1 with two context variables of students' prior outcomes and gender added to the empty model, were also used for the multilevel statistical analysis. For Model 0 the statistical significance of 17.24% was found at teachers' level and 82.76% at students' level (non-slow learners).

In the next step of the analysis, different versions of models were established, examining the impact of teacher factors referring to the dynamic model. Statistical significance was found concerning the factors of Classroom Order, Structuring, Teaching Modelling and Management of Time.

The teacher factor *Classroom Order*, Model 2a, as shown in Table 4.7 examined the impact of teachers' ability to keep order in the classroom on students' outcomes in Greek language. In this model, the factor Classroom Order was added to Model 1. Thus, the fitting of this model was tested against Model 1, and the likelihood statistic ( $\chi^2 = 2,293.589$ ) shows a significant change between Model 1 and Model 2a ( $p < 0.001$ ). This implies that variable measuring the teacher factor Classroom Order had a significant impact of 16.75% on students' outcomes in language.

The teacher factor *Structuring*, Model 2b, as shown in Table 4.7, examines the impact of teachers on students' outcomes in language. In this model, the factor Structuring was added to Model 1. Thus, the fitting of this model was tested against Model 1, and the likelihood statistic ( $\chi^2 = 2,290.239$ ) shows a significant change between Model 1 and of Model 2b ( $p < 0.001$ ). This implies that variable measuring the teacher factor Structuring had a significant impact of 17.24% on students' outcomes in Greek language.

The teacher factor *Teaching Modelling*, Model 2c, as shown in Table 4.7, was examining the impact of teachers on students' outcomes in Greek language. In this model, the factor Teaching Modelling was added to Model 1. Thus, the fitting of this model was tested against Model 1, and the likelihood statistic ( $\chi^2 = 2,286.463$ ) shows a significant change between Model 1 and of Model 2c ( $p < 0.001$ ). This implies that variable measuring the teacher factor Modelling had a significant effect of 19% on students' outcomes in language.

The teacher factor *Management of Time*, Model 2d, as shown in Table 4.7 examined the impact of teachers on students' outcomes in Greek language. In this model, the factor Management of Time was added to Model 1. Thus, the fitting of this model was tested against Model 1, and the likelihood statistic ( $\chi^2 = 2,291.438$ ) shows a significant change between Model 1 and Model 2d ( $p < 0.001$ ). This implies that variable

measuring the teacher factor Management had a significant effect of 16.75% on students' outcomes in language.

Four of the nine factors examined with the High Inference observation instrument were found to have a statistically significant effect on students' outcomes in Greek language (Classroom Order, Structuring, Modelling and Management of Time). The factors Orientation, Student-Student interactions, Teacher-Student interactions, Application and Questioning, which were not found to have a statistically significant effect on outcomes, are not included in Table 4.7

Table 4.7 *Multilevel analysis results for non-slow learners (n=638) with High Inference Observation Instrument*

	Model 0	Model 1	Model 2a	Model 2b	Model 2c	Model 2d
Fixed Part	0.319(0.128)	0.319(0.124)	0.308(0.121)	0.316(0.119)	0.302(0.114)	0.311(0.121)
<b>Student Level</b>						
Gender		-0.315(0.114)	0.314(0.114)	0.314(0.114)	0.311(0.114)	0.313(0.114)
Prior achievement		0.682(0.063)	0.680(0.063)	0.681(0.063)	0.685(0.063)	0.679(0.063)
<b>Classroom Level Factors</b>						
Classroom Order			0.679(0.31)			
Structuring				0.454(0.20)		
Teaching Modeling					0.815(0.293)	
Management of Time						0.437(0.19)
<b>Variance components</b>						
Class Level	17.24%	16.92%	15.78%	15.32%	13.55%	15.78%
Student Level	82.76%	67.46%	67.46%	67.43%	67.43%	67.46%
Explained		15.61%	16.75%	17.24%	19.01%	16.75%
<b>Singificance test</b>						
Log-likelihood	2.421.832	2.293.589	2.291.545	2.290.239	2.286.463	2.291.438
Reduction		128.243	2044	3350	7126	2151
Degrees of Freedom		2	1	1	1	1
<i>p</i> value		0.001	0.001	0.001	0.001	0.001



### *Multilevel analysis on slow learners' outcomes*

The results below present the impact of classroom level factors on slow learners (n=69), first with the Low inference and then with the High Inference observational instrument.

- *Results with the Low Inference observation instrument*

As for the other two groups, the first step was to run a two-level model (classroom/teacher and student level) with no explanatory variables (i.e. empty model) to determine if there was any variance at each level. The variance for Greek language was 11% at classroom level and 89% at student level, and was statistically significant at each level (40 classes, 69 students). Thus, based on the empty model in the Greek language on 69 students, one realises the effect of the classroom level is significant.

Then, in Model 1, the context variables of the slow learners' prior outcomes and gender were added to the empty model. With the two variables, a statistically significant effect at the level .05 was found. In addition, as seen in Table 4.8, Model 1 explains more than 29% of the total variance of student outcomes and most of the explained variance is at student level.

In the next steps of the multilevel analysis, different versions of models were established, measuring the impact of the five teacher factors in five dimensions referring to the dynamic model. Statistical significance was found concerning the factors of Structuring, Application, Teaching Modelling and Questioning. Four factors had a statistically significant impact instead of three factors, which was found at the other two series of analysis (total number of students and non-slow learners).

Regarding the factor *Structuring*, different versions were established (i.e. Models 2a-2e for the Greek language, as shown in Table 4.8) examining the impact of the teacher factor Structuring in five dimensions. In each version of Model 2a-2e, the factor Structuring in different dimensions measured was added one by one to Model 1. Thus, the fitting of each of these models was tested against Model 1 and the likelihood statistic ( $\chi^2 = 242.59$ ) shows a significant change between Model 1 and each version of Model 2a-2e ( $p < 0.001$ ). This implies that variables measuring Structuring have significant effects on slow learners' outcomes in language. Table 4.8 shows that all five dimensions of the factor (Stage, Frequency, Focus, Quality and Differentiation) had a statistically significant result at more than 30%.

Regarding the factor *Application*, different versions were established (i.e. Models 2f-2h for language, as shown in Table 4.8) measuring the impact of the teacher factor Application in five dimensions. In each version of Model 2f-2h, the factor Application, examined in different dimensions, was added one by one to Model 1. Thus, the fitting of

each of these models was tested against Model 1, and the likelihood statistic ( $\chi^2 = 242.59$ ) shows a significant change between Model 1 and each version of Models 2f-2h ( $p < 0.001$ ). This implies that variables measuring Application have a significant effect on student outcomes in language. Table 4.8 shows that four of the five dimensions of the factor had a statistically significant result of more than 30% (Stage, Frequency, Quality and Differentiation).

Regarding the factor of *Teaching Modelling*, different versions were established (i.e. Models 2i-2n for the language, as shown in Table 4.8) measuring the impact of the teacher factor Teaching Modelling in seven dimensions. In each version of Models 2i-2n, the factor Teaching Modelling, examined in different dimensions, was added one by one to Model 1. Thus, the fitting of each of these models was tested against Model 1 and the likelihood statistic ( $\chi^2 = 242.213$ ) shows a significant change between Model 1 and each version of Model 2i-2n ( $p < 0.001$ ). This implies that variables measuring teacher factor Teaching Modelling have a significant effect on slow learners' outcomes in language. Table 4.8 shows that six of the seven dimensions of the factor (Stage, Frequency, Focus, Appropriateness, Quality and Quality Stage) had a statistically significant result of more than 33.37%.

Regarding the factor of *Questioning*, Model 2p, different versions were established (i.e. for the Greek language, as shown in Table 4.8) measuring the impact of the teacher factor Teaching Modelling in seven dimensions. In Model 2p the factor Questioning,

examined in different dimensions, was added one by one to Model 1. Only one dimension was found to have an impact of statistical significance: that of *Questioning - Teachers' Reaction*. Thus, the fitting of this model was tested against Model 1, and the likelihood statistic ( $\chi^2 = 242.83$ ) shows a significant change between Model 1 and each version of Model 2p ( $p < 0.001$ ). This implies that the variable Questioning Teachers' Reaction had a significant effect on slow learners' outcomes in language. Table 4.8 shows that one of the eight dimensions of the factor had a statistically significant result explaining more than 33.37%.

Four of the five factors measured with the Low Inference observation instrument on the group of slow learners had almost double the statistical significance of the two other groups examined for outcomes in Greek language (Structuring, Application, Modelling and Questioning). The factor Orientation, as well as some of the dimensions of the other factors measured, which were not found to have a statistically significant effect on outcomes, were not included in Table 4.8.

Table 4.8 Multilevel analysis results for Slow learners (n=69) with Low Inference Observation Instrument

	Model 0	Model 1	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e	Model 2f	Model 2g	Model 2h
Fixed Part	-	-	-	-	-	-	-	-	-	-
<b>Student Level</b>	1.354(0.223)	1.347(0.181)	-1.350(0.169)	1.361(0.178)	1.350(0.169)	1.350(0.169)	-1.350(0.168)	-1.350(0.169)	-1.361(0.178)	-1.350(0.168)
Gender		0.910(0.353)	-0.999(0.351)	0.900(0.347)	0.988(0.351)	1.009(0.353)	-0.913(0.347)	-0.999(0.351)	-0.900(0.347)	-0.913(0.347)
Prior Achievement		1.115(0.260)	1.132(0.260)	1.163(0.258)	1.098(0.260)	1.128(0.260)	1.162(0.259)	1.132(0.260)	1.163(0.258)	1.162(0.259)
<b>Classroom Level Factors</b>										
<u>Structuring</u>										
Stage			0.294(0.16)							
Frequency				0.050(0.032)						
Focus					0.317(0.190)					
Quality						0.411(0.210)				
Differentiation							0.501(0.300)			
<u>Application</u>										
Stage								0.294(0.160)		
Frequency									0.050(0.032)	
Differentiation										0.501(0.300)
<b>Variance components</b>										
Class Level	11.1%	4%	0.5%	3.8%	0.5%	0.5%	0.5%	0.5%	3.85%	0.5%
Student Level	88.9%	67%	66.13%	65.2%	66.12%	66.13%	66.13%	66.13%	65.20%	66.13%
Explained		29%	33.37%	30.9%	33.38%	33.37%	33.37%	33.37%	30.94%	33.37%
<b>Singificance test</b>										
Log-likelihood	266.632	244.146	242.590	241.698	242.694	242.810	241.468	242.590	241.698	241.468
Reduction		22486	1556	2448	1452	1336	2678	1556	2448	2678
Degrees of Freedom		2	1	1	1	1	1	1	1	1
p value		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

Table 4.8 (continue) *Multilevel analysis results for Slow learners (n=69) with Low Inference Observation Instrument*

	Model 0	Model 1	Model 2i	Model 2j	Model 2k	Model 2l	Model 2m	Model 2n	Model 2p
Fixed Part	-1.354(0.223)	-1.347(0.181)	-1.350(0.168)	-1.350(0.168)	-1.350(0.168)	-1.350(0.168)	-1.350(0.168)	-1.350(0.168)	-1.350(0.171)
<b>Student Level</b>									
Gender		-0.910(0.353)	-0.909(0.349)	-0.902(0.350)	-0.919(0.349)	-0.909(0.349)	-0.909(0.349)	-0.909(0.349)	-0.879(0.355)
Prior Achievement		1.115(0.260)	1.116(0.259)	1.124(0.259)	1.113(0.259)	1.116(0.259)	1.116(0.259)	1.116(0.259)	1.128(0.260)
<b>Classroom Level Factors</b>									
<u>Teaching Modelling</u>									
Stage			1.099(0.729)						
Frequency				0.226(0.135)					
Focus					0.661(0.411)				
Quality						0.549(0.280)			
Appropriateness							0.549(0.283)		
Quality Stage								1.099(0.729)	
<u>Questioning</u>									
Reaction									0.673(0.339)
<b>Variance components</b>									
Class Level	11.1%	4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.50%
Student Level	88.9%	67%	66.13%	66.13%	66.13%	66.13%	66.13%	66.13%	66.13%
Explained		29%	33.37%	33.37%	33.37%	33.37%	33.37%	33.37%	33.37%
<b>Singificance test</b>									
Log-likelihood	266.632	244.146	242.007	242.213	242.077	242.007	242.007	242.007	242.829
Reduction		22486	2139	1933	2069	2139	2139	2139	1317
Degrees of Freedom		2	1	1	1	1	1	1	1
<i>p</i> value		0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

- *Results with High Inference observation instrument*

The two-level model with no explanatory variables, as well as the Model 1 with two context variables, students' prior outcomes and gender, added to the empty model, were also used for the multilevel statistical analyses measuring teacher factors' impact on the group of slow learners. A statistical significance of 11% was found at teachers' level and 89% at students' level.

In the next stage of the analysis, different versions of models were established examining the impact of teacher factors referring to the dynamic model. Statistical significance was found concerning the factors Students' Interactions and Modelling.

The teacher factor *Student-Student Interactions*, Model 2a (as shown in Table 4.9) examined the impact of positive students' interactions in the classroom on slow learners' outcomes in language. In this model, the factor Student-Student Interactions was added to Model 1. Thus, the fitting of this model was tested against Model 1, and the likelihood statistic ( $\chi^2 = 242.67$ ) shows a significant change between Model 1 and Model 2a ( $p < 0.001$ ). This implies that variable measuring the teacher factor Students Interactions' had a significant effect in explaining 33.37% of students' outcomes in Greek language.

The teacher factor *Teaching Modelling*, Model 2b, as shown in Table 4.9 examined the impact of teachers on slow learners' outcomes in Greek language. In this model, the factor Teaching Modelling was added to Model 1. Thus, the fitting of this model was tested against Model 1, and the likelihood statistic

( $\chi^2 = 240.49$ ) shows a significant change between Model 1 and Model 2b ( $p < 0.001$ ). This implies that variable measuring the teacher factor Modelling had a significant effect in explaining more than 34% of slow learners' outcomes in Greek language.

Two out of the nine factors examined with the High Inference observation instrument, Student-Student Interactions and Teaching Modelling, were found to have a statistically significant effect on slow learners' outcomes in Greek language. The factors Classroom Order, Teacher-Student Interactions, Application, Questioning, Orientation, Structuring and Management of Time), which did not have a statistically significant effect on outcomes, are not included in Table 4.9.

Table 4.9 *Multilevel analysis results for Slow learners (n=69) with High Inference Observation Instrument*

	Model 0	Model 1	Model 2a	Model 2b
Fixed Part	-1.354(0.223)	-1.347(0.181)	1.350(0.169)	1.350(0.166)
<b>Student Level</b>				
Gender		-0.910(0.353)	0.969(0.350)	0.865(0.347)
Prior achievement		1.115(0.260)	1.153(0.262)	1.100(0.256)
<b>Class Level Factors</b>				
Interactions Students-Students			0.356(0.236)	
Teaching Modeling				0.736(0.377)
<b>Variance components</b>				
Class Level	11.04%	4%	0.5%	0.5%
Student Level	88.96%	67.57%	66.13%	65.13%
Explained		28.42%	33.37%	34.37%
<b>Singificance test</b>				
Log-likelihood	266.632	244.146	242.671	240.498
Reduction		22486	1475	3648
Degrees of Freedom		2	1	1
<i>p</i> value		0.001	0.001	0.001



After having completed three series of multilevel analyses on the data, the effect size on slow learners' outcomes of each classroom level factors was measured.

*Effect size of classroom level factors - results*

The fixed effect obtained in each multilevel analysis was converted to standardised effects or “Cohen’s d” by following the approach proposed by Elliot and Sammons (2004). This procedure was then repeated for the second group formed from the data – the group of the non-slow learners - where we ran all the models again. The Structuring, Application and Modelling factors and some of their dimensions were found to have significant differential effects on slow learners’ outcomes as compared to non-slow learners. Teacher factors found to have a differential effect on slow learners in comparison to non-slow learners are presented next in table 4.10.

Table 4.10

*The effect sizes (Cohen’s d) of teacher factors found to have differential effects*

<i>Class. lvl. factors<sup>†</sup></i>	<i>Dimension</i>									
	<u>Frequency</u>		<u>Stage</u>		<u>Focus</u>		<u>Quality</u>		<u>Differ/tion</u>	
	NSL	SL	NSL	SL	NSL	SL	NSL	SL	NSL	SL
Structuring	0.18	0.22	0.12	0.20	0.14	0.16	0.17	0.17	0.14	0.25
Application	0.14	0.27	0.12	0.19	0.11	0.12	0.18	0.2	0.15	0.17
Modelling	0.22	0.13	0.18	0.11	0.21	0.16	0.15	0.18	0.12	0.21

*Note:* <sup>†</sup>Classroom Level Factors, NSL.=Non-slow learners, SL=Slow Learner, Differ/tion=Differentiation

All factors and their dimensions were found to have small effects (around .20), but these results are in line with the results of quantitative syntheses of teacher effectiveness studies (Seidel & Shavelson, 2009; Kyriakides et al, 2013). Three effectiveness factors were found to have **differential effects: Structuring, Application and Teaching Modelling.**

The Frequency and Stage dimensions of Application were more important for slow learners (Bateman, 1991; Verguts & DeBoeck, 2001). The Differentiation dimension of the factors Structuring and Modelling were more important for slow learners (Shaw, 2008; Rosenshine & Stevens, 1986). The dimensions of Frequency and Stage of the factor Modelling were less important for slow learners (Borich, 1992; Alesi, 1987). Finally, the findings suggested that almost all teacher factors and their dimensions were found to be associated with language outcomes.

Following the analysis undertaken in this chapter, Chapter 5 discusses the findings in relation to the study's assumption and research questions set in Chapter 1.

## **CHAPTER 5**

### **DISCUSSION**

This chapter summarises the findings of the study and it reports the conclusions. It aims to provide a better insight to the practical and theoretical contribution of the study. As mentioned in Chapters 1 and 2, the study mainly used the conceptual framework of the dynamic model to identify the extent to which classroom level factors are associated with slow learners' outcomes in language competence. This study also aimed to address identification issues concerning slow learners. This Chapter summarises and discusses the key findings of the study. The importance of conducting effectiveness studies for a specific population is emphasized. Then, findings on the generic nature of the classroom level factors for this specific student group and implications for policy on quality of teaching are drawn. Finally, suggestions for further research are provided.

#### **Summary of the key findings**

A stage sampling procedure was used to select a sample of primary schools. Tests in Greek language were administrated to all Grade 4 and 5 students at the beginning and at the end of the school year 2014-2015. In total, 707 fourth and fifth grade students participated, spreading over 40 classes and 12 primary schools. The sample was found to be representative for gender and for school ages. An intelligence test was also administrated to all students of this study at the beginning of the school year to measure their general cognitive ability. Furthermore, data on teachers' factors were collected twice during the school year through two observational measurement instruments associated with the dynamic model.

As explained earlier in Chapter 3, the first step was to examine the results obtained with the curriculum-based test. For the language test, the test scores were vertically equated using Item Response Theory (IRT). This methodology enables us to vertically equate achievement scores of different levels on a single measurement scale so that a score can be comparable. In this study, a satisfactory fitness level was found with the Rasch model of the Item Response Theory, of the language test used for measuring students' outcomes in reading and writing skills. The results were important as the tests were also used as part of the identification procedure of slow learners.

The second step was to decide the identification procedure of slow learners. Two criteria from the Diagnostic and Statistical Manual of Mental Disorders (DSM-V, 2013), were applied on the results obtained from the tests administered to all students: the curriculum-based tests and the intelligence test. Students who scored at both tests between one and two standard deviations below average were selected. Using this methodology, 69 students were identified as slow learners. The combination of criteria led to more accurate compared to having one result on students' outcomes. The percentage of slow learners identified from the sample was near to 10%, which corresponded to percentages found in previous studies on slow learners (Shaw, 2008). This procedure led to two groups of students: slow learners ( $n=69$ ) and a group of students named as non-slow learners for the purpose of this study ( $n=638$ ).

The third step was to analyse the data collected from teachers' observations. The data concern quality of teaching. Data on teaching factors derived from instruments developed in earlier studies to test the dynamic model of educational effectiveness (Creemers & Kyriakides, 2010; Kyriakides & Creemers, 2008). The observational instruments existed in a Greek version, used in earlier studies in the Cypriot context. For this reason, no translations of the instruments were needed. Three series of

multilevel modelling analysis were applied to examine the joint effects of multiple factors at the student and class level that interconnect with students' outcomes in language.

The data of this study had a hierarchical structure (students nested in classes, classes nested in schools). Multilevel modelling techniques have been recognised as a prevailing tool in analysing this kind of hierarchically-structured data sets (Goldstein, 2003; Hox, 2010). For this study, the data fitted into a two-level model. A third level, thus, of school level, could not be included, because only 12 primary schools participated. Therefore, two level models were estimated, students within classes for the models testing the teacher factors.

In summary, three series of multilevel models were estimated in this study:

- (a) Differential effects of classroom level factors on all students on language outcomes
- (b) Differential effects of classroom level factors on non-slow learners on language outcomes
- (c) Differential effects of classroom level factors on slow learners on language outcomes

For each series of the multilevel models a specific statistical analysis was executed. First, a two-level null model was tested without any explanatory variables, to investigate the distribution of the variance over the two levels, thus of student and class level. Then, students' prior achievement in language and students' gender, two explanatory variables, were added to the model. This second model was named "model 1". The next models tested the variables of classroom level. The models ran each time with one explanatory variable at classroom level. Thus, the third model was repeated for every teacher factor separately, resulting in one model for each factor. The classroom level factors emanated from Low

and High Inference observational instruments, referred to the dynamic model measuring quality of teaching.

Turning to the substantive questions as to whether teacher factors and measurement dimensions as presented in the dynamic model, explain slow learners' variation in language outcomes, findings suggest that teacher factors have a significant impact on slow learners. Almost all teacher factors and their dimensions were found to be associated with language outcomes of this specific student group.

In particular, the classroom level factors Structuring, Application, Teaching Modelling and Questioning and their measurement dimensions of Stage, Frequency, Focus, Quality and Differentiation, were the most effective for these students. The effect found to be statistical significant on slow learners' outcomes in Greek language. It is important to mention that the measurement dimension of Differentiation for the factors Structuring and Application, presented the highest percentage of explaining variation on the outcomes for slow learners. Variation for slow learners varied approximately from 30% to 33% and for non-slow learners from 16% to 18%.

Similarly, the classroom level factors of Teaching Modelling and the dimension of Student-Student Interactions from the factor Classroom as learning environment were found to have a statistical significant effect on slow learners' outcomes in language. These two factors derived from the High Inference Observation Instrument. Variation for slow learners varied approximately from 28% to 34% and from 16% to 19% for non-slow learners. Teaching Modelling is the only teacher factor that was statistically significant with both measurement instruments. The factor referring to Classroom as learning environment measuring the effect of Student Interactions, showed something that was not included in the initial assumptions of this study. Literature reviews do not refer specifically to students' interactions as an

important factor to improve slow learners' outcomes. This new element may be explained assuming that students' interactions increases time of academic engagement of slow learners during the learning procedure. This new element should be examined in further researchers.

Furthermore, examining differential effects on slow learners, it seems that all factors and their dimensions were found to have small effects (around .20) but these results are in line with results of quantitative syntheses of teacher effectiveness studies (e.g., Seidel & Shavelson, 2009; Kyriakides et al., 2013). Three effectiveness factors were found to have differential effects: Structuring, Application and Teaching Modelling. The measurement dimensions of Frequency and Stage of factors Structuring and Application was more important for slow learners (Bateman, 1991; Verguts & DeBoeck, 2001). Also, the dimension Differentiation of three factors -Structuring, Application and Teaching Modelling- was more important for slow learners (Shaw, 2008; Rosenshine & Stevens, 1986). Based on the findings that the dimension Differentiation was observed in the classroom, it had a statistical significant effect on slow learners. Differentiation was observed for the factors Structure, Modelling and Application, but not for the factors Orientation and Questioning. Finally, the measurement dimensions Frequency and Stage of the factor Modelling were less important for slow learners (Borich, 1992; Alesi, 1987).

Overall, the findings suggest that the generic nature of teacher factors with reference to the dynamic model were validated also on a specific student group. In what follows, an overview of the classroom level factors of the dynamic model related to slow learners' outcomes in language is presented.

## **Classroom level factors of the dynamic model associated with slow learners' outcomes in language**

In this section, explanations are provided for the factors that were found to be more effective than others. Findings of the multilevel analysis indicated that some teacher factors had more significant impact compared to other factors operating at the same level. As presented in Chapter 4, teaching factors Structuring, Application, Teaching Modelling and Questioning from the Low Inference Observation Instrument were found to have a statistically significant effect on slow learners' outcomes in language. The four effectiveness factors which explained variation of slow learners' outcomes are analysed next.

Regarding the factor Structuring, teachers who structured the materials by outlining the content to be covered, signalling transitions between main points, calling attention to and reviewing main ideas at the end (Rosenshine & Stevens, 1986), seemed to maximise slow learners' achievements. The specific teaching activity seemed to support slow learners in their learning process, knowing that a slow learner needs a) to receive information in a concrete way, avoid abstract material and concepts and b) to be guided in order to integrate new and old information, recognising the relationship between newly-taught and previously-learned information, more than their average functioning peers (Verguts & DeBoeck, 2001). As presented earlier in Chapter 2, a slow learner has difficulties in reading which are related to cognitive abilities such as decoding and linguistic comprehension (Gough & Tunmer, 1986; Hoover & Gough, 1990). This assumption seems to be supported by the study. Teachers' behaviour indulging these students' cognitive difficulties by signalling transitions and outlining the content to be covered, seemed to produce higher outcomes in slow learners. The Structuring elements of the specific factor facilitate memorising of the information and also allowed for its apprehension as an integrated whole, recognising the relationships between parts. Moreover, teaching behaviours stemming from the Structuring factor



have a degree of redundancy in the form of repetition and reviewing general views and key concepts, which seemed to increase learning for slow learners. Findings of this study show that the nature of behaviour stemming from the Structuring effectiveness factor of the dynamic model seemed to address learning issues of slow learners. It is also important to mention that the factor was found to have an impact on slow learners' outcomes in all its measurement dimensions (Stage, Frequency, Focus, Quality and Differentiation). More information about the effect of factors' dimensions are revisited later in this section.

Behaviours stemming from the Application factor, such as teachers who provided necessary practice and application opportunities (Borich, 1992) seems to have supported learning in this specific student group. Effective teachers are expected to encourage application tasks by using seatwork or small group tasks. These students, who are extremely inefficient in their ability to understand and apply new academic information (Bateman, 1991) and require more examples, take more time before they understand and apply new concepts. Thus, giving more opportunities for application they are supported to discover and employ more complex ways of thinking. These students fail to respond to learning stimuli rapidly and efficiently and have low processing speed in reading and writing (Rucklidge & Tannock, 2002). The findings of this study show that teachers behaviors stemming from the factor Application, seemed to have addressed the cognitive difficulty they face to translate a sequence of concepts into their corresponding representations, which are then used to gain access to meaning during reading and writing tasks.

The Teaching Modelling factor is associated with the findings of effectiveness studies. Such studies reveal that effective teachers are likely to help pupils use strategies and develop their own strategies that can help them solve different types of problems (Grieve, 2010; Kyriakides, Campbell &

Christofidou, 2002). Thus, the results of this study show that teachers who provided activities helping students to use strategies seem to have empowered slow learners' ability to generalise strategies, to reflect on a strategy and select one in order to respond to a new learning situation (Alessi, 1987). The findings of this study suggest that behaviors stemming from the factor of Teaching Modelling addressed slow learners' cognitive difficulty in using and handling alternative strategies in their reading or writing process (Beech, 2010).

Regarding the dimension of Quality, of the factor of Questioning is defined in the dynamic model based on five main elements. Thus, effective teachers are expected to offer a range of activities and questions, allow sufficient time for a question to be answered, clear questions with an appropriate level of difficulty, and deal appropriately with students' responses. Therefore, effective teachers are more likely than other teachers to sustain the interaction with the original respondent by rephrasing the question and giving clues to its meaning, rather than terminating the interaction by giving the student the answer or by indicating another student to respond. Findings of this study suggest that only the quality dimension was found to have a significant impact on slow learners' achievements. This means that, teachers who treated students' answers with a perspective of interaction (Anderson et al.1979; Clark et al., 1979), avoided to criticize students when they gave incorrect answers (Rosenshine, 1971), and encouraged them to keep trying in order to experience success (Creemers & Kyriakides, 2008). Furthermore, the findings of this study show such teaching behaviours seem to address slow learners' cognitive difficulties with interpreting information received (Verguts & DeBoeck, 2001).

Measuring teachers' impact on slow learners with the Low Inference Observational Instrument also explicitly provided information about the five dimensions of each factor. Considering effectiveness factors as multi-dimensional constructs not only provides a better picture of what makes teachers

effective, but also helps develop more specific strategies for improving educational practice (Creemers and Kyriakides, 2008).

In this study from the five dimensions of Frequency, Focus, Stage, Quality and Differentiation, the dimension of Differentiation in both factors, Structuring and Application, explained the highest percentage of variation of all factors on slow learners' outcomes by a score of 33.37%. The specific dimension of Differentiation refers to the extent to which activities associated with a factor are implemented in the same way for all the subjects involved with it and it is expected that adaptation to the specific needs of each student will increase the effect on student learning outcomes. The dimension of Differentiation refers to the extent to which activities associated with a factor were implemented in the same way for all students. In this way, the importance of taking into account the special needs of each student or group of students is recognized. Specifically, some teachers helped students to analyse, evaluate, compare and contrast, and critique the information given. In other cases, some teachers helped students learn to apply, use, contextualize and put into practice the new knowledge received. Others, helped students to create from knowledge given and last, others enabled students to capitalise on their strengths and to correct or compensate for their weakness. Finally, it was important that the assessment made at the end of teaching was calling upon analytical, practical as well as memory skills of each student. Each of the teaching activities referring to Differentiation was made upon students' needs. Effective teachers gave extra time for some students in order to reach their learning needs.

In this way, the importance of taking into account the special needs of each student is recognised. This study was in line with the assumption of the dynamic model that each student learns, thinks and processes information differently. Thus, the findings of this study provide an answer to the third research question set in Chapter 1: if any dimension would have a bigger impact on this specific student group.

Cognitive difficulties defining slow learners, thus, of receiving information (processing speed and decoding abilities), integrating knowledge, using and handling strategies and developing critical thinking, seem to be addressed by some factors as analysed above, but also seem to have a stronger effect when applied with the dimension Differentiation. These findings support the need for differentiated instruction so that teachers teach, according to the learning needs of individual students by providing active instruction and feedback, more redundancy, more repetitions and more examples. The results of this study show that teachers who adapted their instructional activities to the specific needs of all students were the most effective in promoting learning to slow learners.

Furthermore, the High Inference Observational Instrument used two factors referring to the dynamic model which were found to have a significant association with slow learners' outcomes in the Greek language. These factors were Teaching Modelling and Student-Student interactions, an element linked to the Classroom as a Learning Environment factor. The Teaching Modelling factor has already been analysed earlier in this section. The new factor found to have a significant association with slow learners' outcomes in language, Classroom as Learning Environment, and specifically the element of interactions between students, was not included in the prior assumptions of this study that it would have a significant impact. The result is interesting knowing that it refers to the teachers' contribution in creating a learning environment in his or her classroom (Cazden, 1986; den Brok et al., 2004; Fraser, 1991). Thus, teachers who managed to create a classroom learning environment by promoting interactions between students seemed to have a significant impact on slow learners' outcomes in the Greek language. The findings of this study are supported in another study at which an innovative collaborative group learning strategy is examined for improving learning achievement of slow learners (Khatoun & Akhter, 2010). In Chapter 2, we examined how these students learn, with more time and individualised comments necessary to conquer new knowledge. Moreover, these findings seem to be related with the significant effect of the

factor of Application. As mentioned earlier in this section, knowledge is promoted whenever teachers put students to work in small groups. The effect of this teaching activity was found to be statistically significant on students' outcomes. Furthermore, this activity is related also to the factor of Classroom as Learning Environment with Students interactions. Findings suggest that slow learners benefited from this learning process by addressing their cognitive difficulty to manipulate information in real time with attention (Verguts & DeBoeck, 2001; Sandber, 2001) and to receive and organise information with more time and repetition (Alessi, 1987).

Analysing the findings of this study showed that using two measurement instruments for teachers' factors provided more information about their effects on this specific student group. Firstly, the Low Inference Observational instrument measured five effective teacher factors in five dimensions, supported knowledge about how these students learn, and linked the results with their cognitive abilities. Only a few studies had related slow learners' results with their cognitive abilities (Kearnes & Fuchs, 2013; Chen, Lian, Yang, Liu & Meng, 2017), however these studies did not relate these findings with multi-dimensional teachers' effectiveness factors. Furthermore, this measurement instrument featured the importance of using differentiation techniques in the teaching procedure. Secondly, the High Inference Observational instrument examined factors that were not included in the first measurement instrument. A factor, Classroom as Learning Environment, was found to have a significant association with slow learners' outcomes in the Greek language. These findings added to information about what works and why with slow learners. The new findings were important since they were not included in the prior assumptions. Moreover, these findings were not addressed in the literature. The findings of this study were supported by the learning profile and the cognitive abilities of slow learners, presented earlier in Chapter 2.

In addition, the results of the multilevel analyses showed that factors belonging to different teaching approaches influence student achievement in language. Namely, both, factors associated with the active and direct teaching approach (e.g., Structuring, Application) and factors that refer to the constructivist approach to learning (e.g., Teaching Modelling) were found to be associated with slow learners' outcomes. This study provides further elements by generating support for using an integrated approach in defining quality of teaching and designing teacher training courses for slow learners. The results are in line with conclusions supported by previous meta-analyses (see Seidel & Shavelson, 2007).

Having analysed the findings, the use of the conceptual framework of the dynamic model of educational effectiveness is fairly supported in this study by adding dynamic elements to the learning profile of slow learners. The elements emanating from the theory of the dynamic model are next presented.

### **Contributing to the definition of slow learners by establishing a dynamic learning profile**

The importance of using the dynamic model in this study is recognised in relation to one of the aims of the research: to define the concept of slow learners.

The term *slow learners* was used for a long time in the literature in a vague way, limiting it to a student who does not have the capacity or potential to learn at the same pace as average children do, and having difficulties with all subjects, giving mainly descriptive characteristics of how these students learn (Pecaut, 1991). Some other recent studies named the learning characteristics of this specific student group, introducing some of their educational needs, such as: preference for concrete material, problems

with organising knowledge, difficulty to generalise knowledge, more practice and repetition (Jensen, 1998; Shaw, 2008). Although longitudinal studies attempted to measure the results of the different modes of instruction, the results gave information only on the progress made on behalf of the students. The results answered one question - whether these students showed any progress after being instructed with active and concrete methods (Pujar & Gaonkar, 2008; Kearnes & Fuchs, 2013), concluding that an organisational framework for effective instruction can promote effective education for slow learners (Shaw, 2008).

The results, however, were not related to teacher effectiveness factors promoting learning. Thus, despite the knowledge, only a limited number of studies (Pujar and Gaonkar, 2008; Kearnes & Fuchs, 2013; Chen, Lian, Yang, Liu & Meng, 2017) have examined which teaching behaviors were most effective for slow learners, but without actually linking them with measurements to a specific teaching effectiveness theory.

The importance of this study stands on the fact that the learning process of these students was directly related to and interpreted with teachers' factors of effectiveness. Specifically, findings of this study were related to teacher effectiveness factors of the dynamic model and their five measurements dimensions.

Slow learners were studied for the first time in line with EER aims, to identify the factors promoting effective learning for them. The theoretical framework positioned slow learners' results in line with other teacher effectiveness studies (Brophy and Good, 1986; Mujis & Reynolds, 2000; Creemers & Kyriakides 2006). Moreover, using a specific model of effectiveness, the multilevel dynamic model

(Creemers & Kyriakides, 2008), a specific theory and methodology were linked for the first time with this overlooked student group to measure their outcomes.

Thus, the results of this study, not only demonstrate how an effectiveness theory was applied for the first time to a specific student group, but also add knowledge to our knowledge about their learning profile. The profile of slow learners, presented in Chapter 2, gave information mainly about *how* these students learn. It was mentioned that these students increase their learning outcomes when they have more time and more examples of information. The new knowledge gained from this study stands on the fact that it provides information, not only for how these students learn but also *why* some teachers' behaviours may increase learning in slow learners.

Having information as to why a specific teacher behaviour may be more effective for slow learners, contributes to teachers' knowledge about teaching a specific student group. The knowledge is based on the effective, multi-dimensional teacher factors. As analysed earlier in this Chapter, teachers who structured materials by outlining the content to be covered, signalling transitions between main points, calling attention and reviewing main ideas at the end (Rosenshine & Stevens, 1986), seem to address the need to receive information based upon their cognitive abilities. Furthermore, it is also important to identify the added value of using these five dimensions of the effectiveness factors to explain variation of slow learners' achievements. The statistically significant factors showed that some teaching activities enforce the learning process of slow learners, giving a percentage of explanation the effect at teacher level. Previous researchers showed that teachers were effective by implicating some specific teaching activities to slow learners by presenting students' outcomes before and after an intervention in the teaching process (Burgner, 2010; Kearns & Fuchs, 2013). This study used multilevel statistical analysis methods to present the extent to which teachers were effective with slow learners. For example,



the findings of a longitudinal study (Shaw, 2008) showed students' outcomes after an intervention, but they did not present the extent to which teacher factors could explain this variation in students' outcomes.

The doubt about *how and why* teach these students had led to ambivalent opinions for a long time. Slow learners may have received more attention in the past than gifted children, however, they still have not achieved the full level of their learning potential (Miller, 1970). Many explained this by referring to students' limited abilities (Early, 1963) and by over-emphasising students' weaknesses. Additionally, teachers' role regarding slow learners was understood as a teacher who showed understanding and patience (Smith, 1966).

Recent studies changed the profile of this specific student group by making the argument that teachers should not ignore students who do not keep pace with the teaching and learning process in the classroom (Kaznowski, 2004; Shaw, 2008). However, these suggestions are not enhanced with measurements and they are not supported with a specific theory. A recent study examining learning for slow learners suggests, among other things, that teachers should create a more inclusive classroom atmosphere, involve students in their future decisions about their learning, and encourage slow learners to contribute to all activities of the class (Sebastian, 2016). This information is given without providing teachers with the *how* to apply these suggestions and to what extent. Furthermore, the information is given without explaining the *why* of these behaviours to be considered as effective for this specific student group.

In this study, it has been ascertained that the literature on slow learners presents a learning profile which mainly provides descriptive characteristics. The findings of this study support, with evidence, a learning profile with dynamic elements based on teacher effectiveness factors and the cognitive abilities

of slow learners. The evidence presented not only helps create a dynamic learning profile of these students, but also helps and supports teachers based on the teaching effectiveness theory.

### **The importance of investigating the impact of classroom level factors on outcomes of a specific student group**

The importance of using the dynamic model in this study, is recognised in relation to the definition of the concept of slow learners as explained above, but also to modelling effectiveness education research of a specific student group.

One of the main questions that concerned researchers in the field of education and gained attention early on in educational effectiveness was the one concerned with the factors that contribute to student learning. Debates on improvement of learning outcomes and maximising the contribution of schooling, have led to a wide range of studies (e.g., Campbell, Kyriakides, Muijs, & Robinson, 2003; Opdenakker & Van Damme, 2000; Rutter et al., 1979) and several meta-analyses (see Hyde, Fennema & Lamon, 1990; Kyriakides, Creemers, Antoniou & Demetriou, 2010; Kyriakides & Christoforou, 2011; Scheerens, Witziers & Steen, 2013; Seidel & Shavelson, 2007), searching for a better understanding of what comprises educational effectiveness. These studies, by using the models existed in the field of EER (Bosker & Scheerens, 1994), led to theoretical models of educational effectiveness (Creemers, 1994; Scheerens, 1992; Stringfield & Slavin, 1992) with a multilevel structure but, however, with uni-dimensional constructs. The establishment of the dynamic model added to the multilevel measurements a multi-dimensional construct of each factor. However, the question as to whether the results of these studies can be considered generic and, thus, equally effective in different educational contexts and subjects and student groups, remains under investigation and requires further investigation.

In this study, for the first-time, the dynamic model was tested by investigating the impact of factors on a specific student group. In this way, the generic nature of classroom level factors was also tested. Furthermore, by investigating the impact of classroom level factors on a specific student group, it is also examined how schools could further support these students. Slow learners are students overlooked in the educational system (Greene, 2005; Shaw, 2008, Chen et al., 2017), due to the difficulty in identifying them and to the ambiguity as to what could really support their learning (Cooter & Cooter, 2004).

For the last three decades, educational effectiveness research aimed to establish effective schooling (Stringfield, 1994) by evaluating what already exists in practice and understanding why and how some schools and teachers are more effective. Establishing a theoretical framework for the multilevel dynamic model of effectiveness (Creemers & Kyriakides, 2008) contributed to the general aim of educational effectiveness research by establishing effectiveness factors at different levels of the educational system. In this study, the theoretical framework of the dynamic model was used in order to examine a specific student group and to provide empirical support to the model and the use of its measurement framework.

By focusing on a specific student group, the study helped contribute to the basic assumptions of the model, referring to the generic nature of these factors. This study could provide support to the generic nature of the teacher factors of the dynamic model in different groups of students by taking into account their level of cognitive development. So far, national and international studies have attempted to provide empirical support to the assumption as to the generic nature of the factors included in the dynamic model concerning different outcomes of schooling (affective and cognitive) (Creemers & Kyriakides, 2010;

Kyriakides and Creemers, 2008; 2009) different subjects, where differential effects were identified. The current study provides further evidence of the effects of the teaching factors on a specific group of students with a slower learning pace. Thus, the effectiveness factors were tested for the first time on a specific student group, proving its generic nature. Moreover, the study contributed to the effort of establishing consistent criteria of teacher effectiveness on different groups of students. The findings suggest that teachers can be effective with slow learners despite their cognitive difficulties. It was particularly revealing that even with a small number of slow learners from the data ( $n=69$ ) an effect could be measured from certain teacher factors.

Furthermore, the results of the study contributed to the argument regarding the potential power of schooling to make a difference in students' life opportunities (Edmonds, 1979; Rutter et al., 1979) and also that teachers' behaviour is considered an effective factor determining school improvement (Creemers & Kyriakides, 2008; Slavin, 1987; Walberg, 1984). In this study, classroom level factors were effective for this specific student group. Some classroom level factors were found to be more significant for slow learners than to non-slow learners. Thus, since the factors have an impact on slow learners' outcomes, their gap seems to be decreased compared to non-slow learners. The fact that some classroom level factors have an impact on students with low school results, brings the attention to promoting equity in education (Charalambous, Kyriakides & Creemer, 2016; Charalambous, Charalambous, Dimosthenous & Kyriakides, 2016). The descriptive definition and literature reviews on slow learners over the decades, presents a rather pessimistic image for such students (Miller, 1970; Early, 1966; Kaznowski, 2004). This image was mainly connected with the first criterion of identifying a student as slow learner – thus, their intelligence (Kaznowski, 2004). However, in this study a varied etiology of being slow learner with a relatively low intelligence in comparison to other students of the same age (attention deficit, emotional problems, cognitive difficulties, etc.) was presented. The results of the study using a theoretical

framework of educational effectiveness research showed that a teacher can be effective with this specific population, in contrast to ideas on equality of opportunity once claimed that schools could not support students learning (Coleman, 1966; Jencks et al., 1972).

In order to measure the impact of classroom level factors of the dynamic model, observations were made with validated observation instruments. These instruments are considered a valuable source methodologically as they can be used again in other studies and even in other countries (Vanlaar, Kyriakides, Panayiotou, Vandecandelaere, McMahon, Fraine & Van Damme, 2016; Kyriakides, Creemers, Panayiotou, Vanlaar, Pfeifer, Cankar & McMahon, 2014). The theory about effective factors at teacher level seems to be valid also for slow learners. The current study contributes to filling the gap with data on students having a slower pace of learning capability, giving information about effective teacher factors.

Moreover, the results of this study, based on an empirically-proven model and a theoretical framework from the field of EER, add to the literature of which teacher behaviours may be more effective with slow learners. Several theories and approaches indicated slow learners should be separated from the classroom in order to support their learning process. The current study shows that the conceptual framework of the dynamic model could be used in order to support these students in the classroom. The novelty of the study is considered important showing that a teacher in the mainstream class could support slow learners' learning in a very specific way without adopting any special programmes or instructional strategies from the field of special education. Over the last decade, studies have revealed that some of the teaching factors are more effective than others on the general student group (Kyriakides & Creemers, 2006). By examining which of these teaching factors had a stronger effect on slow learners' outcomes proved that this specific group of students need something different from the rest of the students in the

classroom. Naming which of the teaching activities would stronger support learning for slow learners may contribute to the problem of leaving some students behind. Findings of the study revealed that the teaching factors Structure, Application and Teaching Modelling and some elements of the factors Questioning and Classroom as a Learning Environment of the dynamic model, were found to be more effective than the other factors at teachers' level on slow learners' outcomes in Greek language. Being differentially effective in teaching, raises more questions about teachers' role in the Language outcomes of all students.

Similarly, questions are raised about teaching slow learners. Researchers have found slow learners are being left behind (Sebastian, 2016). The current study shows that even an effective teacher could leave behind some of the students in their classroom. The dimension of teacher factors emanating from the Low Inference Observation Instrument helped examine this critical point in relation to slow learners. Specifically, the differentiation dimension in the Orientation and Modelling factors was not observed when the data were collected. Thus, effective teachers were questioned in relation to slow learners, knowing that the dimension of differentiation explained in this study with the highest percentage the variation of slow learners' outcomes and knowing that differentiation is considered one of the most effective practices. However, the results of this study on a specific student group whose learning characteristics correspond to the teaching factors and dimensions, as analysed in Chapter 2, is equally important for all students.

The findings of this research contribute to the conceptual theoretical framework used in this study. Firstly, the assumption of the generic nature of factors with reference to the dynamic model is validated for the first time with a specific student group. Secondly, the dimensions of each factor determine teachers' effective behaviours in relation to slow learners. Thirdly, a specific dimension, thus, of

Differentiation, was found to have a significant impact on slow learners' outcomes. Finally, the importance of using the dynamic model is recognised by the multi-dimensional nature of the effectiveness factors, measuring for the first time teachers' impact on slow learners' outcomes.

Based on the findings, it can be supported that the teaching factors of the dynamic model are equally important for slow learners. Effective teaching, however, should also be supported by decisions taken at the policymaking level. In the following section, results of this study will be examined through existing policies for slow learners, as well as some suggestions emanating from the findings.

### **Implications for policy and practice in the Cypriot context**

The results of this study have significant implications for policy-makers. The contribution of providing further support to the dynamic model is not restricted to supporting the theoretical foundations of effectiveness studies. It is also significant that these results promote an evidence-based and theory-driven approach to making practical improvements in education in relation to a specific student group.

#### *Policy on quality of teaching*

In Cyprus, efforts have been made over the past few years to improve students' cognitive and affective outcomes. Teachers' education and professional development has constituted a priority for the Cypriot educational system since 2011, in order to effectively use new educational material and implement effective teaching practices (Ministry of Education and Culture, Republic of Cyprus, 2014). Despite these efforts, there isn't a policy for promoting quality teaching. Such policy would also address

slow learners' educational needs. The policy would support slow learners firstly by acknowledging their existence in the classroom and secondly by setting the context for teachers to respond to their educational needs in an effective way.

The policy should include elements of teaching behaviors found to be effective in this study for slow learners. Teaching behaviors with quality and differentiation, which were found to be related to better students' outcomes (Antoniou, Kyriakides & Creemers, 2009), seem also to provide support in the learning procedure of this specific population. By implementing these skills, teachers are effective for all students in the classroom. These practices are in line with inclusive education, which means effective teaching is promoted by addressing the right of education of all students (Vislie, 2006). Inclusive education could be seen as a matter of social justice (Ballard, 2003), which would empower the rights of slow learners, usually left behind and overlooked by teachers. Inclusive schools are those at which all students learn together, regardless of any difficulties or differences they may face, receiving quality education and support through appropriate curricula, organisational arrangements, teaching strategies, use of resources and partnerships with their communities (Salamanca Statement and Framework for Action on Special Needs Education, UNESCO, 1994). However, teachers' education and professional training, mainly provided by the Cyprus Pedagogical Institute, have been criticised for the absence of systematic, in-service teacher education programmes on inclusion (Symeonidou & Phtiaka, 2014).

The in-service training in Cyprus has also been criticised for being informal, individual and voluntary and without being developed around structured practices or theories (Karagiorgi & Symeou, 2007). In addition, since Cyprus has undertaken educational reform, it appears there is an urgent need for agreement on a policy about the nature of in-service trainings offered.



The Ministry of Education and Culture does not appear to have a stated policy on teacher education in relation to inclusion or to integration (Symeonidou & Phtiaka, 2014).

In this context, findings of this study establish even stronger the need of in-service teacher training in relation to inclusion values and to addressing the right of all students to education, in order to be effective with slow learners. Moreover, the results suggest that teaching practices referenced by the dynamic model may be used as a starting point for establishing an integrated approach to teachers' professional development related to slow learners. This study provides evidence supporting the use of a dynamic approach for teacher professional development in regard to the educational needs of a specific student group. These results support the research findings of previous studies that aimed to compare the widely-used Competency-Based Approach with a Dynamic Approach based on the assumption that teacher skills are inter-related and should be grouped for teacher development purposes (Creemers, Kyriakides & Antoniou, 2013).

In particular, previous studies could support the assumption that the focus on grouping of factors can be proven more beneficial in terms of teacher skill development and also on student achievement, rather than the development of isolated skills (Kyriakides, Archambault, & Janosz, 2013, Kyriakides, Creemers, & Antoniou, 2009). Hence, this study adds to discussions on the form of teacher training courses, providing support to the viewing of teacher development as an integrated whole. The results of this study may be used to persuade Cyprus policymakers that the factors included at classroom level of the dynamic model are important for promoting slow learners' outcomes. Findings of the association of effectiveness at classroom level to outcomes of slow learners, should thus be considered when designing reform policies.

### *Policy on improving teachers' professional development*

The educational context of mainstream classes in Cyprus has been criticised for the absence of a coherent national policy in the educational system and for establishing a more focused teachers' professional programme. Despite the Ministry's efforts to implement teacher professional development courses, the training offered still seems to follow a rather mechanistic approach, aiming to develop isolated, unrelated skills (e.g., professional development courses on the development of skills in relation to the use of new technologies) (Ministry of Education and Culture, Republic of Cyprus, 2014b).

Moreover, the special education context in Cyprus has also been criticized. As mentioned in the literature, but also as it arises from the findings of this study, some slow learners are being supported through special education provision. The Education of Children with Special Needs Law (N. 113(1)/1999), as implemented in the Cypriot context, has been systematically criticised for promoting integration instead of inclusion. Firstly, it has been criticised for being borrowed from the British context without taking into consideration the contextual dynamics of Cyprus (Liasidou, 2007; 2008; Phtiaka, 2007). Moreover, although the law had a philosophy to promote integration, its implementation did not alter the way in which mainstream classrooms functioned as compared with the period before the law was introduced (Phtiaka et al., 2005). This means students are drawn from their classroom to be educationally supported by special education teachers, absorbing from the essence of the role of mainstream classroom teacher with an absence of systematic, in-service teacher education programmes on inclusion.

In addition, research on special education in Cyprus concluded that the notion of integration is still largely related to placement rather than quality, and that policymakers need to develop a sense of policy literacy in order to reshape the ways students are being treated in the educational system (Jones &

Symeonidou, 2017). Given the findings of special education in Cyprus, slow learners, labelled as students with special needs, seem not to be effectively supported.

Thus, practices such as placing slow learners in special education should be examined. Findings of this study are in line with other research findings, criticising special education provision, indicating teachers' training in inclusion and defending the teacher's role in the mainstream classroom in order to promote the right of education of all students. Similarly, mainstream classroom teachers do not particularly contribute to their educational development, knowing these students belong to a different educational framework. These practices do not contribute to developing effective teacher knowledge and skills for all the students in the classroom.

At the same time, budgetary allocations concerning special education by the Ministry of Education and Culture in Cyprus rise by up to three million euros annually, without the assessment of the effectiveness of this policy and practice (Annual Report of the Ministry of Education and Culture, Cyprus, 2015). Knowing that a percentage of slow learners in this study were receiving special education provision, it is important to examine the cost of the system of special education and its effectiveness. The current practice and policies in Cyprus lead us to question whether slow learners are being effectively supported with regards to their educational needs.

Finally, the results of this study can be used by higher institutions of Cyprus, providing teachers with educational development to enforce their teaching process with more effective skills.

The results of this study demonstrated that the educational needs of this specific student group are not being effectively addressed by existing practices and policies. The dynamic learning profile of this

population, based on classroom level factors of the dynamic model, may be used as a basis to establish effective teaching practices to slow learners. The results of this study show that policymakers are urgently needed to examine existing policies and practices and to establish a national policy corresponding to slow learners' needs. Hence, the policy, as well as the trainings offered by the Ministry of Education and Culture, must be reevaluated in light of this student group, with a slower learning pace. Policymakers are expected to adapt their general policy to the educational needs of slow learners and teachers should be encouraged to implement this policy at their instruction.

### **Research limitations and suggestions for further research**

Identification of factors that promote student learning is assumed to have an impact on national policies, leading to implementation of actions for improvement in all levels of education (i.e., system, school, classroom and student). Since the role of teachers was shown to be central in student learning several decades ago (Lockheed & Komenan, 1989), this study was based on the theoretical framework of the dynamic model of educational effectiveness, being focused on providing information on factors operating at the classroom level that may impact slow learners' outcomes in the Greek language.

By using the conceptual framework of the dynamic model, the study aimed to determine the extent to which teacher factors may have an effect on slow learners' outcomes. In so doing, a contribution is acknowledged in promoting effective teaching and to slow learners. Overall, it can be concluded that classroom level factors have a significant association on slow learners' achievements. And some factors seemed to have a bigger association with this specific student group's outcomes. The results of this study, however, should be examined from the perspective of the research limitations.

Firstly, the sample of the group of slow learners was relatively small, even though data from a total of 707 students was collected. This difficulty is related to the issue of examining a specific student group. The sample of 69 slow learners was drawn from the total of the sample. In order to have a representative sample, more data should be collected. As reported in the literature, 14% of students are considered as slow learners (Kaznowski, 2004; Shaw, 2008). The statistical power of the group of the specific population in the current study leaves room for further examining some questions set. Although the data corresponded to a quite large number of students ( $N=707$ ) some results of the multilevel statistical analysis were limited to a smaller group of students of the data ( $N=69$ ). However, despite the small sample, multilevel analysis was possible to implement from the sample collected. It is important to mention that Type 1 error (0.10) was accepted in multilevel analysis results.

Secondly, longitudinal research should be conducted collecting measurements for more than a school year (Gustafsson, 2010). Slow learners have a learning pace that would have made it interesting to follow their progress throughout a secondary school year. However, as explained in Chapter 3, due to practical difficulties, only two-time measurement points have been used. The current study provided mainly information about short-term effects of teachers on slow learners, since the observations concerned one school year. In the Cypriot educational system, there is an issue in terms of continuity. The most common practice is that every school year teachers move to other classes or even to other schools. This fact made it impossible to examine teacher effectiveness regarding students' outcomes over one school year. Thus, teachers' mobility posed a serious research limitation to this study in terms of expanding the research beyond one school year. Therefore, due to this limitation, only short-term effects were examined. Studies implicating more than two measurements would provide more evidence on teacher factors and their association with slow learners' learning process. Thus, possible longitudinal

studies involving observations of the same students at more than two points in time would also provide elements for teachers' long-term effects on slow learners (Creemers, Kyriakides & Sammons, 2010).

Thirdly, the research questions set in this study examined whether teacher factors of the dynamic model had any association with slow learners' outcomes. Findings suggested there is a strong association between these effectiveness factors and slow learners' achievements. Further studies should be conducted with experimental studies searching for causal-effect relations. Experimental studies in the field of education are common, but they are usually brief and examine theoretical topics as opposed to issues of practical interest. The research suggestions are more related to how to think about daily teaching problems rather than to guide educators and policymakers (Slavin, 2010). The gap is even larger considering suggestions related to this specific student group of slow learners. There is a need to conduct experimental studies, based on a theory of educational effectiveness, in order to establish effective practices and policies for slow learners.

In relation to the above point, the findings of this study demonstrated that slow learners' educational needs were not being addressed by existing policies. Policies though, should be designed on the conclusions and suggestions of research on this specific student group. Thus, in order to have an effective policy for these students, more research should be conducted relating teachers' behaviors to slow learners' outcomes.

Fourthly, having used the conceptual framework of the dynamic model at the classroom level (Creemers & Kyriakides, 2008), further studies should be undertaken in Cyprus, using the same conceptual framework, to provide further information examining school factors. This study examined only Classroom level factors of the dynamic model. School factors are considered equally important for

effectiveness factors, and joint studies on school and teacher effectiveness would reveal important interactions between school and teachers to slow learners' outcomes. Furthermore, classroom and school-level factors should be examined in relation to slow learners' outcomes in other school subjects, such as mathematics or science. Results of effectiveness factors on slow learners would be also examined in domain specific. In addition, international studies are suggested to be carried out in order to examine the conceptual educational framework in relation to slow learners in other countries. Elements of practices and policies in other educational systems would add to the findings of this study, which was conducted in the Cypriot educational context.

To answer the main research question of how these students can be better educationally supported, it could be further examined with studies using a conceptual framework other than that of the dynamic model. A suggestion for further research is to study slow learners with the DASI conceptual framework (Kyriakides & Creemers 2013). Knowing that teachers have an effect on this specific student group but that, at the same time, supporting them involves a degree of difficulty, the particular research framework could provide additional support to teachers in order to be effective to slow learners. In addition, the research framework of cognitive development mentioned in this study (Demetriou, Spanoudis & Mouyi, 2011) indicated specific activities that a teacher could implement in order to enforce students' outcomes. Some of these activities were found to be statistically significant for slow learners such as Structuring-Differentiation. However, some other teaching activities related to effective teaching were not observed. Results show a need for more research, combining the two fields of education and psychology for detailing effective teaching.

Furthermore, future research may contribute to gaining a better understanding of not only aspects relating to the quality of education, but also to issues related to equity (Benadusi, 2001; Gorard & Smith, 2004). The provision of equal educational opportunities to students from different economic and social

backgrounds has generated increased interest over the past decade, since the question of whether or not schools can adjust for some students' unprivileged background remains under investigation (Lynch, 2001; Lynch & Baker, 2005; Kelly, 2012).

Finally, this study provided new elements about the conceptual framework of the dynamic model, for the first time related to a specific student group. Further effectiveness studies are needed to test the generic nature of the effectiveness factors at the classroom level on other specific student groups, such as gifted students. These kinds of effectiveness studies add to the theoretical framework of educational effectiveness and to effective practices and policies in the field of EER.



## References

- Aaron, P. G. (1991). Can reading disabilities be diagnosed without using intelligence tests. *Journal of Learning Disabilities*, 24, 178-186,191.
- Aaron, P. G., Joshi, R.M., Ayotollah, M., Ellsberry, A., Henderson, J., & Lindsey, K. (1999). Decoding and sight-word naming: Are they independent components of word recognition skill? *Reading & Writing*, 11, 89-127.
- Aaron, P.G., Joshi, M. & Williams, K. A. (1999). Not all reading disabilities are alike. *Journal of Learning Disabilities*, 32, 120-137.
- Adams, R. J., & Khoo, S.T (1996). Quest - the interactive test analysis system. Australian Council of Educational Research.
- Andersen, E. B. (1977). Sufficient statistics and latent trait models, *Psychometrika*, 42, 69–81.
- Andrich, D. (1988). A general form of Rasch's extended logistic model for partial credit scoring. *Applied Measurement in Education*, 1(4), 363–378.
- Ahrens, J.A., Evans, R.G., & Barnett, R. W. (1990). Factors related to dropping out of school in an incarcerated population. *Education & Psychological Measurement*, 50, 611-617.
- Alessi, G. (1987). Generative strategies and teaching for generalization. *Analysis of Verbal Behavior*, 5, 15-27.
- Alfassi, M., Weiss, I. & Lifshitz, H. (2009). The efficacy of reciprocal teaching in fostering the reading literacy of students with intellectual disabilities, *European Journal of Special Needs Education*, 24:3, 291-305.
- Allington, R. L. (1983). Fluency: The neglected goal. *The Reading Teacher*, 36, 556-561.

American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders (2013), DSM-5, Fifth Edition.

Ames, T. (1980). *Diagnostic reading checklist (stages 1-4)*. Basingstoke, UK: Macmillan Education.

Antoniou, P. (2010). An Experimental Study Integrating Research on Teacher Education and Educational Effectiveness: Using the Dynamic Model of Educational Effectiveness for Teacher Professional Development. *Paper presented at the annual meeting of the International Congress on School Effectiveness and School Improvement (ICSEI)*, Kuala Lumpur: Malaysia.

Aaricio, J. J., & Moneo, M. R. (2005). Constructivism, the so-called semantic learning theories, and situated cognition versus the psychological learning theories. *Spanish Journal of Psychology*, 8(2), 180-198.

Artman, L., Cahan, S., & Avni-Babad, D. (2006). Age, schooling and conditional reasoning. *Cognitive Development*, 21, 131-145.

Askew, M., & William, D. (1995). *Recent research in mathematics education 5–16*. London: Office for Standards in Education.

Bangert-Drowns, R. L., Kulik, J. A., & Kulik, C. L. C. (1991). Effects of frequent classroom testing. *The Journal of Educational Research*, 85(2), 89-99.

Bateman, B. (1991). Teaching word recognition to slow-learning children. *Journal of Reading, Writing and Learning Disabilities*, 7, 1-16.

Beech, J.R. (2010). Young Readers' Strategic Approaches to Reading Unfamiliar Words in Text, *Reading & Writing Quarterly: Overcoming Learning Difficulties*, 26:3, 264-284.

Benadusi, L. (2001). Equity and education: a critical review of sociological research and thought, In W. Hutmacher, D. Cochrane & N. Bottani (Eds) *In pursuit of equity in education*. Dordrecht, Kluwer.

Bereiter, C., & Scardamalia, M. (1987). *The Psychology of written composition*. Hillsdale, NJ: Laurence Erlbaum.

- Beresford J., (2003), Developing Students as Effective Learners: The Students Conditions for School Improvement, School Effectiveness and School Improvement: An international Journal of Research, Policy and Practice, 14:2, 121 – 158.
- Black, P., & Wiliam, D. (1998). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan*, 80(2), 139-148.
- Black, P., & Wiliam, D. (2009). Developing a theory of formative assessment. *Educational Assessment, Evaluation and Accountability*, 21(1), 5–31.
- Blair, C. (2006). How similar are fluid cognition and general intelligence? A developmental neuroscience perspective on fluid cognition as an aspect of human cognitive ability. *The Behavioral and Brain Sciences*, 29, 109-160.
- Bond, T.G., & Fox, C.M. (2001). Applying the Rasch model: Fundamental measurement in the human sciences. Mahwah, N. J.: Lawrence Erlbaum Associates, Publishers.
- Borich, G.D. (1992) (2nd Ed). *Effective teaching methods*. New York: Macmillan Publishing Company.
- Borich, G.D. (1999). *Observation Skills for effective teaching*. New Jersey: Prentice-Hall, Inc.
- Breznitz, Z. (1987). Increasing first grades reading accuracy and comprehension by accelerating their reading rates. *Journal of Education Psychology*, 79,236-242.
- Brookhart, S. M. (2001). Successful students' formative and summative uses of assessment information. *Assessment in Education: Principles, Policy & Practice*, 8(2), 153-169.
- Brookover, W. B. Beady, C. Flood, P., & Schwetzzer. J. (1979). *School systems and student achievement: schools make a difference*. New York: Praeger
- Brookover, W. B., Beady, C. Flood, P., Schweitzer, J., & Wisenbaker, J. (1979). *Schools, social systems and student achievement: Schools can make a difference*. New York: Praeger.
- Brophy, J., & Good, T. (1970). Teacher's communication of differential expectations for children's classroom performance: Some behavioral data. *Journal of Educational Psychology*, 61, 365–374.
- Brophy, J., & Good, T. (1974). *Teacher–student relationships: Causes and consequences*. New York: Holt, Rinehart & Winston.

- Brophy, J., & Good, T.L. (1986). Teacher behaviour and student achievement. In M.C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed, pp. 328–375). New York: MacMillan.
- Campbell, R.J., Muijs, D., Robinson, W., Kyriakides, L. (2003). Measuring teachers' performance: A case for differentiation. *Education 3-13*, 31(2), 4 – 8.
- Campbell, R. J., Kyriakides, L., Muijs, R.D. & Robinson W. (2004). Effective Teaching and Values: some implications for research and teacher appraisal, *Oxford Review of Education*, 30:4, 451-465.
- Campbell, R.J., Kyriakides, L., Muijs, R.D., & Robinson, W. (2003). Differential teacher effectiveness: Towards a model for research and teacher appraisal. *Oxford Review of Education*, 29(3), 347–362.
- Campbell, R.J., Kyriakides, L., Muijs, R.D., & Robinson, W. (2004). *Assessing Teacher Effectiveness: A Differentiated Model*. London: Routledge/Falmer.
- Cantrell, S. C. & Carter, J. C. (2009). Relationships Among Learner Characteristics and Adolescents' Perceptions About Reading Strategy Use, *Reading Psychology*, 30:3, 195-224.
- Carroll, J.B. (1963). A model of school learning. *Teachers College Record*, 64, 722-733.
- Carroll, J. B. (1989). The Carroll model a 25-year retrospective and prospective view. *Educational Researcher*, 18(1), 26-31.
- Carroll, S. (1998). Slow learners in the regular classroom: A handout for teachers. In A. S. Canter & S. A. Carroll (Eds), *Helping children at home and school: Handouts from your school psychologist* (pp.205-206). Bethesda, MD: The National Association of School Psychologists.
- Case, R. (1992). *The mind's staircase: Exploring the conceptual underpinnings of children's thought and knowledge*. Hillsdale: Lawrence Erlbaum.
- Catts, H. W., Brigid, M. S., & Little, T. D. (2008). Reading achievement growth in children with language impairments. *Journal of Speech, Language and Hearing Research*, Vol. 51, 1569-1579.

- Cazden, C. B. (1986). Classroom discourse. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (pp. 432–463). New York: MacMillan.
- Charalambous, E., Charalambous, C.Y., Dimosthenous, A., & Kyriakides, L. (2016). Using International Comparative Studies to Investigate the Relationship between Quality and Equity in Education. *Paper presented at the symposium "Studying educational inequalities from an international perspective" at the American Educational Research Association (AERA) 2016 Conference "Public Scholarship to Educate Diverse Democracies"*. Washington, DC, April 8 – April 12.
- Charalambous, E., Kyriakides, L., & Creemers, B.P.M. (2016). Promoting quality and equity in socially disadvantaged schools: A group-randomisation study. *Studies in Educational Evaluation*. doi: <http://dx.doi.org/10.1016/j.stueduc.2016.06.001>
- Chen, Y., Lian, R., Yang, L., Liu, J., & Meng, Y. (2017). Working memory load and reminder effect on event-based prospective memory of high- and low-achieving students in math. *Journal of Learning Disabilities*, Vol. 50(5), 602-608.
- Clark, C. M., & Peterson, P. L. (1986). Teachers' Thought Processes. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed., pp. 255-296). New York: Macmillan.
- Cohen, L., Manion, L. & Morrison, K. (2000). *Research methods in education*. London: Routledge/Falmer.
- Cohen, L., Manion, L. & Morrison, K. (2007). *Research methods in education*, 6th ed. London & New York: Routledge/Falmer.
- Coleman, J.S., Campbell, E., Hobson, C., McPartland, J., Mood, A., Weinfield, F. & York, R. (1966). *Equality of Educational Opportunity*. Washington DC: US Government Printing Office.
- Conway, A. R. A., Cowan, N., Bunting, M. F., Therriault, D. J., & Minkoff, S. R. B. (2002). A latent variable analysis of working memory capacity, short term memory capacity, processing speed, and general fluid intelligence. *Intelligence*, 30, 163-183.
- Cook, T. D., Shadish, W. R., & Wong, V. C. (2008). Three conditions under which experiments and observational studies produce comparable causal estimates: New findings from within study comparisons. *Journal of policy analysis and management*, 27(4), 724-750.
- Creemers, B.P.M. (1994). *The Effective Classroom*. London: Cassell.

- Creemers, B.P.M. (2002). An International Perspective on Efficiency in School Financing. *School Effectiveness and School Improvement*, 13(2), 247-252.
- Creemers, B.P.M & Kyriakides, L. (2005). Establishing links between educational effectiveness research and improvement practices through the development of a dynamic model of educational effectiveness. Paper presented at the 86<sup>th</sup> Annual Meeting of the American Educational Research Association, Montreal, April.
- Creemers, B.P.M., & Kyriakides, L. (2006). A critical analysis of the current approaches to modelling educational effectiveness: the importance of establishing a dynamic model. *School Effectiveness and School Improvement*, 17(3), 347-366.
- Creemers, B.P.M., & Kyriakides, L. (2008). *The dynamics of educational effectiveness: a contribution to policy, practice and theory in contemporary schools*. London: Routledge.
- Creemers, B. P. M. & Kyriakides, L. (2008). *The dynamics of educational effectiveness: a contribution to policy, practice and theory in contemporary schools*. London: Routledge.
- Creemers, B. P. M. & Kyriakides, L. (2010). Using the Dynamic Model to Develop an Evidence-Based and Theory-Driven Approach to School Improvement. *Irish Educational Studies*, 29 (1), 5-23.
- Creemers, B., Kyriakides, L., & P. Sammons, P. (2010), *Methodological Advances in Educational Effectiveness Research.*, London: Routledge Taylor Francis.
- Creemers, B.P.M., & Kyriakides, L. (2012). *Improving Quality in Education: Dynamic Approaches to School Improvement*. London and New York: Routledge.
- Creemers, B.P.M., & Reezigt, G.J. (1996). School level conditions affecting the effectiveness of instruction. *School Effectiveness and School Improvement*, 7(3), 197-228.
- Creemers, B.P.M., & Reezigt, G. (1997). School effectiveness and school improvement: sustaining links. *School Effectiveness and School Improvement*. 8, 396 – 429.
- Cronbach, L. J., Gleser, G. C., Nanda, H. & Rajaratnam, N. (1972). *The Dependability of Behavioral Measurements. Theory of Generalizability Scores and Profiles*. New York: Wiley.
- Darling-Hammond, L. (2000). Teacher quality and student achievement: a review of state policy evidence. *Education Policy Analysis Archives*, 8 (1), <http://epaa.asu.edu/epaa/v8n1/>.

- De Corte, E. (2000). Marrying theory building and the improvement of school practice: a permanent challenge for instructional psychology. *Learning and Instruction, 10*(3), 249–266.
- De Jong, R., Westerhof, K. J., & Kruiter, J. H. (2004). Empirical evidence of a comprehensive model of school effectiveness: A multilevel study in mathematics in the first year of junior general education in the Netherlands. *School Effectiveness and School Improvement, 15*(1), 3 – 31.
- Delgado, A., & Prieto, G. (2004). Cognitive mediators and sex-related differences in mathematics. *Intelligence, 32*, 25-32.
- Demetriou, A. (2004). Mind, intelligence and development: A cognitive, differential, and developmental theory of intelligence. In A. Demetriou & A. Raftopoulos, (Eds.), *Cognitive developmental change: Models, methods, and measurement* (pp. 21-73). Cambridge: Cambridge University Press.
- Demetriou, A. & Kyriakides, L. (2006). The Functional and Developmental Organization of Cognitive Developmental Sequences. *British Journal of Educational Psychology, 76*, 209-242.
- Demetriou, A., Spanoudis G., Mouyi, A. (2011). Educating the Developing Mind: Towards an Overarching Paradigm, *Educational Psychology Review, 23*: 601 – 663.
- Den Brok, P., Brekelmans, M., & Wubbels, T. (2004). Interpersonal teacher behaviour and student outcomes. *School Effectiveness and School Improvement, 15*(3/4), 407–442.
- Dietrich, D. M. (1965). Teaching Reading to Slow Learner, *The slow learning child, 12*:1, 49-54.
- Doll, E.A. (1953). Speech at the the Third Annual Institute on the Slow Learner, Wisconsin State College, Milwaukee, Apr. 18, 1953.
- Driessen, G. & Slegers, P. (2000). Consistency of teaching approach and student achievement: An empirical test. *School Effectiveness and School Improvement, 11*(1), 57-79.
- Duffy, A., & Atkinson, T. S. (2001). Learning to teach struggling (and non-struggling) elementary school readers: An analysis of preservice teachers' knowledges. *Reading Research and Instruction, 41*:1, 83-102.

- Elbaum B., Arguelles M.E., Campbell Y. & Saleh B. M. (2004). Effects of a Student-Reads-Aloud Accommodation on the Performance of Students With and Without Learning Disabilities on a Test of Reading Comprehension, *Exceptionality: A Special Education Journal*, 12:2, 71-87.
- Early, M. (1963) Teaching reading to slow learners in secondary schools. *The slow learning child*, 10:2, 67-75.
- Edmonds, R.R. (1979). Effective schools for the urban poor. *Educational Leadership*, 37(1), 15-27.
- Elliott, K., & Sammons, P. (2004). Exploring the use of effect sizes to evaluate the impact of different influences on child outcomes: Possibilities and limitations. In I. Schagen & K. Elliott (Eds.), *But what does it mean? The use of effect sizes in educational research* (pp.6-25). Slough: NFER.
- Ennis, R. H. (1987). A taxonomy of critical thinking dispositions and abilities. In J. Baron & R. Sternberg (Eds.), *Teaching thinking skills: Theory and practice* (pp. 9-26). New York: W.H. Freeman.
- Evertson, C. M., Anderson, C. W., Anderson, L. M., & Brophy, J. E. (1980). Relationships between classroom behaviors and student outcomes in junior high mathematics and English classes. *American educational research journal*, 17(1), 43-60.
- Flanders, N. (1970). *Analyzing teacher behaviour*. Reading, M.A: Addison-Wesley.
- Florian, L. (2007). *The Sage Handbook of Special Education*, Sage Publications.
- Flynn, J. R., & Weiss, L. G. (2007). American IQ Grains from 1932 to 2002: The WISC subtests and Educational Progress, *International Journal of Testing*, 7(2), 209-224.
- Fornes, S.R. (1985). Effects of public policy at the state level: California's impact on MR, DL, and ED categories. *Remedial and Special Education*, 6, 36-43.
- Fraser, B. J. (1991). Two decades of classroom environment research. In B. J. Fraser & H. J. Walberg (Eds.), *Educational environments: Evaluations, antecedents and consequences*. New York: Pergamon Press.
- Frost, R. (1998). Towards a strong phonological theory of visual word recognition: True issues and false trails. *Psychological Bulletin*, 123, 71 -99.



- Fuchs, L., Fuchs, D., Compton, D., Schatschneider, C., Powell, S., Seethaler, P., et al. (2006). The cognitive correlates of third-grade skill in arithmetic, algorithmic computation, and arithmetic word problems. *Journal of Educational Psychology*, 98, 29-43.
- Furedy, C., & Furedy, J. (1985). Critical thinking: Towards research and dialogue. In Donald & Sullivan (Eds.), *Using research to improve teaching (New directions for Teaching and Learning No. 23)*. San Francisco: Jossey-Bass.
- Geary, D. C., (2003). Math disabilities. In H. L. Swanson, K. Harris, & S. Graham (Eds.), *Handbook of learning disabilities* (pp. 199-212). New York, NY: Guilford.
- Geary, D., Brown, S., & Samaranayake, V. (1991). Cognitive addition: A short longitudinal study of strategy choice and speed of processing differences in normal and mathematically disabled children. *Developmental Psychology*, 27, 787-797.
- Gijbels, D., Van de Watering, G., Dochy, F., & Van den Bossche, P. (2006). New learning environments and constructivism: The students' perspective. *Instructional Science*, 34 (3), 213-226.
- Gold, A. B., Ewing-Cobbs, L., Cirino, P., Fuchs, L. S., Stuebing, K. K., & Fletcher, J. M. (2013). Cognitive and behavioral attention in children with maths difficulties, *Child Neuropsychology: A Journal on Normal and Abnormal Development in Childhood and Adolescence*, 19:4, 420-437.
- Goldstein, H. (1997). Methods in School Effectiveness Research. *School effectiveness and school improvement*, 8(4), 369-395.
- Goldstein, H. (2003). *Multilevel statistical models* (3rd ed.). London: Edward Arnold.
- Gorard, S., & Smith, E. (2004). An international comparison of equity in education systems. *Comparative education*, 40(1), 15-28.
- Gough, P. B. (1972). One second of reading. In F. Kavanagh & G. Mattingly (Eds.), *Language by ear and by eye*. Cambridge, MA: MIT Press.
- Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial & Special Education*, 7, 6-10.

- Graham, S., & Harris, K. R. (2013). Common Core State Standards, Writing, and Students with LD: Recommendations. In *Learning Disabilities Research & Practice*, 28(1), 28-37. W4
- Grieve, A. M. (2010). Exploring the characteristics of “teachers for excellence”: Teachers’ own perceptions. *European Journal of Teacher Education*, 33(3), 265–277.
- Gustafsson, J. E. (2010). Longitudinal designs, in *Methodological Advances in Educational Effectiveness Research*, Routledge.
- Hale, J.B., Fiorello, C.A., Kavanaugh, J.A., Hoepfner, J.B., & Gaitherer, R. A. (2001). WISC-III predictors of academic achievement for children with learning disabilities: Are global and factor scores comparable? *School Psychology Quarterly*, 16, 31-35.
- Halford, G.S., Wilson, W.H., & Phillips, S. (1998). Processing capacity defined by relational complexity: Implications for comparative, developmental, and cognitive psychology. *The behavioral and Brain Sciences*, 21, 803-864.
- Hanline, M. F., Milton, S., & Phelps, P. C. (2010). The relationship between preschool block play and reading and maths abilities in early elementary school: a longitudinal study of children with and without disabilities, *Early Child Development and Care*, 180:8, 1005-1017.
- Harjunen, E. (2012). Patterns of control over the teaching–studying–learning process and classrooms as complex dynamic environments: a theoretical framework. *European Journal of Teacher Education*, 34(2), 139-161.
- Harris, K.R., Schmidt, T., & Graham, S. (1998). Every child can write: Strategies for composition and self-regulation in the writing process. In K.R. Harris, S. Graham, & D. Deshler (Eds.), *Teaching Every Child Every Day: Learning in Diverse Schools and Classrooms*, (pp.131-167). Cambridge, MA: Brookline Books.
- Hattie, J. (2009). *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*. London and New York: Routledge.
- Hopkins, D., & Stern, D. (1996). Quality teachers, quality schools: International perspectives and policy implications. *Teaching and Teacher Education*, 12(5), 501-517.

- Horowitz-Kraus, T. & Breznitz, Z. (2011). Error Detection Mechanism for Words and Sentences: A comparison between readers with dyslexia and skilled readers, *International Journal of Disability, Development and Education*, 58:1, 33-45.
- Hoover, W. A., & Gough, P. B. (1990). The simple view of reading. *Reading & Writing*, 2, 127-160.
- Hox, J. (2010). *Multilevel analysis: Techniques and applications*. New York: Routledge.
- Hunt E. (2012). Educating the Developing Mind: The view from Cognitive Psychology, *Educational Psychology Review*, 24: 1- 7.
- Hyde, J. S., Fennema, E., & Lamon, S. J. (1990). Gender differences in mathematics performance: a meta-analysis. *Psychological bulletin*, 107(2), 139.
- Jencks, C., Smith, M., Acland, H., Bane, M.J., Cohen, D., Gintis, H., Heyns, B., & Michelson, S. (1972). *Inequality: a Reassessment of the Effects of Family and Schooling in America*. New York: Basic Books.
- Jensen, A. R. (1998). *The g factor*: Westport, CT: Praeger.
- Johnson, D., & Myklebust, H. (1967). *Learning disabilities: Educational principles and practices*. New York, Grune & Stratton.
- Jones R. E. (1960). A Canadian point of view regarding the segregation of Slow Learners, *The Slow Learning Child*, 7:1, 28-30.
- Jones, C., & Symeonidou, S. (2017). The Hare and the Tortoise: a comparative review of the drive towards inclusive education policies in England and Cyprus. *International Journal of Inclusive Education*, 21:7, 775-789.
- Jordan, N., Hanich, L. B., & Kaplan, D. (2003). A longitudinal study of mathematical competencies in children with specific mathematics difficulties versus children with co-morbid mathematics and reading difficulties. *Child Development*, 74, 834-850.
- Kaplan, R.M., & Saccuzzo, D.P. (2009). Standardized tests in education, civil service and the military. *Psychological testing: Principles, applications, and issues* (7 ed.) Belmont, CA: Wadsworth.

- Karagiorgi, Y., & Symeou, L. (2007). Teachers' in-service training needs in Cyprus. *European Journal of Teacher Education*, 30(2), 175-194.
- Karnes, M. B., (1970). The slow learner...what are his characteristics and needs? *Today's Education*, 42-44.
- Kaznowski, K. (2004) Slow Learners: Are Educators Leaving Them Behind? *NASSP Bulletin*, Vol.88 No 641, December.
- Karande, S., Kanchan, S., & Kulkarni, M. (2008). *Indian Journal of Pediatrics*, Volume 75-August, 2008.
- Kearns, D.M., & Fuchs, D. (2013). Does cognitively focused instruction improve the academic performance of low-achieving students? *Exceptional Children*, Vol. 79, (3), pp. 263-290.
- Keller, C.E., & Sutton, J.P. (1991). Specific mathematics disorders. In J.E. Obrzut & G.W. Hynd (Eds.), *Neuropsychological foundation of learning disabilities: A handbook of issues, methods and practice*. San Diego, CA: Academic Press.
- Kelly, A. (2012). Measuring 'equity' and 'equitability' in school effectiveness research. *British Educational Research Journal*, 38(6), 977-1002.
- Kirk, S. A. (1993). Characteristics of slow learners and needed adjustments in reading. In G. A. Harris & W. D. Kirk (Eds), *The foundations of special education selected papers and speeches of Samuel A. Kirk* (pp.145-151). Reston VA: Council for Exceptional Children. (original work published 1949).
- Kirschner, P. A. (2002). Cognitive load theory: Implications of cognitive load theory on the design of learning. *Learning and instruction*, 12(1), 1-10.
- Khasnavis, P. K., & Cain, G.G (2001). Social Studies and the Elementary Slow Learner. *Education*, Vo. 99 (4), 2001.
- Khatoun, S., & Akhter, M. (2010). An innovative collaborative group learning strategy for improving learning achievement of slow learners. *Journal of Research and Reflections in Education*, December 2010, Vol. 4(2) pp 142-160.
- Kline R. B. (2011). *Principles and practice of Structural Equation Modeling, Third Edition*. New York: The Guilford Press (425pp.).
- Kyllonen, P., & Christal, R. E. (1990). Reasoning ability is (little more than) working memory capacity? *Intelligence*, 14, 389-433.

- Kyriakides, L., Campbell, R. J., & Christofidou, E. (2002). Generating criteria for measuring teacher effectiveness through a self-evaluation approach: A complementary way of measuring teacher effectiveness. *School Effectiveness and School Improvement*, 13(3), 291-325.
- Kyriakides, L. (2007). Generic and Differentiated Models of Educational Effectiveness: Implications for the Improvement of Educational Practice. In T. Townsend (Ed.) *International Handbook of School Effectiveness and Improvement* (pp. 41–56). Dordrecht, the Netherlands: Springer.
- Kyriakides, L. & Creemers, B.P.M. (2008). A longitudinal study on the stability over time of school and teacher effects on student outcomes. *Oxford Review of Education*, 34, 521-546.
- Kyriakides, L., Creemers, B.P.M. & Antoniou, P. (2009). Teacher behaviour and student outcomes: Suggestions for research on teacher training and professional development. *Teaching and Teacher Education*, 25(1), 12-23.
- Kyriakides, L., Creemers, B., Antoniou, P., & Demetriou, D. (2010). A synthesis of studies searching for school factors: Implications for theory and research. *British Educational Research Journal*, 36(5), 807-830.
- Kyriakides, L., Campbell, R.J., & Gagatsis, A. (2000). The significance of the classroom effect in primary schools: An application of Creemers' comprehensive model of educational effectiveness. *School Effectiveness and School Improvement*, 11 (4), 501-529.
- Kyriakides, L. & Campbell, R.J. (2003). Teacher Evaluation in Cyprus: Some conceptual and methodological issues arising from Teacher and School Effectiveness Research.
- Kyriakides, L. & Charalambous, C. (2005). Using educational effectiveness research to design international comparative studies: turning limitations into new perspectives. *Research Papers in Education*, 20 (4), 391-412.
- Kyriakides, L., & Christoforou, Ch. (2011). A Synthesis of Studies Searching for Teacher Factors: Implications for Educational Effectiveness Theory. Paper presented at the American Educational Research Association (AERA) 2011 Conference. New Orleans, April 2011.

- Kyriakides, L., Christoforou, C., & Charalambous, C.Y. (2013). What matters for student learning outcomes: A meta-analysis of studies exploring factors of effective teaching. *Teaching and Teacher Education*, 36, 143-152.
- Kyriakides, L., & Demetriou, D. (2007). Introducing a teacher evaluation system based on teacher effectiveness research: An investigation of stakeholders' perceptions. *Journal of Personnel Evaluation in Education*, 19, 43-64.
- Kyriakides, L., Demetriou, D., & Charalambous, C. (2006). Generating criteria for evaluating teachers through teacher effectiveness research. *Educational Research*, 48, 1-20.
- Kyriakides, L., Creemers, B.P.M., Antoniou, P., & Demetriou, D. (2010). A synthesis of studies searching for school factors: Implications for theory and research. *British Educational Research Journal*, 36, 807-830.
- Kyriakides, L., & Luyten, H. (2009). The contribution of schooling to the cognitive development of secondary education students in Cyprus: An application of regression discontinuity with multiple cut-off points. *School Effectiveness and School Improvement*, 20, 167-186.
- Kyriakides, L. & Tsangaridou, N. (2004). School effectiveness and teacher effectiveness in physical education. *Paper presented at the 85<sup>th</sup> Annual Meeting of the American Educational Research Association*. San Diego, CA, April.
- Kyriakides, L., Archambault, I., & Janosz, M. (2013). Searching for stages of effective teaching: a study testing the validity of the dynamic model in Canada. *Journal of Classroom Interaction*, 48(2), 11-24.
- Kyriakides, L., & Tsangaridou, N. (2008). Towards the development of generic and differentiated models of educational effectiveness: a study on school and teacher Effectiveness in Physical Education. *British Educational Research Journal* 34(6), 807-83.
- Landerl, K., Fussenegger, B., Moll, K., & Willburger, E. (2009). Dyslexia and dyscalculia: Two learning disorders with different cognitive profiles. *Journal of Experimental Child Psychology*, 103(3), 309-324.
- Levine, D.U., & Lezotte, L.W. (1990). *Unusually effective schools: A review and analysis of research and practice*. Madison, WI: National Center for Effective Schools Research and Development.

- Levine, M., & Barringer, M.D. (2008). Brain-based research helps to identify and treat Slow Learners. *The Educationa Digest*, May 2008.
- Liasidou, A. (2008). 'Critical discourse analysis and inclusive educational policies: the power to exclude'. *Journal of Educational Policy*, 23 (5), pp.483-500.
- Liasidou, A. (2007). 'Inclusive Education Policies and the Feasibility of Educational Change: the case of Cyprus.' *International Studies in Sociology of Education* 17 (4):329-347.
- Linacre, J. M. (1999). Understanding Rasch measurement: Estimation methods for Rasch measures. *Journal of Outcome Measurement*, 3(4), 382-405.
- Lipowsky, F. (2005). A Model of Differentiated Teacher Effectiveness: Theoretical Framework and Empirical Research, *School Effectiveness and School Improvement: An International Journal of Research, Policy and Practice*, 16:2, 217-227.
- Lockheed, M. E., & Komenan, A. (1989). Teaching quality and student achievement in Africa: The case of Nigeria and Swaziland. *Teaching and Teacher Education*, 5(2), 93-113.
- Louise Bates Ames (1970): True and Pseudo Slow Learners, *The Slow Learning Child*, 17:2, 112-118.
- Luyten, H., & Sammons, P. (2010). Multilevel modelling, in *Methodological Advances in Educational Effectiveness Research*, Routledge.
- Lynam, D., Moffitt, T., & Stouthamer-Loeber, M. (1993). Explaining the relation between IQ and delinquency: Class, race, test, motivation, school failure or self-control? *Journal of Abnormal Psychology*, 102, 187-196.
- Lynch, K. (2001). Equality in education. *Studies: An Irish Quarterly Review*, 90(360), 395-411.
- Lynch, K., & Baker, J. (2005). Equality in education An equality of condition perspective. *Theory and Research in Education*, 3(2), 131-164.
- MacArthur, C. A., (2009). Reflections on Research on Writing and Technology for Struggling Writers. *Learning Disabilities Research & Practice*, 24(2), 93-103.

- Machek, G. R., & Nelson, J.M. (2010). School psychologists perceptions regarding the practice of identifying reading disabilities: cognitive assessment and response to intervention considerations. *Psychology in the Schools*, Vol. 47(3), 2010.
- Madison, J.P. (1971). The slow learner: A winner at last? *Elementary English*, 48(7), 896-901.
- Maehler, C. & Schuchardt, K. (2009). Working memory functioning in children with learning disabilities: does intelligence make a difference? *Journal of Intellectual Disability Research*, Vol., 53.
- Malik, N. I., Rehman, G. & Hanif, R. (2012). Effect of Academic Interventions on the Developmental Skills of Slow Learners. *Pakistan Journal of Psychological Research*, 2012, Vol. 27, No. 1, 135-151.
- Mavrou, K., & Symeonidou, S. (2014). Employing the principles of universal design for learning to deconstruct the Greek-Cypriot new national curriculum. *International Journal of Inclusive Education*, 18:9, 918-933.
- Marzano, R. J. (2007). *The art and science of teaching: A comprehensive framework for effective instruction*. Alexandria, VA: Association for Supervision and Curriculum Development.
- McCutchen, D., Teske, P., & Bankston, C. (2008). Writing and Cognition: Implications of the cognitive architecture of learning to write and writing to learn. In C. Bazerman (Ed.) *Handbook of writing research* (pp. 451-470). Hillsdale, NJ: Laurence Erlbaum.
- Miller, W. H. (1970). How can we best teach reading to slow-learning children in the primary grades? *The Slow Learning Child*, 17:2,107-111.
- Miller, L. T., & Vernon, P. A. (1992). The general factor in short-term memory, intelligence, and reaction time. *Intelligence*, 16, 5-29.
- MoEC (Ministry of Education and Culture), 2010. National Curriculum for the pre-Primary, Primary and Secondary Education. Nicosia: Cyprus Pedagogical Institute and Programme Development Service. (in Greek).
- Mortimore, P. (1992). Issues in school effectiveness. In D. Reynolds & P. Cuttance (Eds.), *School effectiveness research, policy and practice* (pp. 154–163). London, UK: Cassell.



- Muijs, D., & Reynolds, D. (2003). Student background and teacher effects on achievement and attainment in mathematics. *Educational Research and Evaluation*, 9, 289–314.
- Muijs, D., & Reynolds, D. (2011). *Effective teaching. Evidence and practice*. London: Sage.
- Muijs, D., Kyriakides, L., van der Werf, G., Creemers, B., Timperley, H., & Earl, L. (2014). State of the art–teacher effectiveness and professional learning. *School Effectiveness and School Improvement*, 25(2), 231-256.
- National Association of School Psychologists (1998). *Helping children at home and school: handouts from your school psychologist*. Silver Spring, M.D: Author.
- Neisser, U. (1998). *The rising curve*. Washington: American Psychological Association.
- Norvig A. M., (1959). How we help Slow Learners at Emdrupborg Experimental School, *The Slow Learning Child*, 6:1, 8-13.
- Nunes, T., Bryant, P., & Evans, D. (2007). The contribution of logical reasoning to the learning of mathematics in primary school. *British Journal of Developmental Psychology*, 25, 147-166.
- Opdenakker, M.C. & Van Damme, J. (2006). Differences between secondary schools: A study about school context, group composition, school practice, and school effects with special attention to public and Catholic schools and types of schools. *School Effectiveness and School Improvement*, 17(1), 87-117
- Opie S.J. (1995). Effective Teaching of Reading: A study of Personal Qualities and Teaching Approaches in a Group of Successful Teachers, *Educational Psychology in Practice: theory, research and practice in educational psychology*, 11:2, 3-7.
- Paas, F., Renkl, A., & Sweller, J. (2003). Cognitive load theory and instructional design: Recent developments. *Educational psychologist*, 38(1), 1-4.
- Paris S.G., & Paris, A.H. (2001). Classroom applications of research on self-regulated learning. *Educational Psychologist*. 36(2), 89–101.
- Pascarella, E. T., & Terenzin, P.T. (2005). *How college affects students*. San Francisco: Jossey-Bass.

- Pascual-Leone, J. (1988). Organismic processes for neo-Piagetian theories: A dialectical causal account of cognitive development. In A. Demetriou (Ed.), *The neo-Piagetian theories of cognitive development: Toward an integration* (pp. 25-64). Amsterdam: North-Holland.
- Passolunghi, M., & Siegel, L. (2004). Working memory and access to numerical information in children with disability in mathematics. *Journal of Experimental Child Psychology*, 88, 348-367.
- Pecaut, L. S. (1991). Why can't Johnny learn? *Principal*, 70(4), 29-30.
- Pennington, B. (1991). *Diagnosing learning disorders*. New York: Guilford Press.
- Phtiaka, H. (2007). 'Where do we come from and where are we going? Cypriot state and special education'. (the article was published in 2000). In H. Phtiaka (ed.) *Special and Inclusive Education in Cyprus*, pp. 52-75. Athens, Greece: Taksideftis. (in Greek).
- Phtiaka, H., Michaelidou, A., Tsouris, C. & Vlami, E. (2005). 'The implementation of the educational legislation 113(i)/99 in Cyprus schools". Phase A-preprimary and primary education. Nicosia: unpublished report. (in Greek).
- Pressley, M., & Afflerbach, P. (1995). *Verbal protocols of reading: The nature of constructively responsive reading*. Hillsdale, NJ: Erlbaum.
- Pujar L.L. & Gaonkar V., (2008). Instructional strategies to accelerate science learning among slow learners. *Karnataka J. Agric. Sci.*, 21(4) (553-556): 2008.
- Rasinski, T., Homan, S., & Biggs, M. (2009). Teaching reading fluency to struggling readers: method, materials, and evidence. *Overcoming Learning Difficulties*, 25:2-3, 192-204.
- Raven, J., (2000). The Raven's Progressive Matrices: Change and Stability over Culture and Time, *Cognitive Psychology*, 41, 1-48.
- Resing, W. C. M., & Tunteler E. (2007). Children Becoming More Intelligent: Can the Flynn Effect be Generalized to Other Child Intelligence Tests? *International Journal of Testing*, 7:2, 191-208.
- Reynolds, D., Creemers, B., Stringfield, S., Teddlie, C., & Schaffer, G. (Eds.). (2002). *World class schools*. London: RoutledgeFalmer.

- Reynolds, D., Sammons, P., De Fraine, B., Townsend, T., & Van Damme, J. (2011, January). Educational Effectiveness Research (EER): A state of the art review. *Paper presented at the annual meeting of the International Congress for School Effectiveness and Improvement*, Limassol, Cyprus.
- Reynolds, D., Sammons, P., De Fraine, B., Van Damme, J., Townsend, T., Teddlie, C., & Stringfield, S. (2014). Educational effectiveness research (EER): a state-of-the-art review. *School Effectiveness and School Improvement*, 25(2), 197-230.
- Rogosa, D.R., Brandt, D. & Zimowski, M. (1982). A growth curve approach to the measurement of change, *Psychological Bulletin*, 92(3): 726-48.
- Rosenshine, B., & Stevens, R. (1986). Teaching Functions. In M. C. Wittrock (Ed.), *Handbook of Research on Teaching* (3rd ed., pp. 376–391). New York: Macmillan
- Rourke, B.P. (1987). Syndrome of nonverbal learning disabilities: The final common pathway of white-matter disease/dysfunction? *Clinical Neuropsychologist*, 1, 209-234.
- Rourke, B.P., (1993). Arithmetic disabilities, specific and otherwise: A neuropsychological perspective. *Journal of Learning Disabilities*, 26, 214-226.
- Rourke, B. P., (1995). *Syndrome of nonverbal learning disabilities: Neurodevelopmental manifestations*. New York: Guilford Press.
- Rucklidge, J.J., & Tannock, R. (2002). Neuropsychological profiles of adolescents with ADHD: Effects of reading difficulties and gender. *Journal of Child Psychology & Psychiatry*, 43, 988-1003.
- Rumelhart, D. (1978). Toward an interactive model of reading. In S. Dornic (Ed.), *Attention and performance* (Vol.1) Hillsdale, NJ:Erlbaum.
- Rutter. M., Maughan, B., Mortimore, P. & Ouston, J. (with Smith, A.) (1979). *Fifteen thousand hours: secondary schools and their effects on children*. London: Open Books.
- Sabornie, E.J., Cullinan, D., & Osborne, S.S. (2005). Intellectual, academic, and behavioral functioning of students with high-incidence disabilities: A cross-categorical meta-analysis. *Exceptional Children*, 72, 47-63.

- Sandberg, A. D. (2001). Reading and spelling, phonological awareness, and working memory in children with severe speech impairments: A longitudinal study. *AAC Augmentative and Alternative Communication*, 17, 11-26.
- Scheerens, J. (1992). *Effective schooling: Research, theory and practice*. London: Cassell.
- Scheerens, J. (1993). Effective schooling: Research, theory and practice. *School Effectiveness and School Improvement*, 4(3), 230-235.
- Scheerens, J., & Bosker, R.J. (1997). *The foundations of educational effectiveness*.
- Scheerens, J. (2013). The use of theory in school effectiveness research revisited. *School Effectiveness and School Improvement*, 24(1), 1-38.
- Scheerens, J. (2014). School, teaching, and system effectiveness: some comments on three state-of-the-art reviews. *School Effectiveness and School Improvement*, 25(2), 282-290.
- Scheerens, J., Witziers, B., & Steen, R. (2013). A meta-analysis of School Effectiveness studies. *Revista de educacion*, 361, 619-645.
- Scheerens, J. (2016). *Educational Effectiveness and Ineffectiveness: A Critical Review of the Knowledge Base*. Dordrecht, the Netherlands: Springer.
- Sebastian, V. (2016). Ensuring learning in Slow Learners. *Educational Quest: An International Journal of Education and Applied Social Sciences*, Vol.7, Issue 2, August 2016.
- Seidel, T., & Shavelson, R. J. (2007). Teaching effectiveness research in the past decade: The role of theory and research design in disentangling meta-analysis results. *Review of educational research*, 77(4), 454-499.
- Seidenberg, M. S., & McClelland, J. L. (1989). A distributed, developmental model of word recognition and naming. *Psychological Review*, 96, 523-568.
- Semrud-Clikeman, M., & Hynd, G. (1990). Right hemispheric dysfunction in nonverbal learning disabilities: Social, academic, and adaptive functioning in adults and children. *Psychological Bulletin*, 107, 198-209.

- Shavelson, R. J., Webb, N. M. & Rowley, G. L. (1989). Generalizability theory. *American Psychologist*, 44(6), 922-932.
- Shaw, S.R. (1999). The devolution of interest in slow learners: Can we continue to ignore? *NASP Communique*, 31.
- Shaw S.R. (2000). Slow learners and mental health issues. *NASP Communique*, 4.
- Shaw,S.R, (2008). An Educational Programming Framework for a Subset of Students With Diverse Learning Needs: Bordeline Intellectuaul Functioning. *Intervention in School and Clinic, Journal*, Vol.43, No.5, May 2008, PP. 291-299.
- Shaw, S.R, (2010). Rescuing students from the slow learner trap. *NASSP, Principal Leadership*, February, 2010.
- Shaw, S.R, Grimes, D. & Bulman, J. (2005). Educating slow learners: Are charter schools the last, best hope for their educational success? *The Charter Schools Resource Journal*, Vol. 1, n.1.
- Shayer, M., & Adey, P. (2002). *Learning intelligence: Cognitive acceleration across the curriculum from 5 to 15 years*. Milton Keynes: Open University Press.
- Shayer, M., & Adhami, M. (2003). Realizing the cognitive potential of children 5-7 with a mathematics focus. *International Journal of Educational Research*, 39, 743-775.
- Shepard, L. A. (1989). Why we need better assessment. *Educational Leadership*, 46(2), 4–8.
- Siegel, H. (1988). *Educating reason: Rationality, critical thinking, and education*. London: Routledge.
- Silver-Pacuilla, H., & Fleischman, S. (2006). Technology to help Struggling Students. *Journal of Educational Leadership*, February, 2006.
- Singn, V. P. (2004). *Education of the slow learners*. New Delhi, India: Sarup.
- Slater, R. O., & Teddlie, C. (1992). Toward a theory of school effectiveness and leadership. *School Effectiveness and School Improvement*, 3(4), 247-257.

- Slavin, R.E. (1987) Mastering learning reconsidered. *Review of Educational Research*, 57 (2), 175-213.
- Slavin, R. E. (1996). *Education for all*. Exton, PA: Sweets & Zeitlinger Publishers.
- Smith, N.B. (1966). The slow learner: His needs in learning to read, *The slow Learning Child*, 12:3, 161-172.
- Snijders, T.A.B., & Bosker, R.J. (1999). *Multilevel Analysis: An Introduction to Basic and Advanced multilevel modelling*. London: SAGE Publications.
- Snijders, T. (2011). Multilevel analysis. In M. Lovric (ed). *International Encyclopedia of Statistical Science* (pp. 879-882). Berlin Heidelberg: Springer.
- Stenmark, J. K. (1992). *Mathematics assessment: Myths, models, good questions and practical suggestions*. Reston, VA: NCTM.
- Strand, S. (2010) Do Some Schools Narrow the Gap? Differential School Effectiveness by Ethnicity, Gender, Poverty, and Prior Achievement. *School Effectiveness and School Improvement*, 21(3), 289–314.
- Stringfield, S.C. and Slavin, R.E. (1992). A hierarchical longitudinal model for elementary school effects, in Creemers, B.P.M. and Reezigt, G.J. (Eds), *Evaluation of Effectiveness*. Groningen: ICO.
- Sugasawara, H., & Yamamoto, J. (2009). Computer-Based teaching of Kanji construction and writing in a student with developmental disabilities. *Behavioral Interventions* 24: 43-53 .
- Suggate S., & Reese E. (2012). *Contemporary Debates in Childhood Education and Development*. New York: Routledge.
- Swanson, H. L., & Jerman, O. (2006). Math Disabilities: A selective meta-analysis of the literature. *Review of Educational Research*, 76, 249-274.
- Swanson, H. L., & Sachse-Lee, C. (2001). Mathematical problem solving and working memory in children with learning disabilities: Both executive and phonological processes are important. *Journal of Experimental Child Psychology*, 79, 294-321.

- Symeonidou S. (2015). Rights of people with intellectual disability in Cyprus: Policies and Practices related to greater social and education inclusion. *Journal of Policy and Practice in Intellectual Disabilities*, Vol. 12 (2) pp 120-131.
- Symeonidou S., & Mavrou K. (2014). Deconstructing the Greek-Cypriot new national curriculum: to what extent are disable children considered in the 'humane and democratic school' of Cyprus? *Disability & Society*, 29:2, 303-316.
- Symeonidou S., & Phtiaka, H. (2009). Using teachers prior knowledge , attitudes and beliefs to develop in-service Teacher Education Courses for Inclusion. *Teaching and Teacher Education* 25 (4): 543-550.
- Symeonidou S., & Phtiaka, H. (2014). 'My colleagues wear blinkers.if they were trained, they would understand better'. Reflections on teacher education on inclusion in Cyprus, *Journal of Research in Special Education Needs*, Vol. 14 (2), 110-119.
- Tan, K. H., Wheldall, K., Madelaine, A. & Lee L.,W. (2007). A review of the simple view of reading: Decoding and linguistic comprehension skills of low-progress readers, *Australian Journal of Learning Disabilities*, 12:1, 19-30.9
- Teddlie, C., & Reynolds, D. (2000). *The international handbook of school effectiveness research*. London: Falmer Press.
- Tomlinson, R. (1982). *Special needs in education*. ERIC Doc. No. 235 614.
- Tunstall, P., & Gipps, C. (1996). Teacher feedback to young children in formative assessment: A typology. *British Educational Research Journal*, 22(4), 389-404.
- Turner, S., & Alborz, A. (2003). Academic attainments of children with Down's syndrome: A longitudinal study. *British Journal of Educational Psychology*, 73, 563-583.
- Vanlaar, G., Kyriakides, L., Panayiotou, A., Vandecandelaere, M., McMahon, L., De Fraine, B., & Van Damme, J. (2016). Do the teacher and school factors of the dynamic model affect high- and low-achieving student groups to the same extent? A cross-country study. *Research Papers in Education*, 31(2), 183-211.
- Verguts, T., & DeBoeck, P. (2001). On the correlation between working memory capacity and performance on intelligence tests. *Learning and Individual Differences*, 13, 37-56.

- Walberg, H.J. (1984). Improving the productivity of America's schools. *Educational Leadership*, 41 (8),19-27.
- Walberg H.J. (1986). Syntheses of research on teaching. In M.C. Wittrock (Ed.), *Handbook of research on teaching* (pp. 214–229). New York: Macmillan.
- Watson, G. B., & Glaser, E. M. (1980). *WGCTA Watson-Glasser Critical Thinking Appraisal Manual: Forms A and B*. San Antonio: The Psychological Corporation.
- William, D., Lee, C., Harrison, C., & Black, P. J. (2004). Teachers developing assessment for learning: Impact on student achievement. *Assessment in Education: Principles Policy and Practice*, 11(1), 49-65.
- Willcutt, E. G. (2010). Attention-deficit/hyperactivity disorder. In K. O. Yeates, M. D. Ris, M. G. Taylor, & B.F. Pennington (Eds), *Pediatric Neuropsychology* (2<sup>nd</sup> ed.) (pp. 393-417). NY: Guilford.
- Wilma H. Miller (1970). How can we best teach reading to slow-learning children in the primary grades? *The Slow Learning Child*, 17:2, 107-111.
- Wilson, K.M., & Swanson, H.L. (2001). Are mathematics disabilities due to a domain-general or a domain-specific working memory deficit? *Journal of Learning Disabilities*, 34, 237-248.
- Winne, P. H. (2005). A perspective on state-of-the-art research on self-regulated learning. *Instructional Science*, 33, 559–565.
- Wright, B.D. (1985). Additivity in psychological measurement. In E.E. Roskam (Ed.), *Measurement and personality assessment* (pp. 101-112). Amsterdam: Elsevier Science Publishers BV.
- Wright, B. D., & Masters, G. (1981). The measurement of knowledge and attitude (Research Memorandum 30). Chicago: University of Chicago, Department of Education, Statistical Laboratory.



## Δοκίμιο στα Ελληνικά (Δ' τάξη)-Αρχική Μέτρηση

Όνομα: .....

Σχολείο: .....

### Μέρος Α

Γράψε μία μικρή παράγραφο (3-4 προτάσεις) για να περιγράψεις το αγαπημένο σου παιχνίδι. Στην παράγραφο αυτή, περίγραψε εξωτερικά το παιχνίδι σου και πώς νιώθεις όταν παίζεις με αυτό.

---

---

---

---

---

---

---

---

---

---

---

## Μέρος Β

► Διάβασε το κείμενο και κάνε τις εργασίες που ακολουθούν.

### Τα αναποδογυρισμένα ποντίκια

Μια φορά και ένα καιρό ζούσε ένας γεροντάκος που τον έλεγαν κυρ- Ανέστη. Ήταν ένας φτωχός μα ήσυχος και ευτυχισμένος άνθρωπος.

Μια μέρα ο κυρ Ανέστης ανακάλυψε ότι είχε ποντίκια στο σπίτι του. Στην αρχή δεν τον ένοιασε και τόσο. Αλλά τα ποντίκια άρχισαν να γίνονται ολοένα και πιο πολλά ώσπου έφτασε μια στιγμή που δεν μπορούσε να αντέξει άλλο. Πήγε λοιπόν σε ένα μαγαζί και αγόρασε μερικές ποντικοπαγίδες, ένα κομμάτι τυρί και λίγη κόλλα.

Όταν γύρισε σπίτι άλειψε την κόλλα κάτω από τις ποντικοπαγίδες και τις κόλλησε στο ταβάνι. Έβαλε το δόλωμα και κανόνισε να κλείσουν μόλις τα ποντίκια δοκίμαζαν να φάνε τα κομματάκια από τυρί.

Το βράδυ όταν τα ποντίκια είδαν τις ποντικοπαγίδες στο ταβάνι βρήκαν το πράγμα πολύ αστείο. Έσπρωχναν το ένα το άλλο, σήκωναν τα μπροστινά τους πόδια και βλέποντας το ταβάνι ξεσπούσαν σε τρανταχτά γέλια.

Το επόμενο πρωί, όταν ο κυρ Ανέστης είδε πως δεν πιάστηκαν καθόλου ποντίκια στις ποντικοπαγίδες, χαμογέλασε αλλά δεν είπε τίποτα. Άλειψε με κόλλα τα πόδια μιας καρέκλας και την κόλλησε ανάποδα στο ταβάνι κοντά στις ποντικοπαγίδες. Το ίδιο έκανε και με το τραπέζι, την τηλεόραση, το κομοδίνο, ένα μικρό χαλάκι και όλα τα πράγματα που υπήρχαν στο πάτωμα.

Το επόμενο βράδυ, όταν τα ποντίκια βγήκαν από τις τρύπες τους, μόλις κοίταξαν στο ταβάνι πάγωσαν με αυτό που είδαν.

« Εκεί πάνω βρίσκεται το πάτωμα! » φώναξε ένα ποντίκι.

«Βοήθεια, εμείς στεκόμαστε στο ταβάνι τώρα!» φώναξε ένα άλλο.

«Άρχισα να ζαλίζομαι, έχει πάει το αίμα στο κεφάλι μου, θα λιποθυμήσω.»

παραπονέθηκε ένα άλλο ποντικάκι.

«Είναι φοβερό, πρέπει να κάνουμε κάτι και αμέσως μάλιστα!» είπε ο γέρο πόντικας.

Έκαναν όλοι σαν τρελοί. Είχε αρχίσει να τα πιάνει ο πανικός.

« Βοήθεια! Κάντε κάτι, κάποιος γρήγορα!»

« Εγώ ξέρω τι πρέπει να κάνουμε» είπε ο σοφός γέρο-πόντικας. « Αν σταθούμε όλοι ανάποδα με το κεφάλι κάτω, τότε θα στεκόμαστε ίσια.»

Έτσι, όλα τα ποντίκια στάθηκαν πάνω στα κεφάλια τους και σε κάμποση ώρα λιποθυμούσαν από το αίμα που έφτανε στο κεφάλι τους.

Το επόμενο πρωί ο κυρ Ανέστης βρήκε το πάτωμα στρωμένο με αναίσθητα ποντίκια. Γρήγορα, γρήγορα τα μάζεψε και τα έβαλε σε ένα καλάθι.

Έτσι, πρέπει να θυμόμαστε πως ακόμα και αν ο κόσμος μας φαίνεται άνω-κάτω, εμείς να είμαστε σίγουροι πως τα πόδια μας πατάνε στερεά στη γη!

### **Βάλε σε κύκλο τη σωστή απάντηση σε κάθε μια από τις ερωτήσεις 1-4:**

1. Γιατί ήθελε ο κυρ Ανέστης να ξεφορτωθεί τα ποντίκια;

α) Πάντα μισούσε τα ποντίκια.

β) Ήταν πάρα πολλά.

γ) Γελούσαν πολύ δυνατά.

δ) Του τρώγανε όλο το τυρί.

2. Πού έβαλε ο κυρ Ανέστης τις ποντικοπαγίδες;

α) μέσα σε ένα καλάθο.

β) κοντά στις ποντικότρυπες.

γ) κάτω από τις καρέκλες.

δ) απάνω στο ταβάνι.

3. Τι έκανε ο κυρ Ανέστης μετά που κόλλησε την καρέκλα στο ταβάνι;

α) χαμογέλασε και δεν είπε τίποτα.

β) αγόρασε μερικές ποντικοπαγίδες.

γ) κόλλησε και άλλα πράγματα στο ταβάνι.

δ) Έδωσε λίγο τυρί στα ποντίκια.

4. Ποιες από τις πιο κάτω λέξεις αποτελούν τον καλύτερο χαρακτηρισμό για αυτό το παραμύθι;

α) σοβαρό και λυπητερό.

β) τρομακτικό και συναρπαστικό.

γ) έξυπνο και αστείο.

δ) συγκινητικό και μυστηριώδες.

**Απάντησε τις πιο κάτω ερωτήσεις:**

5. Να βρεις και να αντιγράψεις από το κείμενο μια πρόταση που δείχνει τον πανικό που ένιωσαν τα ποντίκια το δεύτερο βράδυ.

---

6. Σκέψου αυτά που έκανε ο κυρ Ανέστης και τα ποντίκια στο παραμύθι. Εξήγησε τι είναι εκείνα που κάνουν την ιστορία απίστευτη.

---

---

## Μέρος Γ

1. Να συμπληρώσεις τον πίνακα σχηματίζοντας τον παρατατικό και τον αόριστο στο ίδιο πρόσωπο με αυτό που είναι τα ρήματα στον ενεστώτα, όπως στο παράδειγμα της πρώτης γραμμής.

Ενεστώτας	Παρατατικός	Αόριστος
παίζω	έπαιξα	έπαιξα
διαβάζει		
σκεπάζετε		
σκορπίζει		
φτάνεις		
ταξιδεύουμε		

2. Να μετατρέψεις τις πιο κάτω προτάσεις από τον ενικό στον πληθυντικό αριθμό και αντίθετα.

Το βράδυ η γιαγιά διαβάζει το παραμύθι.

---

Χτενίζω την κούκλα μου και χτενίζομαι και εγώ.

---

Το γραμματόσημο αυτό είναι πολύ σπάνιο.

---

3. Να γράψεις με μια λέξη πώς λέγεται:

- Ο άνθρωπος από χιόνι: \_\_\_\_\_
- Το κατάστημα που πουλάει κρέας: \_\_\_\_\_
- Αυτός που πουλάει βιβλία: \_\_\_\_\_
- Αυτός που έχει ανθοπωλείο: \_\_\_\_\_
- Αυτή που μαγειρεύει: \_\_\_\_\_

**4. Να γράψεις τα αντίθετα των πιο κάτω λέξεων:**

- πλούσιος: \_\_\_\_\_
- χαρούμενη: \_\_\_\_\_
- δυνατός: \_\_\_\_\_
- γελώ: \_\_\_\_\_
- ευτυχισμένος: \_\_\_\_\_

**5. Να συμπληρώσεις επιλέγοντας από την παρένθεση τα συνώνυμα των πιο κάτω λέξεων (νέος, όμορφος, γοργός, πελώριος, συμπαθητικός, αστραφτερός, κενός):**

- ωραίος: \_\_\_\_\_
- καινούργιος : \_\_\_\_\_
- θεόρατος: \_\_\_\_\_
- γρήγορος: \_\_\_\_\_

**6. Να υπογραμμίσεις τα επίθετα της πιο κάτω πρότασης:**

Ήταν ένα τεράστιο σπίτι με έναν πανέμορφο κήπο, με μαλακό πράσινο γρασίδι και πολύχρωμα λουλούδια.

## Δοκίμιο στα Ελληνικά (Ε΄ τάξη)- Αρχική Μέτρηση

Όνομα: .....

Σχολείο:

### Μέρος Α

Αποφασίσατε να οργανώσετε στην τάξη μια έκθεση με τα αγαπημένα σας παιχνίδια. Ο καθένας θα φέρει στην τάξη το αγαπημένο του παιχνίδι και ένα σύντομο σημείωμα που θα το παρουσιάζει στους συμμαθητές του. Για το λόγο αυτό πρέπει να γράψεις τώρα το σύντομο σου σημείωμα. Στο σημείωμα αυτό πρέπει να δώσεις τις παρακάτω πληροφορίες για το αγαπημένο σου παιχνίδι: τι διάλεξες να παρουσιάσεις, εξωτερική περιγραφή, από ποια μέρη αποτελείται, ποια είναι τα χαρακτηριστικά του κάθε μέρους. Ακόμη πρέπει να αναφέρεις πως παίζεις με το παιχνίδι σου και πως νιώθεις για αυτό. Μπορείς να προσθέσεις οποιοδήποτε άλλο στοιχείο θεωρείς εσύ χρήσιμο για να γνωρίσουν οι συμμαθητές σου καλύτερα το αγαπημένο σου παιχνίδι!

---

---

---

---

---

---

---

---

---

---

---

## Μέρος Β

► Διάβασε το κείμενο και κάνε τις εργασίες που ακολουθούν.

### Τα αναποδογυρισμένα ποντίκια

Μια φορά και ένα καιρό ζούσε ένας γεροντάκος που τον έλεγαν κυρ- Ανέστη. Ήταν ένας φτωχός μα ήσυχος και ευτυχισμένος άνθρωπος.

Μια μέρα ο κυρ Ανέστης ανακάλυψε ότι είχε ποντίκια στο σπίτι του. Στην αρχή δεν τον ένοιασε και τόσο. Αλλά τα ποντίκια άρχισαν να γίνονται ολοένα και πιο πολλά ώσπου έφτασε μια στιγμή που δεν μπορούσε να αντέξει άλλο. Πήγε λοιπόν σε ένα μαγαζί και αγόρασε μερικές ποντικοπαγίδες, ένα κομμάτι τυρί και λίγη κόλλα.

Όταν γύρισε σπίτι άλειψε την κόλλα κάτω από τις ποντικοπαγίδες και τις κόλλησε στο ταβάνι. Έβαλε το δόλωμα και κανόνισε να κλείσουν μόλις τα ποντίκια δοκίμαζαν να φάνε τα κομματάκια από τυρί.

Το βράδυ όταν τα ποντίκια είδανε τις ποντικοπαγίδες στο ταβάνι βρήκαν το πράγμα πολύ αστείο. Έσπρωχναν το ένα το άλλο, σήκωναν τα μπροστινά τους πόδια και βλέποντας το ταβάνι ξεσπούσαν σε τρανταχτά γέλια.

Το επόμενο πρωί, όταν ο κυρ Ανέστης είδε πως δεν πιάστηκαν καθόλου ποντίκια στις ποντικοπαγίδες, χαμογέλασε αλλά δεν είπε τίποτα. Άλειψε με κόλλα τα πόδια μιας καρέκλας και την κόλλησε ανάποδα στο ταβάνι κοντά στις ποντικοπαγίδες. Το ίδιο έκανε και με το τραπέζι, την τηλεόραση, το κομοδίνο, ένα μικρό χαλάκι και όλα τα πράγματα που υπήρχαν στο πάτωμα.

Το επόμενο βράδυ, όταν τα ποντίκια βγήκαν από τις τρύπες τους, μόλις κοίταξαν στο ταβάνι πάγωσαν με αυτό που είδαν.



« Εκεί πάνω βρίσκεται το πάτωμα! » φώναξε ένα ποντίκι.

«Βοήθεια, εμείς στεκόμαστε στο ταβάνι τώρα!» φώναξε ένα άλλο.

«Άρχισα να ζαλίζομαι, έχει πάει το αίμα στο κεφάλι μου, θα λιποθυμήσω.»

παραπονέθηκε ένα άλλο ποντικάκι.

«Είναι φοβερό, πρέπει να κάνουμε κάτι και αμέσως μάλιστα!» είπε ο γέρο πόντικας.

Έκαναν όλοι σαν τρελοί. Είχε αρχίσει να τα πιάνει ο πανικός.

« Βοήθεια! Κάντε κάτι, κάποιος γρήγορα!»

« Εγώ ξέρω τι πρέπει να κάνουμε» είπε ο σοφός γέρο-πόντικας. « Αν σταθούμε όλοι ανάποδα με το κεφάλι κάτω, τότε θα στεκόμαστε ίσια.»

Έτσι, όλα τα ποντίκια στάθηκαν πάνω στα κεφάλια τους και σε κάμποση ώρα λιποθυμούσαν από το αίμα που έφτανε στο κεφάλι τους.

Το επόμενο πρωί ο κυρ Ανέστης βρήκε το πάτωμα στρωμένο με αναίσθητα ποντίκια. Γρήγορα, γρήγορα τα μάζεψε και τα έβαλε σε ένα καλάθι.

Έτσι, πρέπει να θυμόμαστε πως ακόμα και αν ο κόσμος μας φαίνεται άνω-κάτω, εμείς να είμαστε σίγουροι πως τα πόδια μας πατάνε στερεά στη γη!

**Βάλε σε κύκλο τη σωστή απάντηση σε κάθε μια από τις ερωτήσεις 1-4:**

7. Γιατί ήθελε ο κυρ Ανέστης να ξεφορτωθεί τα ποντίκια;

α) Πάντα μισούσε τα ποντίκια.

β) Ήταν πάρα πολλά.

γ) Γελούσαν πολύ δυνατά.

δ) Του τρώγανε όλο το τυρί.

8. Πού έβαλε ο κυρ Ανέστης τις ποντικοπαγίδες;

α) μέσα σε ένα καλάθο.

β) κοντά στις ποντικότρυπες.

γ) κάτω από τις καρέκλες.

δ) απάνω στο ταβάνι.

9. Τι έκανε ο κυρ Ανέστης μετά που κόλλησε την καρέκλα στο ταβάνι;

α) χαμογέλασε και δεν είπε τίποτα.

β) αγόρασε μερικές ποντικοπαγίδες.

γ) κόλλησε και άλλα πράγματα στο ταβάνι.

δ) Έδωσε λίγο τυρί στα ποντίκια.

10. Ποιες από τις πιο κάτω λέξεις αποτελούν τον καλύτερο χαρακτηρισμό για αυτό το παραμύθι;

α) σοβαρό και λυπητερό.

β) τρομακτικό και συναρπαστικό.

γ) έξυπνο και αστείο.

δ) συγκινητικό και μυστηριώδες.

**Απάντησε τις πιο κάτω ερωτήσεις:**

11. Τη δεύτερη νύκτα που νόμισαν τα ποντίκια ότι στέκονταν; Τι αποφάσισαν τότε να κάνουν;

---

12. Να βρεις και να αντιγράψεις από το κείμενο μια πρόταση που δείχνει τον πανικό που ένιωσαν τα ποντίκια το δεύτερο βράδυ.

---

13. Σκέψου αυτά που έκανε ο κυρ Ανέστης και τα ποντίκια στο παραμύθι.  
Εξήγησε τι είναι εκείνα που κάνουν την ιστορία απίστευτη.

Μέρος Γ

1. Να συμπληρώσεις τον πίνακα σχηματίζοντας τον παρατατικό και τον αόριστο στο ίδιο πρόσωπο με αυτό που είναι τα ρήματα στον ενεστώτα, όπως στο παράδειγμα της πρώτης γραμμής.

Ενεστώτας	Παρατατικός	Αόριστος
παίζω	έπαιζα	έπαιξα
διαβάζει		
σκεπάζετε		
σκορπίζει		
κάθεται		
απολαμβάνω		
παίζετε		
κρύβεσαι		
βιδώνουμε		
απαντούν		

2. Να φτιάξεις μόνο τέσσερις προτάσεις, παίρνοντας κάθε φορά ένα ουσιαστικό και ένα ρήμα, όπως στο παράδειγμα.

αέρας

λεωφορείο

σκυλί

παιδί

σχολεία

ουρανός

φωνάζω

συννεφιάζω

περνώ

φυσώ

κλείνω

δαγκώνω

Παράδειγμα: Ο αέρας φυσά.

Προτάσεις:

- α. \_\_\_\_\_  
β. \_\_\_\_\_  
γ. \_\_\_\_\_  
δ. \_\_\_\_\_

**3. Να ξαναγράψεις την κάθε πρόταση μεγαλώνοντάς τη με μια λέξη ή φράση από την παρένθεση που ταιριάζει, όπως στο παράδειγμα.**

(λαμπρός, ζωγραφίζοντας, σε συντρίμια, διψασμένος, σε επιτυχία, το Σαββατοκύριακο, με μεγάλη ταχύτητα, για τη συλλογή μας)

Παράδειγμα: Ο ιππότης φόρεσε μίαν πανοπλία  
Ο ιππότης φόρεσε μία λαμπρή πανοπλία.

Τα χωράφια ρούφηξαν το νερό.

\_\_\_\_\_

Είχαμε συμφωνήσει να πάμε εκδρομή.

\_\_\_\_\_

Το αυτοκίνητο έτρεχε.

\_\_\_\_\_

Ο σεισμός σάρωσε τα σπίτια.

\_\_\_\_\_

**4. Να συμπληρώσεις με τις αντωνυμίες από την παρένθεση που ταιριάζουν και με τις καταλήξεις που λείπουν.**

(ποιοι, εκείνη, κάποιοι, αυτοί, μερικά, ποιοι, εκείνος, αυτός, κάποιος)

- \_\_\_\_\_ Θα είναι στο πάρτι της Αγγελικής; ρώτησε ο Αντρέας τη Σοφία.
- \_\_\_\_\_ φίλ\_\_ της, απάντησε \_\_\_\_\_
- \_\_\_\_\_ είναι \_\_\_\_\_; ξαναρώτησε.
- Τα παιδιά της τάξης μας και \_\_\_\_\_ άλλα ακόμη.

**5. Να μετατρέψεις τις πιο κάτω προτάσεις από τον ενικό στον πληθυντικό αριθμό και αντίθετα.**

Ο τεχνίτης διόρθωσε τη βλάβη της μηχανής.

\_\_\_\_\_

Οι θεατές θαύμασαν την προσπάθεια του αθλητή.

\_\_\_\_\_

Ο νομάρχης κάλεσε το δήμαρχο και τον πρόεδρο της περιοχής.

\_\_\_\_\_

Σε λίγο θα αρχίσει το μάθημα.

\_\_\_\_\_

Η πόρτα έκλεισε δυνατά.

\_\_\_\_\_

Επικοινωνούμε μαζί σας κάθε φορά που ερχόμαστε στην Κύπρο.

---

**6. Να γράψεις με μια λέξη πώς λέγεται:**

- Ο άνθρωπος από χιόνι: \_\_\_\_\_
- Το κατάστημα που πουλάει κρέας: \_\_\_\_\_
- Αυτός που τρώει χόρτα: \_\_\_\_\_

**7. Να συμπληρώσεις το κείμενο με επίθετα της ίδιας οικογένειας με τα ρήματα αδιαθετώ, κουράζω, ανοίγω.**

Ο Σπύρος ξύπνησε αδιάθετος σήμερα. Η χτεσινή μέρα ήταν πολύ ευχάριστη μα και πολύ \_\_\_\_\_. Στην επιστροφή κάθισε κοντά στο \_\_\_\_\_ παράθυρο του αυτοκινήτου και φαίνεται πως κρύωσε.

**8. Να βάλεις σε αλφαβητική σειρά τις πιο κάτω λέξεις:**

ηλιακός, λεωφόρος, ηλιόλουστος, ηλιαχτίδα, φωτεινός, φωτιά, λεωφορείο.

---

---

## Δοκίμιο στα Ελληνικά (Δ΄ τάξη)-Τελική μέτρηση

Όνομα: .....

Σχολείο:

### Μέρος Α

Αποφασίσατε να οργανώσετε στην τάξη μια έκθεση με τα αγαπημένα σας παιχνίδια. Ο καθένας θα φέρει στην τάξη το αγαπημένο του παιχνίδι και ένα σύντομο σημείωμα που θα το παρουσιάζει στους συμμαθητές του. Για το λόγο αυτό πρέπει να γράψεις τώρα το σύντομο σου σημείωμα. Στο σημείωμα αυτό πρέπει να δώσεις τις παρακάτω πληροφορίες για το αγαπημένο σου παιχνίδι: τι διάλεξες να παρουσιάσεις, εξωτερική περιγραφή, από ποια μέρη αποτελείται, ποια είναι τα χαρακτηριστικά του κάθε μέρους. Ακόμη πρέπει να αναφέρεις πως παίζεις με το παιχνίδι σου και πως νιώθεις για αυτό. Μπορείς να προσθέσεις οποιοδήποτε άλλο στοιχείο θεωρείς εσύ χρήσιμο για να γνωρίσουν οι συμμαθητές σου καλύτερα το αγαπημένο σου παιχνίδι!

---

---

---

---

---

---

---

---

---

---

---

## Μέρος Β

► Διάβασε το κείμενο και κάνε τις εργασίες που ακολουθούν.

### Τα αναποδογυρισμένα ποντίκια

Μια φορά και ένα καιρό ζούσε ένας γεροντάκος που τον έλεγαν κυρ- Ανέστη. Ήταν ένας φτωχός μα ήσυχος και ευτυχισμένος άνθρωπος.

Μια μέρα ο κυρ Ανέστης ανακάλυψε ότι είχε ποντίκια στο σπίτι του. Στην αρχή δεν τον ένοιασε και τόσο. Αλλά τα ποντίκια άρχισαν να γίνονται ολοένα και πιο πολλά ώσπου έφτασε μια στιγμή που δεν μπορούσε να αντέξει άλλο. Πήγε λοιπόν σε ένα μαγαζί και αγόρασε μερικές ποντικοπαγίδες, ένα κομμάτι τυρί και λίγη κόλλα.

Όταν γύρισε σπίτι άλειψε την κόλλα κάτω από τις ποντικοπαγίδες και τις κόλλησε στο ταβάνι. Έβαλε το δόλωμα και κανόνισε να κλείσουν μόλις τα ποντίκια δοκίμαζαν να φάνε τα κομματάκια από τυρί.

Το βράδυ όταν τα ποντίκια είδανε τις ποντικοπαγίδες στο ταβάνι βρήκαν το πράγμα πολύ αστείο. Έσπρωχναν το ένα το άλλο, σήκωναν τα μπροστινά τους πόδια και βλέποντας το ταβάνι ξεσπούσαν σε τρανταχτά γέλια.

Το επόμενο πρωί, όταν ο κυρ Ανέστης είδε πως δεν πιάστηκαν καθόλου ποντίκια στις ποντικοπαγίδες, χαμογέλασε αλλά δεν είπε τίποτα. Άλειψε με κόλλα τα πόδια μιας καρέκλας και την κόλλησε ανάποδα στο ταβάνι κοντά στις ποντικοπαγίδες. Το ίδιο έκανε και με το τραπέζι, την τηλεόραση, το κομοδίνο, ένα μικρό χαλάκι και όλα τα πράγματα που υπήρχαν στο πάτωμα.

Το επόμενο βράδυ, όταν τα ποντίκια βγήκαν από τις τρύπες τους, μόλις κοίταξαν στο ταβάνι πάγωσαν με αυτό που είδαν.



« Εκεί πάνω βρίσκεται το πάτωμα! » φώναξε ένα ποντίκι.

«Βοήθεια, εμείς στεκόμαστε στο ταβάνι τώρα!» φώναξε ένα άλλο.

«Άρχισα να ζαλίζομαι, έχει πάει το αίμα στο κεφάλι μου, θα λιποθυμήσω.»

παραπονέθηκε ένα άλλο ποντικάκι.

«Είναι φοβερό, πρέπει να κάνουμε κάτι και αμέσως μάλιστα!» είπε ο γέρο πόντικας.

Έκαναν όλοι σαν τρελοί. Είχε αρχίσει να τα πιάνει ο πανικός.

« Βοήθεια! Κάντε κάτι, κάποιος γρήγορα!»

« Εγώ ξέρω τι πρέπει να κάνουμε» είπε ο σοφός γέρο-πόντικας. « Αν σταθούμε όλοι ανάποδα με το κεφάλι κάτω, τότε θα στεκόμαστε ίσια.»

Έτσι, όλα τα ποντίκια στάθηκαν πάνω στα κεφάλια τους και σε κάμποση ώρα λιποθυμούσαν από το αίμα που έφτανε στο κεφάλι τους.

Το επόμενο πρωί ο κυρ Ανέστης βρήκε το πάτωμα στρωμένο με αναίσθητα ποντίκια. Γρήγορα, γρήγορα τα μάζεψε και τα έβαλε σε ένα καλάθι.

Έτσι, πρέπει να θυμόμαστε πως ακόμα και αν ο κόσμος μας φαίνεται άνω-κάτω, εμείς να είμαστε σίγουροι πως τα πόδια μας πατάνε στερεά στη γη!

#### **Βάλε σε κύκλο τη σωστή απάντηση σε κάθε μια από τις ερωτήσεις 1-4:**

14. Γιατί ήθελε ο κυρ Ανέστης να ξεφορτωθεί τα ποντίκια;

α) Πάντα μισούσε τα ποντίκια.

β) Ήταν πάρα πολλά.

γ) Γελούσαν πολύ δυνατά.

δ) Του τρώγανε όλο το τυρί.

15. Πού έβαλε ο κυρ Ανέστης τις ποντικοπαγίδες;

α) μέσα σε ένα καλάθο.

β) κοντά στις ποντικότρυπες.

γ) κάτω από τις καρέκλες.

δ) απάνω στο ταβάνι.

16. Τι έκανε ο κυρ Ανέστης μετά που κόλλησε την καρέκλα στο ταβάνι;

α) χαμογέλασε και δεν είπε τίποτα.

β) αγόρασε μερικές ποντικοπαγίδες.

γ) κόλλησε και άλλα πράγματα στο ταβάνι.

δ) Έδωσε λίγο τυρί στα ποντίκια.

17. Ποιες από τις πιο κάτω λέξεις αποτελούν τον καλύτερο χαρακτηρισμό για αυτό το παραμύθι;

α) σοβαρό και λυπητερό.

β) τρομακτικό και συναρπαστικό.

γ) έξυπνο και αστείο.

δ) συγκινητικό και μυστηριώδες.

**Απάντησε τις πιο κάτω ερωτήσεις:**

18. Τη δεύτερη νύκτα που νόμισαν τα ποντίκια ότι στέκονταν; Τι αποφάσισαν τότε να κάνουν;

---

19. Να βρεις και να αντιγράψεις από το κείμενο μια πρόταση που δείχνει τον πανικό που ένιωσαν τα ποντίκια το δεύτερο βράδυ.

---

20. Σκέψου αυτά που έκανε ο κυρ Ανέστης και τα ποντίκια στο παραμύθι.  
Εξήγησε τι είναι εκείνα που κάνουν την ιστορία απίστευτη.

Μέρος Γ

1. Να συμπληρώσεις τον πίνακα σχηματίζοντας τον παρατατικό και τον αόριστο στο ίδιο πρόσωπο με αυτό που είναι τα ρήματα στον ενεστώτα, όπως στο παράδειγμα της πρώτης γραμμής.

Ενεστώτας	Παρατατικός	Αόριστος
παίζω	έπαιζα	έπαιξα
διαβάζει		
σκεπάζετε		
σκορπίζει		
κάθεται		
απολαμβάνω		
παίζετε		
κρύβεσαι		
βιδώνουμε		
απαντούν		

2. Να φτιάξεις μόνο τέσσερις προτάσεις, παίρνοντας κάθε φορά ένα ουσιαστικό και ένα ρήμα, όπως στο παράδειγμα.

αέρας

λεωφορείο

σκυλί

παιδί

σχολεία

ουρανός

φωνάζω

συννεφιάζω

περνώ

φυσώ

κλείνω

δαγκώνω

Παράδειγμα: Ο αέρας φυσά.

Προτάσεις:

α. \_\_\_\_\_

β. \_\_\_\_\_

γ. \_\_\_\_\_

δ. \_\_\_\_\_

**3. Να ξαναγράψεις την κάθε πρόταση μεγαλώνοντάς τη με μια λέξη ή φράση από την παρένθεση που ταιριάζει, όπως στο παράδειγμα.**

(λαμπρός, ζωγραφίζοντας, σε συντρίμια, διψασμένος, σε επιτυχία, το Σαββατοκύριακο, με μεγάλη ταχύτητα, για τη συλλογή μας)

Παράδειγμα: Ο ιππότης φόρεσε μian πανοπλία  
Ο ιππότης φόρεσε μια λαμπρή πανοπλία.

Τα χωράφια ρούφηξαν το νερό.

\_\_\_\_\_

Είχαμε συμφωνήσει να πάμε εκδρομή.

\_\_\_\_\_

Το αυτοκίνητο έτρεχε.

\_\_\_\_\_

Ο σεισμός σάριασε τα σπίτια.

\_\_\_\_\_

**4. Να συμπληρώσεις με τις αντωνυμίες από την παρένθεση που ταιριάζουν και με τις καταλήξεις που λείπουν.**

(ποιοι, εκείνη, κάποιοι, αυτοί, μερικά, ποιοι, εκείνος, αυτός, κάποιος)

- \_\_\_\_\_ Θα είναι στο πάρτι της Αγγελικής; ρώτησε ο Αντρέας τη Σοφία.
- \_\_\_\_\_ φίλ\_\_ της, απάντησε \_\_\_\_\_
- \_\_\_\_\_ είναι \_\_\_\_\_; ξαναρώτησε.
- Τα παιδιά της τάξης μας και \_\_\_\_\_ άλλα ακόμη.

**5. Να μετατρέψεις τις πιο κάτω προτάσεις από τον ενικό στον πληθυντικό αριθμό και αντίθετα.**

Ο τεχνίτης διόρθωσε τη βλάβη της μηχανής.

\_\_\_\_\_

Οι θεατές θαύμασαν την προσπάθεια του αθλητή.

\_\_\_\_\_

Ο νομάρχης κάλεσε το δήμαρχο και τον πρόεδρο της περιοχής.

\_\_\_\_\_

Σε λίγο θα αρχίσει το μάθημα.

\_\_\_\_\_

Η πόρτα έκλεισε δυνατά.

\_\_\_\_\_

Επικοινωνούμε μαζί σας κάθε φορά που ερχόμαστε στην Κύπρο.

---

**6. Να γράψεις με μια λέξη πώς λέγεται:**

- Ο άνθρωπος από χιόνι: \_\_\_\_\_
- Το κατάστημα που πουλάει κρέας: \_\_\_\_\_
- Αυτός που τρώει χόρτα: \_\_\_\_\_

**7. Να συμπληρώσεις το κείμενο με επίθετα της ίδιας οικογένειας με τα ρήματα αδιαθετώ, κουράζω, ανοίγω.**

Ο Σπύρος ξύπνησε αδιάθετος σήμερα. Η χτεσινή μέρα ήταν πολύ ευχάριστη μα και πολύ \_\_\_\_\_. Στην επιστροφή κάθισε κοντά στο \_\_\_\_\_ παράθυρο του αυτοκινήτου και φαίνεται πως κρύωσε.

**8. Να βάλεις σε αλφαβητική σειρά τις πιο κάτω λέξεις:**

ηλιακός, λεωφόρος, ηλιόλουστος, ηλιαχτίδα, φωτεινός, φωτιά, λεωφορείο.

---

---



## Μέρος Β

► Διάβασε το κείμενο και κάνε τις εργασίες που ακολουθούν.

### Γράμμα από τη Θεία Ελένη

Η Ελένη Ιωάννου είναι μία επιστήμονας που εργάζεται στην Ανταρκτική. Διαβάζοντας το γράμμα που έστειλε στον ανιψιό της Νίκο, μπορείς να μάθεις πολλές χρήσιμες πληροφορίες για την Ανταρκτική και τη ζωή εκεί.

Αγαπητέ μου Νίκο,

Ξέρω ότι πάει καιρός να σου γράψω και είμαι σίγουρη ότι έχεις παράπονο. Δυστυχώς, όμως, είναι τέτοια η δουλειά μου, που δεν μπορώ να κάνω διαφορετικά. Αυτή τη φορά δε θα σου πω που βρίσκομαι, θα σε αφήσω να το μαντέψεις μόνος σου. Λοιπόν... βρίσκομαι σε μια ήπειρο, η οποία καταλαμβάνει το ένα δέκατο της επιφάνειας της γης, στο νοτιότερο μέρος του πλανήτη και είναι καλυμμένη από στρώμα πάγου. Ναι, ναι! Σωστά υπέθεσες. Βρίσκομαι στην Ανταρκτική.

Η Ανταρκτική είναι η ψυχρότερη ήπειρος. Έχει, επίσης, την πιο χαμηλή βροχόπτωση, το μεγαλύτερο υψόμετρο και τους πιο δυνατούς ανέμους. Πολύ λίγοι άνθρωποι μένουν εδώ κατά τη διάρκεια του χρόνου. Εμείς οι επιστήμονες μένουμε μόνο για μικρά χρονικά διαστήματα και ζούμε σε ειδικά κατασκευασμένους ερευνητικούς σταθμούς.

Το καλοκαίρι στην Ανταρκτική ξεκινά τον Οκτώβρη και μας αποχαιρετά το Μάρτη. Σ' αυτό το χρονικό διάστημα δε νυχτώνει καθόλου! Είμαι σίγουρη ότι τώρα θα ενθουσιάστηκες μ' αυτό που σου είπα, γιατί ξέρω πόσο γκρινιάζεις κάθε φορά που η μαμά σου φωνάζει να σταματήσεις το παιχνίδι και να πας σπίτι, γιατί έχει νυχτώσει. Πρέπει, όμως, να σου πω κιόλας ότι το χειμώνα, από τον Απρίλη ως το Σεπτέμβρη, η Ανταρκτική βυθίζεται στο σκοτάδι για έξι ολόκληρους μήνες! Πώς σου ακούγεται αυτό;



Νικολάκη μου, δε μπορείς να φανταστείς πόσο κρύο κάνει στην Ανταρκτική! Ειδικά εδώ που βρίσκομαι, στο Νότιο Πόλο, είναι το πιο ψυχρό σημείο της Ανταρκτικής. Το χειμώνα, που η θερμοκρασία πέφτει στο πιο χαμηλό της σημείο, αν ρίξεις στον αέρα ένα ποτήρι με ζεστό νερό, θα παγώσει πριν προλάβει να πέσει κάτω στον πάγο! Για να καταλάβεις, μερικές φορές χρησιμοποιούμε τα ψυγεία, για να διατηρούμε τα δείγματα που μαζεύουμε ζεστά!

Ανέφερα το ψυγείο και ακούω πάλι το στομάχι μου να παραπονιέται... Εδώ δεν υπάρχει τίποτα φρέσκο κι έτσι αναγκαζόμαστε να τρώμε αποξηραμένα τρόφιμα, κονσέρβες ή κατεψυγμένα φαγητά. Τα περισσότερα έχουν απαίσια γεύση. Κάθε φορά, λοιπόν, που αρνείσαι να φας τα φασόλια σου ή τη σαλάτα σου, να θυμάσαι τη Θεία σου την Ελένη, που αναγκάζεται να τρώει τα χειρότερα φαγητά και να μην παραπονιέσαι!

Ξέρεις Νίκο μου, εδώ στην Ανταρκτική δεν είναι και πολύ ευχάριστη η διαμονή μου, όμως, απέκτησα ένα φίλο που μου δίνει πολλή χαρά και ομορφαίνει τις μέρες μου. Είναι λίγο κοντούλης, κυκλοφορεί πάντα με σμόκιν και τον λένε Θεμιστοκλή. Πρόκειται για ένα τρισαγαπημένο πιγκουίνο!

Εδώ στην Ανταρκτική υπάρχουν πάρα πολλοί πιγκουίνοι. Δεν μπορούν να πετάξουν, αλλά χρησιμοποιούν τις κοντές τους φτερούγες σαν πτερύγια για να κολυμπούν. Είναι έξοχοι κολυμβητές! Στη στεριά, περπατούν αδέξια με όρθιο το σώμα ή κινούνται με μικρά πεδηματάκια. Για περισσότερη ζεστασιά, οι πιγκουίνοι μαζεύονται σε κοπάδια στριμωγμένοι ο ένας δίπλα στον άλλο.

Θα πρόσεξες ότι έδωσα στον πιγκουίνο το όνομα του μπαμπά μου... Πεθυμώ πολύ τον μπαμπά μου, όπως και όλους σας. Ελπίζω να βρεθώ σύντομα κοντά σας. Φρόνιμα ζωηρούλη... Σε αγαπώ πολύ!

Σε φιλώ  
η Θεία Ελένη

## Ερωτήσεις

1. Σε ποιο μέρος του πλανήτη βρίσκεται η Ανταρκτική;
-

2. Ποιο είναι το ψυχρότερο σημείο της Ανταρκτικής;

---

3. Σκέψου αυτά που γράφει στο γράμμα της η Θεία Ελένη για την Ανταρκτική.

Δώσε δύο λόγους για τους οποίους οι πιο πολλοί απ' όσους επισκέπτονται την Ανταρκτική αποφεύγουν να πηγαίνουν εκεί την περίοδο μεταξύ Απρίλη και Σεπτέμβρη.

α) \_\_\_\_\_

---

β) \_\_\_\_\_

---

**Βάλε σε κύκλο τη σωστή απάντηση σε κάθε μια από τις ερωτήσεις 4-6.**

4. Η Ανταρκτική είναι το ψυχρότερο μέρος της γης. Ποια άλλα ρεκόρ κατέχει;

α) είναι το πιο ξηρό και συνεφιασμένο μέρος

β) είναι το πιο βροχερό μέρος με τους πιο δυνατούς ανέμους

γ) έχει τους πιο δυνατούς ανέμους και τη χαμηλότερη βροχόπτωση

δ) είναι το πιο συνεφιασμένο μέρος με το μεγαλύτερο υψόμετρο.

5. Γιατί στο γράμμα αναφέρεται ότι « αν ρίξουμε στον αέρα ένα φλυντζάνι με βραστό νερό θα παγώσει πριν προλάβει να πέσει κάτω στον πάγο »;

α) για να μας πει πόσο ζεστό είναι το νερό στην Ανταρκτική

β) για να μας δείξει τι πίνουν στην Ανταρκτική

γ) για να μας πει για τη δουλειά των επιστημόνων στην Ανταρκτική

δ) για να μας δείξει πόσο κρύο κάνει στην Ανταρκτική.

6. Για ποιο πράγμα χρησιμοποιούν οι πιγκουίνοι τις φτερούγες τους;

- α) για να πετούν
- β) για να κολυμπούν
- γ) για να ζεσταίνουν τα μικρά τους

### Μέρος Γ

1. Να μετατρέψεις τις προτάσεις του κειμένου από τον ενικό στον πληθυντικό αριθμό και αντίθετα.

**Παράδειγμα:**

Τα παιδιά μπαίνουν στις τάξεις.

Το παιδί μπαίνει στην τάξη.

Σε λίγο θα αρχίσει το μάθημα.

---

Η πόρτα έκλεισε δυνατά.

---

Επικοινωνούμε μαζί σας κάθε φορά που ερχόμαστε στην Κύπρο.

---

Όταν φώναζες, δεν το σκέφτηκες ότι θα σου βγει σε κακό;

---

2. Να αντικαταστήσεις τις υπογραμμισμένες φράσεις με την κατάλληλη μετοχή.

**Παράδειγμα:**

Ήρθε με χαρά.

▶ Ήρθε χαρούμενος.

Έφυγαν με ενθουσιασμό.

▶ Έφυγαν \_\_\_\_\_

Το είπε με λύπη.

▶ Το είπε \_\_\_\_\_

Παρακολουθούσε με προσήλωση.

▶ Παρακολουθούσε \_\_\_\_\_

Στο σκοτάδι νιώθει φόβο.

▶ Στο σκοτάδι νιώθει \_\_\_\_\_

**3. Να μεταφέρεις τις παρακάτω προτάσεις από τον Ενεστώτα στον Αόριστο και τον Παρατατικό.**

**Παράδειγμα:**

Το ποτάμι κυλάει μέσα από βουνά και πεδιάδες.

Αόριστος: Το ποτάμι κύλησε μέσα από βουνά και πεδιάδες.

Παρατατικός: Το ποτάμι κυλούσε μέσα από βουνά και πεδιάδες.

Απολαμβάνω τις διακοπές μου στο νησί.

Αόριστος: \_\_\_\_\_

Παρατατικός: \_\_\_\_\_

Ο Θανάσης κάθεται σκεφτικός και περίλυπος.

Αόριστος: \_\_\_\_\_

Παρατατικός: \_\_\_\_\_

Παίζετε αμέριμνα στη γειτονιά.

Αόριστος: \_\_\_\_\_

Παρατατικός: \_\_\_\_\_

**4. Ένωσε με μια γραμμή την κάθε φράση της α' στήλης με**

το είδος του επιφωνήματος που ταιριάζει, για να δείξεις τι είδους επιφώνημα είναι.

- |                             |   |              |
|-----------------------------|---|--------------|
| Ποπό! Τι μεγάλο αυτοκίνητο! | • | • Άρνηση     |
| Μακάρι να ερχόταν!          | • | • Απορία     |
| Ουφ! Κι άλλο τρέξιμο!       | • | • Παράπονο   |
| Μπα; Και τι ώρα θα έρθει;   | • | • Ευχή       |
|                             |   | • Κάλεσμα    |
|                             |   | • Θαυμασμός  |
|                             |   | • Παρακίνηση |

5. Να συμπληρώσεις τον πίνακα γράφοντας τα ρήματα, τα επίθετα και τα ουσιαστικά που παράγονται κάθε φορά, όπως το παράδειγμα της πρώτης γραμμής.

Ρήματα	Ουσιαστικά	Επίθετα
βρέχω	βροχή	βροχερός
	αρχή	
		χρήσιμος
αγωνίζομαι		
λυπάμαι		
	χρώμα	
παίζω		
		σκεπτικός

6. Να μετατρέψεις τις προτάσεις από την ενεργητική στην παθητική σύνταξη και αντίθετα.

Παράδειγμα:

Τα σύννεφα σκεπάζουν τον ουρανό.

Ο ουρανός σκεπάζεται από τα σύννεφα.

---

Τα τετράδια διορθώνονται από τους μαθητές.

---

Οι γονείς πήραν τη σπουδαία απόφαση.

---

Τα χωράφια θα εγκαταλειφθούν από τους αγρότες.

---

7. Γράφω στην παρένθεση που βρίσκεται μπροστά από κάθε πρόταση **Κ** (αν η πρόταση είναι Κυριολεξία), **Μ** (αν η πρόταση είναι Μεταφορά) ή **Π** (αν η πρόταση είναι Παρομοίωση).

Παράδειγμα:

(Π) Είναι μαύρος σαν κάρβουνο.

( ) Ο Αλέξης κοιμήθηκε βαθιά.

( ) Τα παιδιά κρέμονται από τα χείλη του.

( ) Το πρόσωπό της έλαμπε σαν ήλιος.

( ) Έχει σκληρή καρδιά.

( ) Το μαχαίρι είναι κοφτερό.

8. Συμπληρώνω τα κενά με την κατάλληλη πρόθεση (αντί, μετά, από, σε).

- Πρώτα θα φας το φαγητό σου και ..... το γλυκό, είπε η μαμά.
- Ανέβηκε από τις σκάλες ..... να χρησιμοποιήσει τον ανελκυστήρα.
- Τα δημοτικά τραγούδια μεταδίδονταν από στόμα ..... στόμα.
- Η Άννα κατοικεί στην Κύπρο, αλλά κατάγεται ..... τη Ρωσία.
- Είναι προτιμότερο να διαβάζεις, ..... να βλέπεις τηλεόραση.
- Έμαθε να παίζει πιάνο ..... μικρό παιδί.

**Ευχαριστούμε πολύ για την προσπάθειά σας.**

**SECOND LOW-INFERENCE OBSERVATION INSTRUMENT (LIO2)**

**(1) ORIENTATION**

<b>(1) ORIENTATION</b>																				
<b>DIMENSIO NS</b>	<b>Instructions for coding</b>																			
Sequence of the activity	Ordinal number of the activity as observed during the lesson.																			
Duration	Duration in minutes.																			
Focus	<u>Relation with:</u> 1. an aim of the lesson 2. the day lesson 3. the unit/number of lessons.																			
Quality	1. typical 2. related to learning 3. students specify the aim(s).																			
Differentiation	Put down the sign V for any type of differentiation you observe.																			



**(2) STRUCTURING**

DIMENSION	Instructions for coding																				
Sequence of the activity	Ordinal number of the activity as observed during the lesson.																				
Duration	Duration in minutes.																				
Focus	<p><u>Relation with:</u></p> <ol style="list-style-type: none"> <li>1. previous lessons</li> <li>2. structure of the day lesson</li> <li>3. the unit/number of lessons.</li> </ol>																				
Quality: clarity	<ol style="list-style-type: none"> <li>1. clear for the students</li> <li>2. not clear for the students</li> </ol>																				
Differentiation	Put down the sign V for any type of differentiation you observe.																				



**(4) NEW LEARNING-MODELLING**

DIMENSION	Instructions for coding																			
Sequence of the activity	Ordinal number of the activity as observed during the lesson.																			
Duration	Duration in minutes.																			
Focus	1. can be used in the lesson only 2. can be used in the unit 3. can be used across units.																			
Quality: teacher 's role	1. given by the teacher 2. guided discovery 3. discovery																			
Quality: appropriateness of the model	1. successful. 2. not successful.																			
Differentiation	Put down the sign √ for any type of differentiation you observe.																			

### (5) QUESTIONING TECHNIQUES

DIMENSIO NS	Instructions for coding																			
Sequence of the activity	Ordinal number of the activity as observed during the lesson.																			
Waiting time	Time given before answering																			
Focus	<p><u>Relation with:</u></p> <ol style="list-style-type: none"> <li>1. only a specific task</li> <li>2. the whole lesson</li> <li>3. the unit/a number of lessons.</li> </ol>																			
Quality: type	<ol style="list-style-type: none"> <li>1. product</li> <li>2. process.</li> </ol>																			
Quality: reaction if no answer from pupils (in case there is an answer put an X).	<ol style="list-style-type: none"> <li>1. restate (easier words)</li> <li>2. pose an easier question</li> <li>3. move to another question or answers the question him/herself.</li> </ol>																			
Quality: feedback-reaction to student	<ol style="list-style-type: none"> <li>1. negative comment to incorrect and partly correct answers.</li> <li>2. positive comment to correct answer only.</li> <li>3. positive comment to correct answer</li> </ol>																			

	and constructive comments to incorrect and to partly correct answers. 4. no comments.																			
Quality: feedback - reaction about the answer	1. teacher ignores the answer. 2. teacher indicates that the answer is correct or partly correct or incorrect. 3. students are invited to give comments on the answer.																			
Differentia tion:	Put down the sign V for any type of differentiation you observe.																			

CHRISTINA IOANNIDOU

### HIGH-INFERENCE OBSERVATION INSTRUMENT

**Observer's Name:** .....

**Teacher's Name:** .....

**DIRECTIONS:** Use the scale to note the extent to which you agree with the following statements. (*Scale: 1:Minimum point .... 4: Maximum point*).

	STATEMENT	MINIMUM POINT				MAXIMUM POINT
	The orientation activities that were organized during the lesson helped students understand the new content.					
	The teacher explained how each activity served in fulfilling the aims of the lesson.					
	The teacher explained the structure of the lesson in a way that was clear for the pupils.					
	The teacher explained how the lesson of the day was linked to previous or to subsequent lessons of a unit.					
	The teacher asked pupils to discover the purpose of doing specific activities.					

	The teacher explained how the different activities were linked to each other.					
	The teacher posed questions to link the lesson of the day with previous or subsequent lessons.					
	The teacher posed revision questions to examine what pupils had understood from the lesson of the day.					
	The lesson transited from easier to more complex activities.					
	The observed application activities referred (were linked) to the whole lesson.					
	The observed application activities referred (were linked) to certain parts of the lesson.					
	The observed application activities referred (were linked) to previous lessons as well.					
	The application activities were nothing else but a replication of the activities that were organized during the presentation of the new content.					
	The teacher asked pupils to deal with application exercises that were more demanding than those used for teaching the new concept.					
	The teacher organised application activities that resulted in something that could be exploited for new learning.					
	The teacher used to differentiate the application exercises that s/he gave to the pupils, according to their					

	abilities.					
	The teacher spent the teaching time on learning activities.					
	The teacher challenged pupils to express their opinions on certain issues.					
	During the lesson, the teacher gave only to some pupils the opportunity to participate in the lesson.					
	The teacher encouraged pupils to co-operate with each other.					
	During the lesson, pupils co-operated on their own initiative.					
	Each pupil was engaged in individual work assigned to him/her by the teacher.					
	The teacher encouraged competition between pupils.					
	The teacher was interacting with pupils for the whole of the lesson.					
	During the lesson, some pupils were co-operating with each other while others did not.					



	Pupils interacted with each other during the whole of the lesson.				
	Interaction between pupils contributed in achieving the lessons goals.				
	The teacher discouraged the negative aspects of competition.				
	There was pupil misbehaviour in the form of verbal harassment during the lesson.				
	There was pupil misbehaviour in the form of serious verbal harassment during the lesson.				
	There was pupil misbehaviour in the form of bodily harassment without putting others in danger during the lesson.				
	There was pupil misbehaviour in the form of bodily harassment putting others in danger during the lesson.				
	The lesson was interrupted by the misbehaviour of some pupils.				
	The teacher was forced to make remarks to some students because they were talking to each other.				

	In the case of misbehaviour in the classroom, the teacher ignored it deliberately.					
	In the case of misbehaviour in the classroom, the teacher reacted and temporarily solved the problem.					
	In the case of misbehaviour in the classroom, the teacher reacted and managed to solve the problem.					
	In the case of misbehaviour in the classroom, the teacher reacted but did not manage to solve the problem.					
	The lesson was interrupted by external factors.					
	The aims that the teacher had set before the lesson were met during the 40-minute period of the lesson.					
	The activities that were organised during the lesson helped each pupil to advance conceptually, according to his/her abilities.					
	The majority of pupils were engaged in activities that were provided by their teacher.					
	During the lesson the majority of the pupils were on task.					
	Less able pupils considered the lesson activities as					

	very difficult.					
	More able pupils considered the lesson activities as very easy.					
	The teacher used to pose questions that were clear for the pupils in terms of their content.					
	The teacher used to correct pupils' misconceptions using their wrong answers.					
	When teacher posed a question that was not clear for the pupils, she/he used to rephrased (restate) it.					
	When teacher posed a question that was not clear for the pupils, she/he used to pose a simpler question to help pupils find the answer.					
	Pupils were puzzled by the procedures or strategies that the teacher presented to them for overcoming problematic situations.					
	When pupils faced certain learning obstacles or were confronted with a problematic situation, the teacher used to provide them with useful procedures or strategies for overcoming them.					
	The procedures or strategies that teacher presented to the pupils to help them overcome the problematic situations they faced can be used in other lessons as well.					

