



University
of Cyprus

UNIVERSITY OF CYPRUS

DEPARTMENT OF EDUCATION

**A LONGITUDINAL STUDY ON THE IMPACT
OF INSTRUCTIONAL QUALITY ON STUDENT
LEARNING IN PRIMARY SCHOOLS
OF MALDIVES.**

DOCTOR OF PHILOSOPHY DISSERTATION

HAWWA SHIUNA MUSTHAFA

2020



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OF MALDIVES**

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

December 2020

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VALIDATION PAGE

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Doctoral Thesis Title: A longitudinal study on the impact of instructional quality on student learning in primary schools of Maldives

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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.

Hawwa Shiuna Musthafa

STATEMENT OF INTERNATIONAL WORK

The present doctoral dissertation presents the results of an international study with the participation of the author's home country - the Republic of Maldives. Therefore, the contribution of the country towards this research is appreciated and acknowledged.

School selection, tests and questionnaire administration as well as data entering in Maldives were conducted by the author (Hawwa Shiuna Musthafa). Data processing (i.e., cleaning, recoding data and statistical analyses presented in this doctoral dissertation was performed by the author with the assistance of Dr. Leonidas Kyriakides (research supervisor) at the University of Cyprus. Therefore, his assistance and support are greatly appreciated.

Abstract

One of the most important findings of educational effectiveness research is the prominence given to student and teacher (classroom) level factors that directly impact and lead to student learning. In accordance, the Dynamic Model of Educational Effectiveness (DM) was introduced as a result of the comprehensive research works undertaken on educational effectiveness research. Hence, in this research, primarily, the conceptual framework of the DM is used to find the factors and search for stages of effective teaching that impacts student learning in the Maldives.

The DM refers to the factors operating at four levels: student, teacher (classroom), school, and the educational system. However, this study seeks to identify factors operating only at the student and teacher (classroom) level. At the teacher (classroom) level, the model refers to eight factors related to teachers' behaviour in the classroom (i.e., *orientation, structuring, questioning, application, teaching-modelling, management of time, classroom as a learning environment* and *assessment*). The model assumes that each of the above factors can be defined and measured using five dimensions of *frequency, focus, stage, quality* and *differentiation*.

The Dynamic Model's instruments have been validated in various studies across the world. These instruments provide empirical support to the validity of this measurement framework. They also reveal that student and teacher (classroom level) factors are connected to student learning. The instruments of the DM have not been used in the Maldives before. Hence, the main aim of the study is to determine if the factors and dimensions of the DM operating at the student and teacher (classroom) level can be detected in primary classrooms in the Maldives

and whether they have an impact on student learning.

A multi-stage sampling procedure was used in the collection of data. The sample consisted of grade 4 students ($N = 350$) and class teachers ($N = 31$) from 8 primary schools in Male', the capital city of Maldives. Written tests were administered to students in term 1 and at the end of term 2 for the year 2018 - 2019. Data was also collected on additional student background factors (for example., socio-economic status, students' perception of importance of studying, parental involvement in students' study behaviour, students' trust in parents, and further tuition help). Data was also collected on teachers' background factors (such as teachers' age, qualification and years of experience). One high-inference, the second low-inference observation instrument, and the student questionnaire from the DM were used in collecting data on instructional quality of teachers. In addition, an observation tool of differentiated instruction was also used in order to check if additional factors of differentiation could be captured.

The multilevel analysis revealed associations with teaching effects and student learning. The data that emerged from the student questionnaire, second low-inference and the high-inference instruments were able to identify and associate teacher factors with student learning. However, the data from the differentiated instruction instrument did not capture any teaching effects on student learning. It was also revealed that student background factors did not have a significant effect on their learning. In addition, it was also revealed that, with the exception of teachers' age, the teachers' background factors did not have a significant effect on student learning.

Based on the results, it can be concluded that both factors and dimensions of the DM are significant in developing context in a Maldivian classroom. The importance of using theory driven observation instruments to measure the impact

of teaching on student learning in a small island nation like the Maldives is also discussed. The implications for theory and practice on educational effectiveness and quality are drawn.

The study also identified different stages of teaching in a Maldivian classroom. The results indicated that different teaching factors and dimensions can be grouped into six types of teacher behaviour stages that are identified in a Maldivian classroom and that which are distinctive from one stage to the other. The grouping of factors and dimensions into different stages showed that teachers' teaching skills progressed from stage to stage starting with showing more direct teaching behaviour and moving towards more advanced and differentiated teaching behaviours. In the advanced teaching stages, it was also revealed that teachers used newer, constructivist and differentiated approaches to teaching. Implications for the identification of stages of teaching on teachers' professional development are drawn.

Acknowledgments

By the grace of the Almighty, completing this PhD programme has been a rewarding experience. I am eternally grateful for all the support and motivation that I have received throughout this journey of completing this programme.

First and foremost, I would like to express my sincere gratitude to Professor Mary Koutselini of University of Cyprus for her initial supervision in carrying out the present study. I would like to thank her for her supportive attitude and constant encouragement in the beginning of my studies in the University of Cyprus. Next, I would like to extend my sincere and utmost gratitude to Professor Leonidas Kyriakides, my research supervisor, for being with me every step of the way in the successful completion of this research. Ever since I have known him from 2011, it is his exceptional skill set and exemplary teaching passion that got me interested in the present research work that I have undertaken. He is one of the most knowledgeable and considerate professionals I have come across. I would not have been able to complete this journey so holistically without his unending support. I would also like to acknowledge and thank Dr. Andria Demosthenous, research scientist at the University of Cyprus, for all the trainings that she has conducted on how to use the instruments and the various softwares in the present study and also for aiding me in the stages of data cleaning and analysis. I thank her immensely for the constant support and all the valuable lessons I have learned from her.

I am grateful to my mother, Aminath Rasheeda. Without her encouragement and support, this journey would have been a difficult one. I'm also grateful to my husband, Kameel Didi, and my two children Arya and Mekael for their support at different stages of the completion of the research.

I thank all the school Principals, teachers and students who gave me their constant support in the successful completion of this research work. Finally, I would like to express my sincere gratitude to all others who have helped me directly or indirectly in the successful completion of this research work.

Hawwa Shiuna Mustafa

This thesis is dedicated to my parents Aminath Rasheeda & Musthafa Waheed, my husband Kameel Didi and my children Arya Kameel & Mekael Kameel, for their everlasting love through and through.

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CHAPTER 1

INTRODUCTION TO THE STUDY

This chapter presents an overall view of this study. Chapter 1 will mainly focus on the research background particularly focussing on the progress, developments and the advancements in Educational Effectiveness Research (EER) to date. This is followed by the main aims and objectives of the study together with the research questions that this study seeks to answer. Next, the theoretical contribution and the significance of the study are discussed. Finally, a brief summary of the study is provided. The chapter concludes with a brief description of how the thesis will be structured.

Educational Effectiveness Research (EER) mainly focusses on identifying and attempting to isolate those factors that explains why some students do better than others in a classroom. EER also focusses on finding answers as to why teachers differ in their effectiveness from one school to another. EER has great many accolades accounting to it's research works undertaken on its many methodological aspects (Goldstein, 2003; Creemers, Kyriakides & Sammons, 2010) and also theoretical aspects (Levine & Lezotte, 1990; Scheerens & Bosker, 1997).

EER is a widely researched area of interest among academic researchers. Among EER, research on teacher instructional behaviour and its connections to student learning has been studied and debated extensively among scholars and researchers. Research works undertaken over the past decade shows teachers' teaching effects on students as one of the most compelling and impelling factors in student learning and over all their lifelong achievements or accomplishments (Nye, Konstantopoulos & Hedges, 2004). Factors such as teachers' instructional

behaviour and effective classroom management skills plays a very crucial role on on student learning (Thomas, Kyriakides, & Townsend, 2016). Adhered to the aforementioned research area, the main research question this research seeks to answer is: what are the factors and stages of effective teaching in a Maldivian classroom. The terms “effective teaching” and “quality instruction” and likewise “student learning” and “student achievement” are synonymously used in this research.

The teacher effectiveness research dates back to the 1960’s where researchers like Coleman et al (1966), found that there is not much variance in student achievement that can be explained by educational factors. Many of the earlier studies (as cited in Bowman, 1991), refuted that schools make a difference. However, starting in the 1980’s, studies started to give evidence that schools does matter in explaining student achievement. The newer researchers introduced more comprehensive, integrated models and systems that explained the school and teaching effects on student achievement (Creemers, 1994; Stringfield & Slavin, 1992). After the 1990’s and the beginning of 2000, the focus of educational effectiveness turned to the dynamics of education, focussing more on student achievement and it’s complexity in factors operating at both school and classroom level (Kyriakides, 2008). Since then, many of the researchers from developed countries are more centered around finding factors at the teacher and classroom level that can determine student learning (Townsend, 2007). Studies originating from the 1980’s have argued that both school and teacher factors matter in producing better student achievement. By the end of the 1980’s and beginning of the 1990’s the research focus shifted to more on integrated models of finding educational effectiveness and the different variations that are evident in student achievements (Creemers, 1994a). After the 1990’s and the beginning of the 2000’s,

the shift became more on studying the complex nature of the whole teaching and learning process (Kyriakides, 2008).

Dynamic Model of Educational Effectiveness (DM) challenges to explain the dynamic relations between the multiple factors that are associated with educational effectiveness (Sammons, 2009). The DM provides an illustration of a measure of teacher effectiveness driven by dynamic development. The DM deals with factors operating at different levels of educational effectiveness (Creemers & Kyriakides, 2008). Therefore, using the conceptual framework of the DM at the student and teacher (classroom) level, this study on hand will use a longitudinal research design with two testing points, and in addition, use complex statistical analysis such as multilevel modelling techniques, to identify the factors and stages of effective teaching in a Maldivian classroom.

The Dynamic Model's factors and dimensions operating at the student and classroom (teacher) level, was thus, chosen to provide a basis for this study. Additional variables such as students' perception of effective teaching, students' demographic data such as socio-economic status (SES) are also taken into consideration to search for effects on learning. It is important to highlight that no research based on a theoretical model has been done to identify factors and stages of effective teaching in the Maldives. Thus, one of the most important aims of this research is to determine the various stages of effective teaching and the factors that contribute to student achievement in a Maldivian classroom. In this respect, the study is first of its kind in the Maldives and therefore, the study will contribute to theory of EER from the standpoint of the island nation: The Republic of Maldives.

The Dynamic Model operates on the assumption that the student and teacher (classroom) factors can be categorised in terms of the five dimensions of *frequency*, *focus*, *stage*, *quality* and *differentiation*. Many studies have been conducted in

different parts of the world that tested the main assumptions of the Dynamic Model regarding factors operating at classroom level (e.g., Kyriakides et al., 2009; Kyriakides, Archambault, & Janosz, 2013; Antoniou & Kyriakides, 2011; Christoforidou et al., 2014; Creemers et al., 2013a; Azkiyah et al., 2014; Panayiotou et al., 2014; Azigwe et al., 2016; Vanlaar et al., 2016; Kyriakides et al., 2017). All the above studies testified for the construct validity of the model for each of the five dimensions of *frequency*, *focus*, *stage*, *quality* and *differentiation* and the eight teacher factors of *orientation*, *structuring*, *questioning*, *teaching modelling*, *application*, *teachers' role in making classroom a learning environment*, *management of time* and *assessment* (Creemers & Kyriakides, 2006) which were also linked to student achievement. Research shows that students who are in classes where the teacher is of lesser caliber significantly showed lower achievement than those assigned to highly effective teachers (Sanders & Rivers, 1996). According to Wendel (2000), the effects of a bad teacher with her poor teaching skills can have negative impact on the students' well-being even long after the student has left the school. In these respects, the importance of a teacher and her teaching skills can neither be minimised nor compromised. The next section will provide an overview of the research purpose and aims.

Research Purpose and Aims

The study on hand will use two frameworks of teaching effectiveness, however, the Dynamic Model of Educational Effectiveness (Kyriakides, 2008) will be used as the primary measure for detecting teaching effects and identify the stages of effective teaching. An observation key for differentiated instruction (Valiandes, Koutsolini, & Kyriakides, 2011), will also be used as a subordinate observation tool to see if it could capture additional data on differentiation. The

study uses a longitudinal design with data sets measured at two check points. Advanced statistical techniques such as multilevel modelling will be used in order to identify the teacher effects on students' learning in English reading comprehension and writing skills. In addition, the study attempts to identify the unique stages of effective teaching in the Maldives through cluster analysis and multilevel modelling techniques. By using the Dynamic Model of Educational Effectiveness (Kyriakides, 2008), and the Differentiation Model of Instruction (Valiandes, Koutsolini, & Kyriakides, 2011), the broader aim of the study is to determine if these models are deemed appropriate in a Maldivian classroom and detect the effects of teaching and additionally identify the stages of effective teaching. The impact on student learning is then drawn from the teacher effects and decide if the models were relevant to the Maldivian context. With these broader aims, the research objectives are covered in the next section.

Research Objectives

The main research objectives of the study are as follows:

1. To identify the factors / dimensions of effective teaching and its impact on student learning in a Maldivian classroom.
2. To identify the stages of effective teaching in a Maldivian classroom.
3. To check if there are any overlaps in the use of Dynamic Model and the Differentiated models as tools of observation.
4. To determine whether the Dynamic Model and the Differentiated Model were relevant to the Maldivian context.

Research Questions

With these research objectives in mind, this research seeks to find answers

for the following research questions:

1. What are the factors and dimensions of effective teaching identified in a Maldivian classroom?
2. Are the factors and dimensions able to detect teaching effects on student learning outcomes?
3. What are the stages of effective teaching in a Maldivian classroom?
4. Are there any overlaps in the use of Dynamic Model and the Differentiated Model as tools of observation?
5. Were the Dynamic Model and the Differentiated Model relevant to the Maldivian context?

Contribution to the Theory

The main aim of this study is to investigate the factors and stages of effective teaching in a Maldivian classroom through the Dynamic Model and the Differentiation model. It is hoped that this study opens avenues to establish a theory driven and evidence-based approach to improving the system of education across different schools in all islands of the Maldives.

The DM is concerned with student learning irrespective of region and context. Therefore, through this research conducted in the Maldives, will reveal whether the models are able to detect effects of effective teaching in the Maldivian socio-cultural setting context. There have been many studies that are conducted worldwide in the past few decades that identified factors that may affect student learning outcomes irrespective of the context or subject (Peaker, 1975) such as quality in education (Heyneman & Loxley, 1983) which has formed as one of the most important constructs that have started to be seen as a matter of critical importance. The aim is to detect effects of teaching across the factors and

dimensions of the model and in addition, identify stages of effective teaching in the Maldives. The findings will then reveal how and what are the factors and stages of the Dynamic Model and the Differentiated Model that are associated with student learning in the Maldives. This would pave path at the student and teacher (classroom) level to explain how and what factors in one context may infact not work in another (Reynolds, Stringfield & Schaffer, 2006).

This study uses advanced statistical analysis (for example., multilevel modelling techniques) in identifying the factors and stages of effective teaching in the Maldives. To the knowledge of the researcher, there have been only cross-sectional designs, studying isolated teaching effects on student learning therefore, it is vital to determine the teaching stages and factors, based on a model that contributes to learning outcomes (Lenkeit, 2013). Attention is also paid to collect data at two measurement points. As mentioned earlier, the study will use multilevel modelling approaches considering the multilevel structure of education (Creemers & Kyriakides, 2010b). This in turn will lead to identifying more valid data on the factors and stages of effective teaching in the Maldives. Research on Value Added Models (VAM) shows the contribution that each teacher provides in a given point of time, which can then be compared to the performance measures of other teachers by isolating various factors in the teaching and learning domain. This, in turn, will enable detecting school or teacher effects on student learning outcomes (Lomax & Kuenzi, 2012).

Another very important contribution of this study for Maldives is the pathway it will create to establish centrally valid instrument based on the theory driven evidence-based approach for measuring teacher behaviour in the classroom and overall, the school. Due to the complex nature of connections between effectiveness and student achievements, this study would definitely broaden the

knowledge of educational effectiveness. The identification of stages of effective teaching is another contribution to teacher effectiveness literature and theory. The study would also contribute to the methodological advancements made in the field of EER in the last few decades.

Doing a search on the internet will show how under represented developing countries are in EER and related research and literature (Thomas, Kyriakides & Townsend, 2016). Such is the case in the Maldives too even though the Maldives transitioned from developing country status to a middleincome status in 2011 through the expansion of the tourism sector (Sareer, 2013). It is important to identify through international studies and researches undertaken in different countries and contexts to check what works and what does not as effective teaching factors. By identifying the different factors and stages of effective teaching in a Maldivian context and comparing those that are recognized as effective worldwide, it is hoped there is enough evidence to showcase that there are certain generic characteristics in teaching and learning that works irrespective of country, context or student differences.

One of other concerning factors discussed among researchers is the lack of statistical power in order to identify the true effects of factors of effectiveness. This can be rectified by increasing the variations at the classroom level (Kyriakides, 2005b). The validation of existing EER models is also possible through international research undertakings especially in the Asian region which will assist in building up a stronger theoretical framework to identify the factors for student achievement in an island nation such as the Maldives.

Another important point to highlight here is that, studies that have been undertaken have one very specific limitation that is the cross-sectional nature of most effectiveness research works undertaken. This means that they look at the

students' academic achievements at one specific time period and not over a period of time. This becomes a lesser, value-added approach to studying effectiveness and beside other teaching factors such as the school and classroom procedures are not accounted for (Reynolds, 2006). Therefore, the provision of evidence-based ways to increase student achievements is severely lacking in cross-sectional studies (Gustafsson, 2007). Hence, the advantage of this research undertaking is that this is the first study that have been conducted in the Maldives, collecting data on two measurement points and using multilevel modelling techniques to analyse data across different schools in the capital city Mal'e, thus, this a better design as compared to a cross-sectional one.

In the next section, the significance of the study will be discussed in detail.

Significance of the Study

One of the important questions that arise quite often in EER is, how does effectiveness operate on different levels of the system i.e., at the student, teacher (classroom), and school levels and in turn, how does these factors contribute to improvement in student learning outcomes. In this study, one of the main aims is to identify those factors that operate at the teacher (classroom) level and in turn, how these effects student learning in the context of Maldives. As a next step, the study then, seeks to identify the stages of effective teaching in a Maldivian classroom.

The DM has been tried and tested across many European countries including Belgium/Flanders, Cyprus, Germany, Greece, Ireland, Canada and Slovenia (Panayiotou et al., 2016; Vanlaar et al, 2015; Kyriakides et al, 2013). Many studies have been conducted in parts of Europe and also Africa to test the validity and reliability of the DM (e.g., Antoniou & Kyriakides, 2011; Creemers &

Kyriakides 2010; Demetriou & Kyriakides, 2012; Creemers & Kyriakides (2008); Kyriakides & Creemers, 2009; Kyriakides et al., 2010; Kyriakides et al., 2013; Panayiotou et al., 2014; Vanlaar et al., 2016; Azigwe et al, 2016). All of the above studies testified for the validity of the model including the construct validity for each of the five dimensions of *frequency*, *focus*, *stage*, *quality* and *differentiation*. The eight teacher factors of *orientation*, *structuring*, *application*, *modelling*, *questioning*, *the classroom as a learning environment*, *management of time*, *teacher assessment* was also linked to student achievements by the above studies conducted worldwide.

The studies addressed many of the aspects pertaining to what effectiveness is at teacher (classroom) and student level. Therefore, the transferability of research findings of teaching practices as deemed effective in other countries can be accepted in a Maldivian context too. For example, in case a factor is not found to be statistically significant in one country may conclude that it is not associated with learning, and thus, might not be deemed a priority for improvement but a factor that is found to have a large impact on student learning but its functioning is not satisfactory could constitute a basis for setting improvement priorities and creating improvement action plans.

Furthermore, this study gives the opportunity to investigate and explain differences in the added value of education, for which the collection of data from different countries is a prerequisite. Collection of data about quality of teaching will establish variation in the functioning of the factors and dimensions of the DM. This will allow for the measurement of their impact on quality in instruction.

In the next section, a summary of the whole study will be presented.

Study Summary

It is important to set check points, to measure learning in students, not just at one but at different points and from different angles. For example, factors such as prior achievement, quality of school, quality of teacher, and community student interconnections can be set as checkpoints (Lenkeit, 2013). Value Added Models (VAM) show the effects of multiple factors in education (Kyriakides, 2007). This can even isolate school or teacher effects on student learning (Lomax & Kuenzi, 2012). In this study, a strategy was adopted using the features of a longitudinal design collecting student results from a test administered for English in term 1 and at the end of term 2 constituting one school academic year (i.e., 2018 -2019). The sample consisted of grade 4 students from 8 primary schools in the capital city of Maldives. (i.e., Male'). Malé is one of the most densely populated capital cities in the world with a third of the country's population living within two square kilometres. In contrast, the rest of the inhabited islands have population of less than 1000 people (as cited in Di Biase, 2019). All the data that was collected were mainly based on the Dynamic Model of Educational Effectiveness. Data about teacher behaviour was also collected through the observation instrument of the Differentiation Model of Instruction (Koutselini, Valiande & Kyriakides, 2011). This instrument was used as a subordinate observation tool to see if this key could capture additional data on differentiation or if there are any overlaps in the use of the Differentiated Model and the Dynamic Model. Observations using the four instruments (i.e., high inference observation instrument, second low - inference observation instrument and the student questionnaire from the Dynamic Model; the differentiation instrument from the Differentiated Model). Additional data of teachers (for example, teachers' age, experience and qualification), additional data from students (for example, students' socio-economic status,

student perceptions on the importance of studying, parental involvement in students' study behaviour, students' trust in parents and tuition help) were also collected in order to check effects on student learning. After that, the data was rigorously analysed, using multilevel modelling techniques to check effects on student achievement in English language comprehension and writing skills. By using multiple techniques, teacher effectiveness factors could be captured from multiple angles. Implications are then drawn from the findings of this research.

In the next section, the structure of the whole thesis is presented chapter wise, for the ease of the reader.

Thesis Structure

This thesis is made of 5 chapters. Chapter 1 is the introduction to the research study with special focus on research background, the research purposes, aims, objectives and questions. Next, the significance of the study is highlighted together with the contribution to the body of knowledge on educational effectiveness research.

Chapter 2 consists mainly of a comprehensive review of literature of EER. The main focus of the review would be based on the theoretical framework on which the present study is based i.e. The Dynamic Model of Educational Effectiveness (DM). Highlights are once again made regarding the main purposes of the study. In the literature review, the literature on EER is presented from the past to date. A brief overview of previous studies in the field of EER are also presented with special focus paid to studies on students and teacher (classroom) factors that have an impact on student achievements. A section is also presented on the findings of the stages of effective teaching that has been identified in many parts of the world. The structure of stages of teaching and its implications on student learning and teachers' professional development are also drawn through the review.

Next, Chapter 3 mainly focuses on the research methodology whereby, a detailed description of the phases of the study including sampling and data collection is provided with special reference given to the data collection instruments and the advanced statistical techniques used to analyse the data.

Then, Chapter 4 is concerned with the analysis of the data. The research questions are revisited once again, in order to check if they have been satisfactorily answered.

Finally, in the last chapter of the study, Chapter 5, the results emerging from

the analyses are discussed, with reference to each research question and to the overall aims of the study. Limitations of the study are listed. Implications are then drawn with suggestions for further research.

The next section comprises the chapter 2 of this thesis where a detailed review of related literature will be presented.

CHAPTER 2

LITERATURE REVIEW

Introduction

The literature review targets to describe the theoretical framework that is related to the study's main purpose. Therefore, the study aims to provide a broader understanding of the concepts that has been outlined. In addition, provide associations with the previous studies conducted in the field of EER. By this literature review, a framework for analysis is created to closely examine the research questions as stated in Chapter 1.

While undertaking any research, it is important to review the literature on the topic on hand. Thus, an attempt has been made to review the researches that has been undertaken on teacher effectiveness. This literature review is divided under several subheadings. As a first step, a detailed review on teacher effectiveness research from past to present is described. Second, all of the theoretical advancements made in the field of EER are then discussed in detail. Next, some of the most influencing educational effectiveness models are also presented. The fourth step in this review, is to look in great detail at the conceptual framework followed for this research undertaking i.e., the Dynamic Model of Educational Effectiveness. Special attention is given to researches based on the same. The fifth step was to look at the main features of the Dynamic Model and in particular the teacher (classroom) level factors (i.e., *orientation, structuring, application, modelling, questioning, the classroom as a learning environment, management of time and teacher assessment*). The measurement dimensions of the Dynamic Model (i.e., *frequency, focus, stage, quality and differentiation*) are also studied. This forms the basis to the study and attempts are made to validate the

assumptions of the Dynamic Model of Educational Effectiveness. Next, the various research works that has been undertaken in order to test the validity and reliability of the Dynamic Model were also reviewed. An overview is also given to the Differentiated Model instrument as this is also an instrument that was used in this study in order to check if additional differentiation factors can be captured through this instrument. The various studies that have been conducted to identify the stages of effective teaching are also discussed. The research took place in the Maldives and hence, a brief introduction to the Maldives is given, followed by a detailed review of related researches to effective teaching within the Maldivian context.

It's a common consensus among academic researchers that teachers are one of the most important resources that determines the success of the students not only in their academic life but even in students' life time achievements (Chetty, Friedman & Rockoff, 2014). Thus, teacher effectiveness research has always placed great emphasis on the teacher from past till date. Goe (2007) explains teacher effectiveness in terms of the growth of students that can be typically measured by standardized assessments through student growth percentile (SGPs) and Value-Added Measures (VAMs). The collective research work by Chetty, Friedman & Rockoff (2014) concluded that students who had been taught by highly effective teachers were more likely to finish tertiary education, earn more, live in higher income neighbourhoods and also are more likely to save money for retirement. Thus, the role of a highly effective teacher cannot be diminished, making it necessary to understand the factors that contribute to teacher effectiveness in the teacher (classroom) level. Hence, one of the main emphasis of teacher effectiveness research, is a continuous inquiry of classroom factors that could explain and have an impact on student achievements (Scheerens, 2014). In the next section, a review is made on teacher effectiveness research works

undertaken from past to present.

Education Effectiveness Research: From past to present

Research in the area of teacher effectiveness has had a long history of inquiry (Doyle, 1975). More and more researchers are coming up to explore the determining factors that would make up an effective teacher. Many researches have explored the variable of student achievement as one among the most important and inevitable factors in deciding who an effective teacher is. One of the most comprehensive studies conducted on teacher effectiveness research that gave birth to the Dynamic Model of Educational Effectiveness was undertaken by the joint effort of researchers (for eg., Kyriakides et al., 2009).

Before we go into the details of the Dynamic Model, it is important to highlight the different phases of teacher effectiveness research that paved path for the birth of the Dynamic Model. The research conducted by Campbell et al. (2003, p: 348-349), highlighted a four-part study of the different phases of teacher effectiveness research. The following section highlights the evolution of teacher effectiveness research from past to present.

The first phase of the birth of the teacher effectiveness research was between 1930's to 1940's which highlighted the presage - product teacher factors in determining teacher effectiveness. In this phase, an attempt was made by researchers to systematically find the psychological characteristics that makes up an effective teacher (for example, aptitude, personality and attitude of the teacher). Presage refers to the main characteristics of a teacher from her qualifications to experience. During the second phase (i.e., between 1940 and 1960's), there was a shift in focus from psychological characteristics of an effective teacher to a more

of the teaching methods that are employed by effective teachers.

In the third phase, (i.e., between 1960 and 1980's), there was once again, a major shift in research inquiry from teaching methods to a more of a process - product variable inquiry. The focus shifted to more on pupils' achievement that was being studied in relation to teacher behaviour in the classroom. Product variables are more or less defined in terms of learning outcomes or achievements of students after the teaching has taken place in the classroom. However, the process is the actual teaching phase where interactions takes place in the classroom pertaining to teaching and learning subject content (Seidel & Shavelson, 2007). Next, during the 1990's, the research focus shifted to inquiry about teachers' subject expertise and pedagogy. Similar to the previous phase, during this fourth phase also, teachers' pedagogical and subject expertise was correlated against student achievements. A study conducted by Kyriakides (2005), concluded that the presage - product studies, although could point to some features that can be considered as effective in teachers, it did not, overall, draw on the psychological factors such as "personality" and "thinking style" that could have a direct impact on student achievements. Another study conducted by Brophy & Good (1986) looked at the teaching methods and if changes in the teaching methods could produce better student achievements. However, the results of this research proved there was no significant correlation between the two. Hence, these research-based methods started to lose its' momentum.

However, the process - product model started to gain more and more popularity with research yielding more reliable data on how effective teachers are shown to use a wide variety of teaching behaviours at appropriate times pinpointing that many of these instructional procedures lead to better achievements in students

(Magliaro, Lockee, & Burton, 2005). In addition, the teaching behaviours comprising of direct instruction were deemed as the most effective for keeping students on task (Graham & Heimerer, 1981). The process - product model was mainly focussed on teacher behavior in the classroom and its' impact on student achievements (Doyle, 1975). It was also pointed out that teachers who produced better achievement results in students, used the same, if not, similar set of instructional behaviours in the classroom (Archer & Hughes, 2011; Good, Biddle, & Brophy, 1976; Rosenshine, 1986; Yates, 2005; Westwood, 1996; Rosenshine 2008). Thus, a shift in direction was felt with researchers' interest to develop an instrument that could record and count the desirable teacher behaviours that yields positive learning achievements in association with background variables of the students such as Socio - Economic Status (SES) and home learning environment.

The research undertakings in this phase, pointed that effective teaching consisted of content sequencing into manageable units and logical selection based on students' ability to grasp content. It was also highlighted that teacher support at some point takes a back step where the students are in the forefront of the teaching and learning process. The new learning or modelling behaviour then becomes the focus. Teacher behaviour clubbed with teachers' instruction in the classroom, thus became bigger and larger with cohorts being studied to search for effective teaching factors that can result in better student achievements. Studies by Muijs & Reynolds (2000) concluded that teachers with their classroom management skills together with the content delivery can create both a conducive learning environment and better student achievement. Additionally, studies undertaken by the efforts of researchers (for eg., Kyriakides & Creemers, 2009; Antoniou & Kyriakides, 2013; Muijs et al., 2014; Azigwe, Kyriakides, Panayiotou, & Creemers, 2016; Kyriakides

et al., 2019) supported and ascertained that student achievements definitely are linked to teacher behaviour in the classroom.

The next section provides a brief description of some of the most influential theoretical models in the field of EER which led to the development of the current multilevel models that present both direct and indirect relations among different factors at the teacher (classroom) level with student achievements.

Theoretical Advances in EER: Modelling Educational Effectiveness

Setting apart some of the methodological limitations, EER research has been criticised in the past for the absence of an efficient theoretical framework upon which research efforts could be based (Reezigt, Guldemon & Creemers, 1999). The fact that there aren't many theoretical model-based teacher effectiveness researches has led many to select isolated teacher factors and create merely statistical relations among them rather than challenging theories that could explain those associations (Creemers, 1997; Creemers & Kyriakides, 2006; Kyriakides, 2012). To make this even more complicated, it is observed that researchers don't often use the existing models in the field of EER creating most existing literature content without a theoretical basis (Bosker & Scheerens, 1994; Creemers, 2002b; Scheerens, 1993; Scheerens & Bosker, 1997; Scheerens, 2014). Hence, it is important to identify that theoretical underpinnings are very important. It is equally important to realise models are needed to assist in summing up relationships among the factors of effectiveness. This would solve the issue of conducting already existing researches (Creemers & Kyriakides, 2012). Therefore, it is essential to revisit some of the important models of educational effectiveness in the field of EER. The next section will present the models of EER which led to the birth of the current models in the arena of teacher effectiveness research.

Educational Effectiveness Models

Carroll's Model of Educational Effectiveness

Carroll's Model of Educational Effectiveness (1963, 1989) is perhaps one of the oldest recognized works in the field of EER. Figure 1 shows an illustration on the working of the Carroll's Model. This model has also provided basis on which other EER research laid the foundation on. According to this model, it operates on the assumption that persons with low aptitude for achievements needs a longer time for learning a specific criterion in comparison to persons with high aptitude for achievements. Carroll's model was also based on five classes of variables that were identified as accounting for different variations in student achievements. The first one being 1. Aptitude: defined as those variables which accounted for the time a student needed to learn or complete a specified activity given that the student had a good learning environment including instructional and motivational; 2. Opportunity to learn: the amount of time that was allowed and given for learning; 3. Perseverance: the amount of time a student is willing to spend on learning; 4. Quality of instruction: is defined in terms of increased quality equals to increased learning and when the quality of instruction is not at its optimal, then the time needed for learning is also increased; 5. Ability to understand instruction: is defined in terms of learners' independence to figure out what the learning tasks are and how to do it. The main assumption on which Carroll's Model was based on was the fact that achievement can be calculated by the ratio between the time spent by students on learning and the given time thereby, considering quantity and quality of time as the most important elements for learning. According to Carroll (1989), both good planning and a good instructional design is the key for effectiveness.

The Carroll's Model received a lot of accolades at the time but at the same time it was criticised for not presenting predominant variables such as 'high quality instruction' in a more in depth and detailed manner. This criticism levelled against the model was also accepted by him (Carroll, 1989, p. 26).

$$\text{Amount of Learning} = f \left[\frac{\left(\begin{array}{c} \text{Opportunity} \\ \text{to learn} \end{array} \right) \times \left(\begin{array}{c} \text{Perseverance} \\ \text{or} \\ \text{Time spent on} \\ \text{learning} \end{array} \right)}{\left(\begin{array}{c} \text{Aptitude} \end{array} \right) \times \left(\begin{array}{c} \text{Quality} \\ \text{of} \\ \text{instruction} \end{array} \times \left(\begin{array}{c} \text{Ability to} \\ \text{understand} \\ \text{instruction} \end{array} \right) \right)} \right]$$

School Learning = $f(\text{time used} / \text{time required})$

Figure 1. The Caroll's Model (1963)

Mastery Learning by Bloom (1976)

In 1976, a similar analysis was adopted by Bloom (1976), based on the main elements of Carroll's Model to develop the theory of "Mastery Learning". Thus, analysed further those relationships that existed and explains between time, perseverance, aptitude and quality of instruction. Some of multilevel models of EER such as the Creemers (1994), Scheerens (1993) and Slavin (1996) formed the basis from the Mastery Level Model's development. Carroll's Model differed from Bloom's in the aspect of looking for equality of "opportunity", and not necessarily equality of attainment. In the Carroll's Model, not only were students provided with appropriate opportunities to learn but also a great emphasis was laid to push students towards their very highest limits (Carroll, 1989).

Walberg's Model (1984)

This model was also based on the workings of the Carroll's Model and operated on working towards estimating the size of effects on educational inputs and outputs. Walberg's Model (1984) extended on Carroll's Model by adding environmental variables thus, demonstrating relationships among the different

effectiveness factors. Specifically, Walberg's Model consisted of nine factors divided into three broad groups. They were A) Student aptitude under which the factors divided into were: 1. Ability or prior achievement, 2. Development, and 3. Motivation; B) Instruction under which the factors divided into were: 1. Quality of instruction, 2. Amount of instruction; C) Environmental factors under which the factors divided into were: 1. The home, 2. The classroom social group, 3. The peer group outside the house, and 4. The use of out-of-school time (Walberg, 1984). Figure 2 provides an illustration of the above factors as well as the relationships between them.

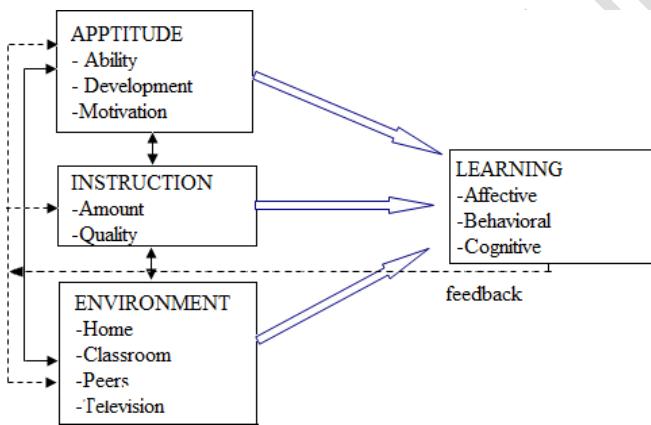


Figure 2. Walberg's Model (1984)

The validity of Walberg's Model has been tested and there are research works undertaken to prove the relations among the proposed factors (Reynolds & Walberg, 1992). With these new findings, the need for establishing a theoretical framework in EER was brought to limelight to consider looking at factors at the different levels of education (Creemers & Kyriakides, 2008).

Comprehensive Model (1994) by Creemers

The Comprehensive Model was developed as one of the most important work carried out by Creemers (1994) in order to identify the relations among factors within and across the different levels of learning. The basis for the model rests on

Carroll's Model (1963) whereby, Creemer's focussed on the teaching and learning factors that operated at the student and the classroom level rather than emphasizing only on the factors that operated on the school level such as educational leadership and an orderly or safe school climate (Edmonds, 1979). Creemer's Model showed not only the different levels of education (for example school, classroom and student levels) and also how these levels were connected with student achievements. The model worked under the assumption that the factors operating at the student level, such as the time and learning opportunities used by the students as well as motivation, aptitudes and social background are directly related with student achievement (Creemers, 1994). However, the model has been subjected to criticisms too. One of the main criticisms that was levelled against the model was the fact that it still lacks in certain specificity in elements at the student level (De Jong, Westerhof & Kruiter, 2004).

Creemers' Model has however, considered students' social background as a variable that can have effect on student achievement. (Creemers & Kyriakides, 2008, Acosta & Hsu, 2014; Lindo, 2014; Kieffer, 2012; Strand, 2014). The comprehensive model works on four underlying principles. They are a) consistency: understood in terms of how individual factors could not be taken in isolation to understand student achievements but rather support and complement each other; b) cohesion: at the school level whereby, all abide by the governance and stability of school policies; c) constancy: referring to sustaining the cohesion through quality instructional practices and d) control: the evaluation processes that are applied to both student achievement as well as the teaching behaviours.

The validity of Creemers' Model (1994) has been tested through studies (i.e., de Jong et al., 2004; Driessen & Sleegers, 2000; Kyriakides et al., 2000; Kyriakides, 2005; Kyriakides & Tsangaridou, 2004; Reezigt, Guldemon &

Creemers, 1999) and in the secondary analysis of TIMSS 1999 (Kyriakides, 2006).

In conclusion, these studies revealed that the Comprehensive Model can provide a solid basis for the development of the theoretical grounds of EER.

The next section will highlight the conceptual framework on which the present study is built. It is important to note that the Dynamic Model of Educational Effectiveness was introduced on the basis of Creemers' Model which, unlike the early models of EER, took into consideration the student achievement being multilevel in nature. In the next section, an overview of the Dynamic Model of Educational Effectiveness is presented which also forms the theoretical basis and the conceptual framework for the present study.

The Conceptual Framework for the study

The Dynamic Model of Educational Effectiveness (DM) forms the basis for the conceptual framework for the study. The DM is based mainly on the following three value assumptions. First, the DM is multilevel in measuring educational effectiveness (Creemers & Kyriakides, 2006). Most of the teacher effectiveness studies singles out either skill-based subjects such as Mathematics or a language rather than focussing on the effectiveness of teacher as against the whole school curriculum. However, the Dynamic Model is a model that aids policy makers and/or stakeholders to take rational decisions concerning the “optimal fit of the factors” and give a true picture of the school or the system in place. In addition, the DM is both parsimonious and is capable to give details about the complex elements of the educational effectiveness factors.

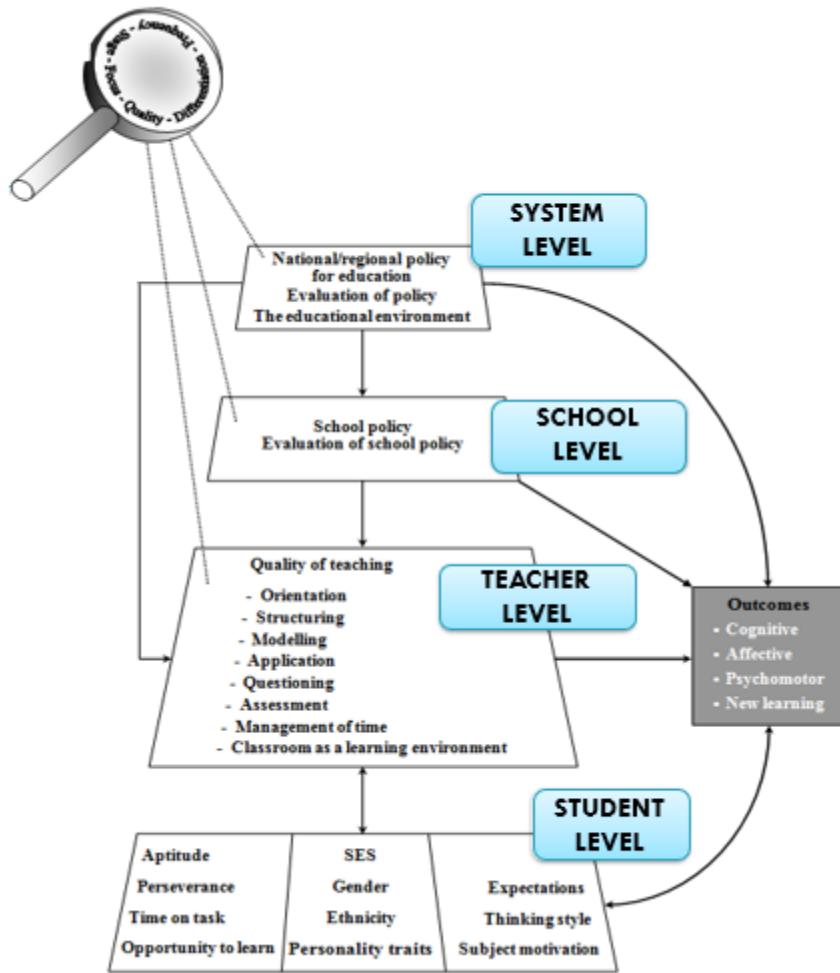


Figure 3. The Dynamic Model of Educational Effectiveness

{Adopted from Creemers & Kyriakides (2008a)}

The Main Features of The Dynamic Model of Educational Effectiveness

The figure 3 presents the Dynamic Model of Educational Effectiveness. As indicated in the figure above, the DM is made to attain data at different levels of the school system (i.e., at the student, teacher (classroom), school and overall, the educational system (Creemers & Kyriakides, 2006). At the student level, it refers to those factors that operate around and within the student, which in turn, aids student achievement. At the teacher (classroom) level, it refers to those factors that influence the classroom teaching and learning. At the school level, it refers to those

factors that aid in making and assessing of school policy for teaching and learning; and at the education system level it aims to influence the system in developing and evaluating educational policy for teaching and learning. (Creemers & Kyriakides, 2006).

The key features of the Dynamic Model of Educational Effectiveness are as follows. Firstly, it operates on multilevel factors of effectiveness. Secondly, many of the factors which function at the same levels may be related to one another and thirdly, while grouping factors in the DM, it can be defined and measured using parallel dimensions. This way it enables to take each of these factors as a multi-dimensional construct and thus, be in line with the parsimonious nature of the model.

Some of the other features include a special focus that is given by the DM to the time students spend on tasks and opportunities presented to them as learning and most importantly the quality of instruction of teachers. All these are of vital importance in student achievement (Creemers & Kyriakides, 2006).

Studies conducted in different parts of the world using the DM proved that a higher percentage of the variance in student attainment can be described by the influence of the student background factors (Brophy & Good, 1986). Thus, it can be seen that the DM operates on background influences such as student socio – cultural and economic factors. In addition, characteristics such as aptitude, motivation, expectations, personality and thinking style of students (Creemers & Kyriakides, 2006).

There are some studies that show that prior knowledge provides an accurate predictor of future accomplishments (Walberg, 2003). Prior knowledge is an important determinant that tells us how the new information is received and understood, how well it is organized as well as how well it is systematically

retrieved in the long run (Slavin, 2014).

It is also important to note that the DM is very much focussed on measuring the actual teacher behaviour in the classroom which is directly connected to student learning. Hence, it is observed that the DM is highly focussed on measuring the actual student engagement in the classroom.

As for the school level, the DM show the end result of a leader instead of focussing on the leadership style of the Principal. This means that the Dynamic Model focusses on the policy content that has resulted in achieving end results through a fusion of activities that have an impact on teaching and learning in schools. It is important at this point to note that, in the present study, the search for effects of the factors and dimensions of DM on student learning is considered only from the student and teacher (classroom) level of the DM. Hence, the school and system level factors that have an effect on student learning goes beyond the scope of this study.

In the next section, the teacher (classroom) level factors of the DM are discussed in detail.

The teacher factors of the Dynamic Model

In the DM, the classroom factors refer to eight specific factors which are in synchrony with student learning (e.g., Brophy & Good, 1986; Creemers, 1994; Doyle, 1975; Muijs & Reynolds, 2000). The eight factors are: *orientation, structuring, questioning, teaching modelling, application, teachers' role in making classroom a learning environment, management of time and assessment* (Creemers & Kyriakides, 2006). Within these factors, the qualitative aspects of teaching include the orientation, structuring, application-level activities, teaching modelling and questioning (Kyriakides, 2005). Muijs & Reynolds (2000) argued that

maximum student learning output is achieved if student activities are facilitated by teacher rather than for students to be left alone to do their work. Brophy & Good (1986), stressed on the transitions between the activities conducted during a lesson and also the orientation and structuring of the lesson for the day. Objectives to be achieved are also important to be stressed. Rosenshine (2012) also emphasised on the importance of the above and in addition, talked about the importance of teachers' role in connecting old learning with new learning, asking the right questions and ensuring students are provided with enough opportunities to acquire meaningful learning. The sub-parts and summaries of each of the sub parts of the lesson must also be reviewed during the lesson progression. Westwood (1996) stressed that one of the most important factor in a classroom is to pay close attention to teachers' questions and questioning technique. Teacher questioning technique and the questions asked by the teacher are one of the most important parts of lesson delivery (Cotton, 2003). These questions can be those questions that are asked by the teacher to students, questions asked by the students to teacher and questions asked by student to students (Brophy & Good, 1986). Researchers such as Kauchak & Eggen (2012) summarised how questioning can be used to elicit information about student motivation for learning; communication; and to draw attention of learner to key content and review of key content. Creemers & Kyriakides (2008), weighed on the two types of questions asked by the teacher in the classroom: i.e. the process and product questions. The former requires students to not only answer the questions posed by the teacher but also to justify and reason with the answers presented. Muijs et al (2014) findings show that, in an effective lesson, the teacher should pose questions at the very beginning of the lesson, during short presentations of the lesson and also at the very end of the lesson. Kauchak & Eggen (2012), asserts that it is important to acknowledge right answers by students with

the right responses in an affirmative manner and when the right answer is not being solicited by students, it is equally important that the teacher makes a conscious effort to ask the right probing questions to get the answers from the students in order to solicit the right answer from the students. If an answer is completely wrong, it is just as important for the teacher to give reasons as to why the answer is wrong and give the right answers. Kauchak & Eggen (2012), further stresses on the importance of wait-time. Wait time can be defined as the time given by the teacher after a question has been posed. A study done by Westwood (1996) proved that if the wait time is extended upto three (3) seconds, it can lead to better student responses. Cotton (2003) indicated the importance of assessments. He stressed that effective teachers used a combination of both formative and diagnostic assessment methods to enhance student learning (Cotton, 2003; Brophy & Good, 1986). Diagnostic assessments help the teacher to identify the prior knowledge and skills of the students and it can further bring to teachers' attention any doubts that the students may have on the topic. Thus, this helps in improving student learning. While formative assessments can reduce students' doubts, a summative assessment can help the teacher to determine what the students have learnt at the end of a teaching segment. Another important factor in a classroom is the focus that has to be paid to new learning / modelling. It is the job of the teacher to guide students into doing an activity that would lead to activation of students' meta cognition and meta cognitive strategies (Ellis & Worthington, 1994). Teaching modelling in the DM is defined as the process by which students are supported by the teacher in order to break down a complex skill into manageable sub-tasks or chunks that would help the learner to sequence, select problems and start practicing on a new skill with the help of cue words and/or checklists. This would then help them to remember the steps as they go about imbibing the new activity or skill for example,

writing their own piece of poetry (Archer & Hughes, 2011).

In the next section, a special focus is given to describe the teacher (classroom) level factors specific to the DM. As previously mentioned, the eight factors in the DM are: *orientation, structuring, questioning, teaching modelling, application, teacher role in making classroom a learning environment, management of time and assessment.*

Orientation

In the classroom, the term orientation refers to those behaviours of the teacher whereby, the teacher gives students the objectives of the day. The objectives of the lesson could be either pertaining to a specific task that they are doing for the day or a specific lesson or even a series of lessons. The objectives of the lesson could either be given by the teacher or it could also be gained from the students if the teacher actively challenges the students to identify and point out the aim for the lesson (Creemers & Kyriakides, 2006). During orientation, the teacher also informs the students what they will be able to do at the end of the lesson. During orientation, usually the teacher gives an overview of what has been previously done and then goes on to explain the particular objectives of the lesson for the day and why it is important to achieve a success criterion for the lesson (Creemers & Kyriakides, 2006). It is of vital importance that students know why the content they are learning is important because this helps them to connect content to their daily lives thus, determine how they would use this information in their daily lives, which in turn would pique their interest and curiosity to learn (Creemers & Kyriakides, 2008). Another very important advantage of orientation and orientation related activities is that it helps students to be motivated and have eager readiness to learn. This helps them to identify with the lesson and the goals of the lessons that they are going to learn which in turn helps them to understand

and bring out the desired learning outcomes (Kift & Field, 2009; Deci & Ryan, 2000).

Structuring

A lesson that has a clear structure from the beginning till the end gives not only the students a sense of direction for the day's lessons but also regulates their learning. It helps students to know and have a clear framework in mind to identify the lesson and link it to previous lessons (Creemers & Kyriakides, 2006). Research by Rosenshine (2012) described that a lesson with a clear structure helps students to maximize on learning. It helps them to know the transitions between the parts of the lessons. It also helps them to know the main ideas that are going to be presented in the lesson and in addition, helps them in summarising what's been learnt in the lesson. This is achieved by integrating the lessons' major points for the day (Brophy & Good, 1986). When there is proper structure for a lesson, even with a degree of redundancy, achievements in children are still proven to be higher (Creemers & Kyriakides, 2006). When students are asked to focus on the key structure of the lesson, it not only helps them to focus on the different parts of the lesson but they also realize readily the flow of the lesson (Rosenshine, 2012).

Questioning Techniques

Teachers' questions in the classroom are one of the most important aspects of the teaching and learning process. It promotes active student involvement in the lesson despite their level or the area of learning. It is also one of the most important tools of assessments. According to Cotton (2003), teacher questioning can be used to develop students' interest, evaluate student learning for their critical thinking and for assessment purposes. It is also very essential for teachers to ask the right kind of questions to students (Westwood, 1996). The kind of questions may range from product to process, inductive to deductive, convergent to divergent. There

should be a good combination of both product and process questions to make an effective lesson (Creemers & Kyriakides, 2009). A study done by Kauchak & Eggen (2012), focussed on the importance of teacher pause after asking a question. According to Westwood (1996), when teachers paused after asking a question for about 3-5 seconds, there is more active involvement by students in the class. In addition, teacher response or how the teacher responded to student answers is also equally important. When a student gives a correct answer, it is important for the teacher to acknowledge and accept the answer as correct and at the same time if a student gives a partly correct answer, it is essential that the teacher acknowledge the part that was correctly answered and rephrase or answers the part that was not correct (Brophy & Good, 1986). However, the teacher must ensure not be overly critical of the wrong answer and tell the right answer with justifications.

Teaching Modelling

Effective teachers are those who uses their own strategies for solving a given problem. Pertaining to language and literary skills for example, creating a new story or a piece of original poem would be considered modelling behaviours demonstrated by students. According to Chinn (2011), modelling helps a student to contextualise learning to everyday behaviours. The teacher helps a student to model a new behaviour through rehearsals and meta-cognition (Ellis & Worthington, 1994). The constructivist view holds that modelling include learners' reflecting on their own learning and then construct their own learning based on their learning (Jonassen, 1991). Through modelling, students are exposed to a discovery learning journey and deeper sense of knowledge (Mayer, 2004).

Application

Application is the phase of learning whereby; students are able to pick up knowledge of what they have learnt and apply it while doing activities in the class.

According to Walberg & Paik (2000), during application there are three phases through which students undergo. In the first phase, it is always the teacher who assist students or students learn under the direction of the teacher while in the second phase, the students become more independent in actively applying skills that have learned and rehearsed with lesser feedback from teachers as compared to the first phase. In the third or the final phase, students independently practice the skills without the help or review from the teacher either as independent class work or homework.

Teacher's role in making classroom a learning environment

According to Brophy & Good (1986), the teacher has a responsibility to create a classroom environment that is safe physically and emotionally. One of the most important facets of the DM is that it focusses on how the teacher plays an important role in creating a learning environment that is both efficient and encouraging (Kyriakides, 2005b). In the DM, the focus is on three types of interaction that takes place in a classroom i.e., between teacher and student, between student and student, the treatment of students by the teacher. In addition, the healthy levels of competition between students and the teacher's classroom management skills are considered equally important.

According to Jacobsen et al (2009) a positive classroom climate creates a conducive environment for students to learn, where students emotional well being is taken care of, where students feel safe, secure and have positive feelings of being included. According to Jones & Jones (2012) the interactions that takes in a classroom are equally important for a positive classroom climate where there are strong student and teacher connections and good communications. A good classroom climate is also one where the class activities are well organized, task or goal oriented and systematic. According to Dunbar (2004) these classrooms will

also have clear expectations from what is expected from both students and the teacher. He further ascertains that the Socio-Economic Status (SES) of the child also contributes to the kind of classroom climate experience students have.

It is also important to point out that a positive classroom climate is in part with effective instructions, leading to reduced classroom management problems. Classroom management problems can also be considerably reduced through effective teaching and active engagement of students in a highly differentiated learning environment (Jones & Jones, 2012). It is important for a classroom to have its own set of rules to follow that is set at the beginning of the academic year which includes both a code of conduct and acceptable classroom behaviours (Kauchak & Eggen, 2012). It is also equally important to negotiate the code of conduct with students in a democratic manner to achieve maximum benefit from the established rules with teacher being clear about consequences of misbehaviour which is acceptable to students as a consequence of the misbehaviour. It is important that the teacher avoids threats and remain consistent with the laid-out rules. In U.S., Pas et al. (2015) looked at teacher behaviour in the classroom in relation to student behaviour with regards to classroom rules and norms. It was found that students who are consistent in behaviour tend to show lesser misbehaviour in the classroom and vice-versa displaying more talkativeness, talking off topic subjects and even bullying.

Reyes et al (2012) found positive relationship between classroom climate and grades. It was revealed that grades increased by 1.74 points for every unit increase in student engagement. Stronge et al. (2011) concluded that teachers who maintain positive classroom climate through good classroom management and positive teacher-student relationships tend to get better grades and achievement from students. Those students, on the other hand, who were non-compliant were

the ones who initiated disruptive behaviours in the classroom and who distracted and disturbed the whole ambiance of the classroom. In Cyprus, Kyriakides (2005a) concluded that classroom climate had a positive impact on students language learning skills in Greek language and also positively impacted the affective aims of schooling. Through this research, it was concluded that all variables related to classroom environment had statistically significant impact on student achievements.

Management of time

The management of time refers to teachers' effectiveness in creating a task-oriented environment where activities of the day are arranged in such a way it has a specific time frame to complete each task rather than wasting too much time on free time. Effective teachers focus on covering the content of the lesson rather than wasting time on less important tasks. According to Walberg and Paik (2000) time need to be prioritized for tasks such as curriculum coverage, focussing on achieving objectives, decreasing on the transition time between the activities that takes place in the period and also maximizing on student teacher time on activities that has positive outcomes for students.

According to Creemers & Kyriakides (2008) one of the most important factors that contribute to positive student achievement is the time on task. Time could refer to the 40 to 45 minutes that would have been allocated for each subject in the timetable. Time could also refer to the various opportunities, students are presented with, at the allocated subject period time. During the period, the time factor can be measured in terms of how much time the teacher gives for teacher delivery and how much time teacher gives for students to do activities in class. According to Archer & Hughes (2011) increasing the instructional time does not lead to more learning or increased number of learning tasks. Huitt, Monetti, &

Hummel (2009) identified two major time factors in the classroom. One is the time that is spent in the class which is referred to “time-on-task”. During the time-on-task, students are either paying attention to teacher talk or doing class work using workbook or worksheets. The other time factor is the “opportunity-to-learn” where students spend time on successful learning through modelling and adopting new learning techniques. Brophy & Good (1986) also talks about the “amount of content learnt which is directly in proportion to the length of the academic year or the number of hours that are utilized for curriculum implementation by the teacher. Suggestions are made as to how to increase the “opportunity-to-learn” and “amount of content learnt”. First, it is substantial for the teachers to analyse what is important for students to focus on; second, teachers need to decide objectives, aims and specific skills that are of priority from those that have a lesser priority to achieve; third, teachers need to find ways to teach content without wasting time, for example, decreasing transition time between lesson parts and increasing time that is allocated for opportunities to learn (Jones and Jones, 2012). The fourth suggestion is giving home extension exercises as another way to increase opportunities to learn however, homework needs to be followed up by teacher to ensure what has been taught has been correctly understood and imbibed by students (Walberg & Paik, 2000). Jones & Jones (2012) sheds light on the fifth suggestion that is to maintain order and decorum in the classroom for maximize opportunities to learn. Classroom management skills are those purposeful interactions by the teacher that results in positive learning in students (Redding & Walberg, 2012). The sixth suggestion by researcher Anderson (2004) highlights the importance of teacher plans and actions, teacher’s responsibilities of creating both a conducive and positive learning environment in the classroom to increase the opportunities to learn for students. Brophy & Good (1986) emphasised on the importance of

teacher's active teaching time in content delivery and in relation to pacing and spacing of instructions, including transitions between activities and setting academic goals for the lessons too. A study conducted by Rowan, Correnti & Miller (2002) concluded that active teaching has a direct impact on student achievement in reading. Instruction time was recorded for each week, specifically for time utilized for activities in the class. Students achievement were then tested and it was found that the time utilized in the classroom for activities had a significant effect on student's achievement in reading. Similar study was conducted by Hay McBer (2000) who analysed the achievements of student in reading and if it had any link to teachers teaching skills. Conclusions drawn from the study showed that effective teachers utilized a lot of time on active teaching and were very precise on when they started the lessons, time spent on teaching and activities and even finished the lesson with enough time for review or summary of the days lesson. There was no time wasted unnecessarily and management of teaching resources were used to maximum efficiency. There were also clear behavioural expectations set in the class as classroom rules hence saving a lot of time in unnecessary class disruption or delays in delivering of lessons. In addition, it was found that that effective teachers are those who had a clear structure in their lesson content and delivery and presented information with enthusiasm and great clarity resulting in maximum student engagement and students' active participation in the lessons. A study conducted in Cyprus examined the relationship between teacher behaviour and achievement of students in Greek Language. The achievements scores of the students and student perceptions were measured against the quantity of classroom activities that showed that using multilevel modelling techniques, the variance of achievement of 0.80 for Greek language proved there was a positive effect between teacher behaviour and achievement of students. A study conducted by Lavy (2010)

also showed a statistically significant impact on student achievements against the instructional time. Thus, the above studies have looked at in great detail about the positive impact the time factors have on student achievements. However, it is important to note that, this quantity component of instruction by itself, is not responsible for successful learning outcomes. A combined effect of both the qualitative aspects and time management can lead to successful learning (Archer & Hughes, 2011).

Assessment

One of the most important facets of an effective teacher is how she/he assesses her students to ensure that they have understood what has been done during the lessons (Brophy & Good, 1986). A teacher has an intuitive task to ensure data is collected on student progress on learning (Huitt, Monetti, & Hummel, 2009). This would help the teacher to determine and identify the factors that will lead to student success and make informed conclusions about student progress and students' standing in class. Both formative and summative assessment evaluation helps in determining student progress. When the teacher provides constructive feedback coupled with positive reinforcement on the assessment factor, it largely helps in bringing students to an acceptable level of academic standing. This will also help the teacher to determine and identify topics for reteaching, if necessary. Through this process of continuous assessment, teachers are also able to reflect on their own teaching. Research shows that these kinds of practices as described above helps the teacher to not only improve student academic achievements but also students' holistic achievements (Walberg, 1986).

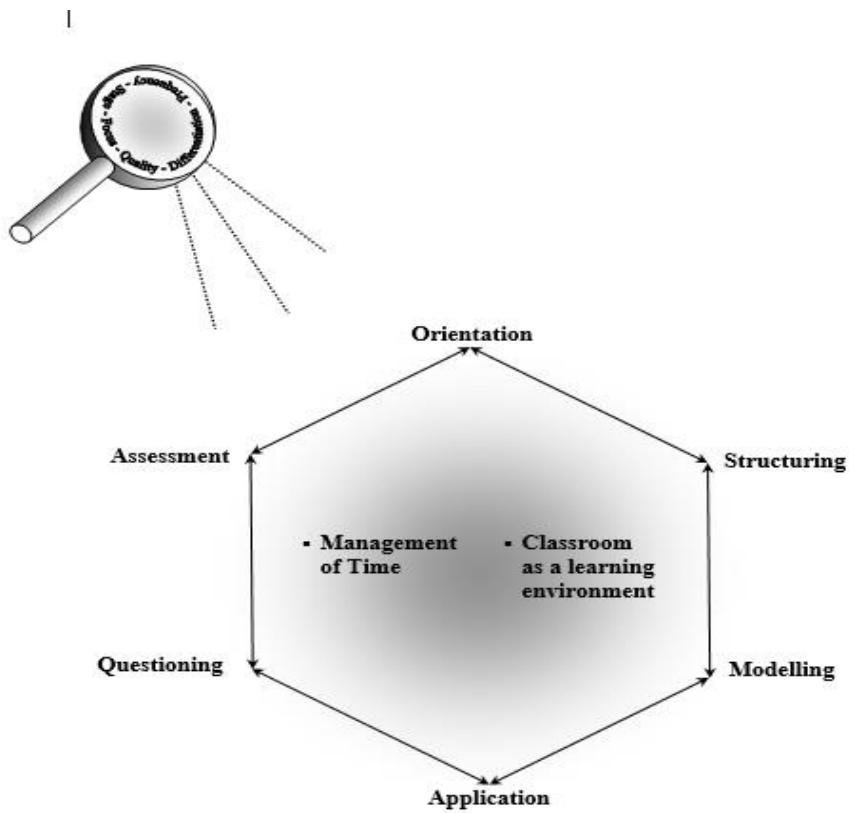


Figure 4. Factors of the Dynamic Model operating at the teacher (classroom) level {Adopted from Creemers and Kyriakides (2008a)}

Figure 4 shows the factors of the Dynamic Model operating at the teacher (classroom) level. It is important to highlight that the DM works on the main assumption that the eight teaching factors can be measured using the five dimensions of the model. In the subsequent discussions, the focus will be on presenting a review on the measurement dimensions of the dynamic model.

The Measurement Dimensions of the Dynamic Model

As mentioned, the DM works under the assumption that the teaching factors can be measured under the five dimensions of *frequency*, *focus*, *stage*, *quality* and *differentiation* (Creemers & Kyriakides, 2006).

According to Creemers and Kyriakides (2006) by using the dimension

measurements in the model, will pave path to improve the teachers' teaching skills together with the quality of feedback given to teachers. In the next section, an overview is given about the measurement dimensions of the DM.

The frequency dimension

The frequency dimension refers to the quantity of an activity associated with each teacher factor. This is considered the easiest measure in the model since it records simply the frequency of occurrence of an activity. This dimension may not always reflect student learning outcomes because this is more of a monitoring dimension and monitoring does not necessarily have an additional impact on learning. In fact, there is a possibility it can have a negative impact on teacher, which ultimately results in negative impact on learning outcomes (Creemers & Kyriakides, 2006). It is also important to note that the quantity of teaching does not lead to an increase in the time students spend on learning tasks. A combination of quantity and quality of instruction is the basis that leads to learning success (Archer & Hughes, 2011).

The focus dimension

The focus dimension measures aspects of class activities which can range from specific to general, the latter addresses the purpose for which an activity takes place. For instance, in the orientation factor, the focus dimension stresses on the aim of the lesson as well as link the activities in a lesson to a unit or number of lessons as already done in earlier lessons.

This dimension also refers to how specific the activities are in moving from specific to general. This is measured by checking if the lessons are in reference to a part of a lesson, to the whole lesson or even to a series of lessons (e.g., a lesson unit). Hence, Kyriakides & Creemers (2008) highlights the aspect that teachers must encourage different levels of engagement of students in various

types of orientation tasks.

The stage dimension

The stage dimension examines if the teaching activities are in any way associated with any of the factors that can be measured by taking into account the stage at which it takes place. Teaching factors operate on the expectation that they take place over a period of time to have positive impact on student learning (Creemers, 1994).

The quality dimension

The quality dimension refers to the quality of that specific factor of teaching in itself. For example, if an activity in the orientation is clear for students, it would be determined under the quality dimension. It also refers to the learning tasks that students can actively engage in where the teacher actively ask students to identify why they do an activity, which in turn, increases their motivation and interest for the lesson (Kift & Field, 2009).

The differentiation dimension

This dimension refers to how activities are administered catering to each student. For example, in a classroom, there are students from different socio-economic backgrounds, from different background experiences, families and also with differences in their prior knowledge. When instructions are differentiated, then there is assurance that maximum benefit is reaped for each student since differentiated instruction involves catering to the needs of all learners (Creemers, 1994; Westwood, 1996). Differentiation is about catering to the needs of the learner to achieve the same purposes, however, the route taken for each child to achieve the same aims may need not be the identical even if the aim and end purposes are the same (Kyriakides & Creemers, 2006).

In the next section, a special attention is paid to specific studies that have

tested the validity of the Dynamic Model of Educational Effectiveness.

Studies testing the validity of the Dynamic Model

Many studies have been conducted in different parts of Europe, America, Asia and Africa to test the validity of the Dynamic Model (e.g., Creemers & Kyriakides, 2008; Kyriakides & Creemers, 2009; Creemers & Kyriakides, 2010; Demetriou & Kyriakides, 2012; Christoforidou et al., 2014; Panayiotou et al., 2014, Azigwe, et al, 2016). All the above studies and more testified for the validity of the model including the construct validity of the model for each of the five dimensions of *frequency, focus, stage, quality* and *differentiation*. The eight teacher factors from all of the above studies were linked to student achievements. Testing the validity and reliability of the DM has been tried in Europe specifically in Cyprus. These studies provided support for the reliability and validity of the DM with the use of its five dimensions measuring the factors of teaching (Creemers & Kyriakides, 2008).

The next section will explain the different longitudinal studies that were conducted to test the effects of classroom and school on student achievements providing support for the DM (Creemers & Kyriakides, 2010a; Kyriakides, Archambault, & Janosz, 2013; Creemers & Kyriakides, 2008; Kyriakides, Creemers, & Antoniou, 2009).



The first longitudinal study conducted aimed to provide support for the five dimensions of the DM in an earnest attempt to test how these were linked to student achievements (Creemers & Kyriakides, 2008). In this endeavour, an attempt was made to check the specific and generic nature of the model too. The sample was selected from 50 primary schools in Cyprus consisting of 2503 students. Data was collected on student achievement in three different subjects (i.e., Mathematics, Greek

language, and religious education). Additional data was collected through observations of teachers and questionnaires administered to students. Even though the study provided support for the construct validity of the five measurement dimensions on most of the effectiveness factors at the classroom level, the study had its limitations. The first one being it was conducted purely at a national level hence, the questions of generalisability arose across different educational contexts. Another criticism that was levelled against it was the fact that it was a national study and reliability and validity of the model could not be tested on an international context.

Another attempt to test the validity and reliability of the DM was attempted through a longitudinal study to verify the importance of the classroom factors and determine their generalisability in two different subjects (i.e., language and Mathematics (Kyriakides & Creemers, 2009). This study was also conducted in Cyprus and the sample for the study consisted of school students from 76 pre-primary and 50 primary schools in Cyprus, The difference between the former and the latter study was that the latter attempted to not only give support to the generalisability of the model but also to test the differential effects of the effectiveness factors of the DM. The attempt was made in this direction in order to provide answers to one of the most frequent criticism levelled against different educational effectiveness models that a description of teacher behaviour following the “one size fits all” do not show the true picture of what education is (Campbell, Kyriakides, Muijs, & Robinson, 2003). Studies conducted on these lines of finding the differential educational effectiveness in EER research highlighted that there are many differences between groups of students and in addition, their teacher’s effectiveness varied across different factors, subjects and over a period of time (Nutall, et al 1989; Kyriakides & Tsangaridou, 2008). This study also similarly , revealed that there was a need to do further analysis on the lines of testing generalisability and further

explanations as to why some factors and dimensions appear to have differential effects (Kyriakides & Creemers, 2009).

The third study that was conducted building upon the criticisms levelled against the earlier researches on DM was to investigate the effects of the classroom and school factors on different outcomes of schooling (i.e. cognitive and affective) on the five measurement dimensions of the DM. This study was also a longitudinal study similar to the previous two and aimed to support the construct validity of the DM focussing both on the classroom and school level factors. The contribution of the classroom and school factors was once again identified and validated however, again at a country specific context that is in Cyprus. Hence, one of the biggest criticisms levelled against this study was the methodology has limitations in producing results that cannot explain the generic nature and the functioning of the factors across different countries, therefore does not allow for generalisation.

The next study that was conducted aimed at testing the validity of the DM by examining if the teacher factors of the DM are interrelated and can be grouped in to factors in an attempt to improve teaching skills and ultimately student achievements (Kyriakides, Creemers, & Antoniou, 2009). The sample consisted of students from 50 Cypriot schools. All year 5 students ($n=2503$) from each class ($n =108$) of the school were chosen to be part of the study. The results emerging from this study showed that the teaching factors and their dimensions of the DM can be grouped into 5 developmental stages moving from more easily acquired teaching skills (such as the structuring of lessons) to more demanding types of teaching behavior such as differentiation of the different aspects of the teacher factors (e.g., differentiation of assessment). Thus, through this study, the assumption of the DM regarding the possible relations among the factors included in the classroom level was answered for.

The fifth study to test the validity of the DM through testing the grouping of factors this time in Canada (Kyriakides, Archambault, & Janosz, 2013). The sample for the study consisted of data collected from seven primary French schools in the suburb area of Montreal. All students of grades 3 - 6 (n=959) from each class (n=42) of the school sample were asked to complete a questionnaire with the teacher factors and their dimensions. The results emerging from this study provided further support to the previous study conducted in Cyprus (Kyriakides, Creemers, & Antoniou, 2009). The results indicated that the teacher factors of the DM can be grouped together in the developmental stages. Again this study was conducted in one country and thus, the generalisability could be further examined through more and international studies.

The study by Kyriakides and Creemers (2009) used the sample selected from Greek Cypriot Primary Schools and in this study , the achievements of grade 6 students were explored in Mathematics, Greek language and religious education. This study was similar to the study on hand in-terms of the aim which was also to determine the extent to which each of the eight factors (i.e., *orientation, structuring, questioning, teaching modelling, applications, management of time, classroom management, and assessment* are multi-dimensional constructs; and whether the factors can be defined in terms of the five measurement dimensions of the Dynamic Model. Classroom observations were conducted for the teachers as well students were tested in Mathematics, Greek language and Religious Education as well student perceptions were sought regarding the effectiveness of their teachers. Data that was obtained was subjected to Structural Equation Modelling (SEM) techniques. Researchers were able to ascertain the construct validity of each of the factors in relation to the five measurement dimensions of the Dynamic Model. The convergent validity was tested and was found to be higher than 0.60 in the factor loadings. Using

multilevel modelling techniques, it was also revealed that there were statistically significant effects on all the outcome measures. The study also demonstrated the unidimensional nature of each factor. Therefore, each of the teacher factors were measured against the five dimensions of the Dynamic Model.

In another study by Kyriakides, Christoforou & Charalambous (2013) a meta analysis was conducted using 167 studies conducted between the time period of 1980-2010. This study too provided evidence to support the validity of the teacher factors of the model. The effects of learning outcomes were measured at Orientation 0.36; Structuring 0.36; Modelling 0.41; Application 0.18; Questioning 0.34; Assessment 0.34; Management of time 0.35; Classroom as a learning environment 0.45 respectively.

Another longitudinal study that was conducted in six of the European countries of Belgium/Flanders, Cyprus, Germany, Greece, Ireland, and Slovenia examined the extent to which the teacher factors of the Dynamic Model are associated with student achievement in Mathematics and Science (Panayiotou et al., 2014). Written tests in both subjects were conducted to a total of 10,742 grade 4 students in 571 classes in 334 schools. The tests were administered in the beginning and at the end of the school year , similar to the previous study, data on student perception of their teachers were also collected. As the other study, multilevel modelling techniques were administered and found on the teacher factors of the student achievement. The variance was obtained at 50% and 45% for Mathematics and Science.

Using the same European data set and analytic procedures Vanlaar et al (2015) looked at the differential effects of the teacher factors on student achievement. This study also concluded that differential effects of the teacher factors were detected on student achievements in maths and science and were especially true for low

achievers in the above subjects mentioned.

Thus, the Dynamic Model not only refers to factors and dimensions of teaching that takes place in various levels of the education system but also argues that there exists a relationship among factors that operate at the same level. With these new advancements through research contribution to EER, an arena to connect the assumptions of the DM with teachers' professional development opened. The concept of grouping of factors was introduced as an area of further exploration. Hence an attempt was made to find the stages of effective teaching in the Maldives too. However, the scope of searching for stages of teaching was limited to only identification of the stages and not necessarily the impact the stages had on student learning in a Maldivian classroom.

The literature on searching for stages of effective teaching and the grouping of factors will be presented in the next section.

Searching for stages of effective teaching

As previously mentioned, the Dynamic Model argues that, there exists a relationship among factors that operate at the same level. With this new avenue, the concept of grouping of factors was presented as an area of investigation in the scope of the Dynamic Model of Educational Effectiveness.

In the following studies, it is evident that not only the relationships among teacher factors were investigated but also the studies were able to identify the different stages of effective teaching (Creemers & Kyriakides, 2013).

The study by researchers (Kyriakides, Creemers, & Antoniou, 2009) which initially set to identify the impact of the eight teacher factors and their dimensions on student achievement in the subject area of language, Mathematics and Religious education extended to check the cognitive and affective learning outcomes of

students as a result of the teacher (classroom) factors operating in the classroom. As earlier testified, through this study also, the measurement dimension framework proposed by the Dynamic Model (see Kyriakides & Creemers, 2008b) was validated.

In addition, the study used the Rasch Model (Andrich, 1988) to identify the extent to which the five dimensions of the teacher factors could be reduced to a “common unidimensional scale” (Creemers, Kyriakides & Antoniou 2013).

Through this study, the following stages of effective teaching were identified in Cyprus: *Stage 1-Basic elements of direct teaching*: In this stage, it was found that teachers employed the following dimensions and related factors: dimension of frequency with management of time, structuring, application, assessment, questioning and teacher-student relationship factors. As the name of the stage specified, teachers in this stage employed the most basic elements of teaching in the classroom.

The stage two that was identified was called *Stage 2- Incorporating aspects of quality in direct teaching and touching on active teaching*. In this stage, it was identified that teachers employed the following dimensions and related factors: dimension of stage with structuring, application and questioning factors; dimension of quality with application and questioning factors; dimension of frequency with student-student relationship factor and dimension of focus with application factor. In this stage, it became evident that teachers were still employing basic teaching skills however, some aspects of quality teaching is also evident.

The third stage that was identified was named *Stage 3- Acquiring quality in active direct teaching*. In this stage, it was identified that teachers used the following dimensions and related factors: the dimension of stage with assessment, student-student and teacher-student relationship factors; dimension of frequency with teaching modelling and orientation factors; dimension of focus with student-student

and teacher-student relationship factors; dimension of quality with feedback on focus of questions factor and the dimension of quality with structuring and assessment factors. In this stage, it is evident that teachers have successfully incorporated quality in active teaching.

Next, the stage 4 was identified which was named as *Stage 4-Differentiation of teaching*. In this stage it was evident that teachers employed the dimension of differentiation with structuring, time management, questioning and application factors; dimension of focus with assessment factor; dimension of differentiation with assessment factor; and finally dimension of stage with teaching modelling and orientation factors. Teachers in this stage are successfully employing higher thinking order teaching skills and actively using differentiated techniques to teach the class.

The final stage was named *Stage 5-Achieving quality and differentiation in teaching using different approaches*. In this stage, it was observed that teachers employed the highest level of teaching strategies such as differentiated and constructivist teaching approaches to teaching and learning. The teachers in this stage employed the dimension of quality with teacher-student and student-student relationship factors; dimension of differentiation with orientation, teacher-student and student- student relationship factors; dimension of focus with orientation and teaching modelling factors; dimension of quality with orientation and teaching modelling factors. Teachers in this stage are considered the ideal teachers who pushes students to think beyond the textbook, open avenues for exploration and higher order thinking for example., there is scope for reciprocal teaching through student pairing and cooperation, scope for Inquiry-based learning (IBL) where learners pose their own questions and seek answers through research and direct observation; problem-based learning. Students own reflection and construction of knowledge is high at this stage.

Similar to the above-mentioned study, another study was conducted in Canada to measure teaching skills (as factors and dimensions of the dynamic model). (Kyriakides, Archambault, & Janosz, 2013). The data emerging from this study was also subjected to the same procedure of analysis. The results revealed that the teaching skills could be categorised into stages similar to the study that was conducted in Cyprus with stages of teaching moving from direct teaching towards teaching that involved more advanced teaching skill set (eg., constructivist approach and differentiation of teaching). Hence, it is revealed through both the above studies that teachers move gradually from relatively simple types of teacher behaviour to more complex ones.

The third study that was conducted in reference to stages of effective teaching, was a longitudinal study with Cypriot primary teachers who were observed over two consecutive school years and three measures of their teaching skills were obtained i.e., at the beginning of the first year, the end of the first year and the end of the second year (Antoniou, 2013). Since the study was longitudinal in nature, it was able to identify both the stages of effective teaching but also whether teachers can move from one stage to another (Antoniou, 2013). Teachers received professional development support through random grouping, however, neither of the groups received professional development during the second year. Similar to the above two studies, using the Rasch and Saltus models, the same five stages of effective teaching emerged (Antoniou & Kyriakides, 2013). In addition, with the professional development support the teachers received in the random group, seem to show that most teachers were situated at the same stage during this period, but only some teachers from the experimental group managed to move from one stage to the next more demanding one during the first year (Antoniou & Kyriakides, 2011).

A sustainability checks study of the professional development support during the second year for teachers revealed neither improvement or decline in the stages of both the experimental and the control groups (Antoniou & Kyriakides, 2013). This study was therefore able to conclude that teaching years had no significant effect on teacher developmental stages in a linear way (Creemers, Kyriakides, & Antoniou, 2013a). So, it is evident that teachers can improve on the stepwise development of types of teacher behaviour that can be achieved through professional development programmes and support arranged to this need.

The next study was an experimental study that was conducted in Indonesia where comparison was drawn from the competency-based approach with a teacher professional development programme. Similar to the above studies, the teacher factors and dimensions of the DM were considered as the teaching skills (Azkiyah et al, 2014) also revealed similar results.

Another experimental study investigated the impact of teacher professional development programmes based on the Dynamic Model and its impact were studied for three school years as opposed to one (Kyriakides et al, 2017). The outcome of this study indicated that there was enough evidence to support that teacher skills progressed over a period of three years, thus strong support for the generalisability of findings of the studies seeking to identify stages of effective teaching based on the Dynamic Model was provided.

Hence, through cross-sectional, longitudinal, experimental studies, the above provided empirical support for the teaching skills included in the Dynamic Model were found to be situated in specific stages of effective teaching. With these findings, there was enough evidence to support the stand that the grouping of factors in the different dimensions of the Dynamic Model was not only possible but also addresses the needs of teachers in teaching and assessing students.

However, some research findings (for eg., Kyriakides et al, 2019; Nachbauer & Kyriakides, in press) that demonstrated there exists an interaction effect between factors operating at the same level. Hence more research work is needed in the area of equity in order to identify the interaction effects of the factors of the Dynamic Model with that of more stable factors pertaining to students such as the student background factors (Kyriakides et al, 2019; Nachbauer & Kyriakides, in press). In this way the assumption that effectiveness factors are related not only with the quality, but also with the equity dimension, maybe empirically tested.

In Cyprus, three experimental studies were conducted to test the assumptions of the Dynamic Model with regard to teachers' professional development (Antoniou & Kyriakides, 2011; Demetriou & Kyriakides, 2012; Kyriakides et al., 2009). A sample of 130 teachers and 2356 students were selected for the study. Antoniou & Kyriakides (2011) examined the effects of integrated approach and holistic approach to teacher' professional development in Mathematics. Similar to previous studies, student achievements were tracked at the beginning and at the end of the intervention. One of the group of teachers were subjected to Dynamic Integrated Approach (DIA) (experimental group) while the other set of teachers were subjected to holistic approach (control group). When the impact of both were measured , it was found that the final scores of teachers employing the DIA (Mean=0.36, SD=1.05) was higher than their initial score (Mean=-0.28, SD=1.01) and that this difference was statistically significant. On the other hand, the final score of teachers employing the HA (Mean=- 0.25, SD=1.04) was not higher than their initial score (Mean=-0.26, SD=1.05).

Based on the results that the above study produced, it was concluded that the Dynamic Integrated Approach (DIA) as proposed by the Dynamic Model was more effective in teachers' professional development. However, it is important to address

that all studies were conducted in different parts of Europe, and hence, different settings with different country contexts are required in order to test the model further on these lines.

The next section will give a brief description about the differentiation model of instruction instrument that was also used as a secondary and subordinate observation instrument. As mentioned earlier, the observation key of differentiation model (Valiandes, Koutselini, & Kyriakides, 2011) will also be used as a subordinate observation of only the differentiation factor in order to see if this evaluation tool could capture additional data on differentiation or if there are any overlaps in the use of and the Differentiation Model and the Dynamic Model.

Differentiation Model of Instruction instrument

To identify the characteristics of teachers' differentiated instruction within the classroom, and also to challenge the Dynamic Model's supposition that differentiation at different dimensions could be picked up through the model, an additional instrument was used in this study to analyse if an additional instrument was needed to detect factors of differentiation in a classroom. The observation key for Differentiation Model of Instruction was created based on the main characteristics of differentiated instruction (Valiandes, Koutselini, & Kyriakides, 2011). The instrument consisted of 18 criteria on a 5 points likert scale. The instrument has been validated in one research study conducted in Cyprus (Valiandes, Koutselini, & Kyriakides, 2011) where initial values for each measure were associated through a Rasch analysis, in order to equate the degree of difficulty in implementation of each measure. The observation instrument consisted of one factor that is the differentiated factor based on three dimensions: differentiation in

lesson preparation, differentiation in the teacher-teaching and learning environment and differentiation in assessment (Valiandes, Koutselini, & Kyriakides, 2011).

The next section will review the other variables including differentiaion that have been studied in relation to student achievement and associated with effective classroom teaching and learning.

Other variables associated with effective classroom teaching and learning

The following section will highlight a few studies associated student achievement and other variables that can have a positive impact on learning.

In a classroom, there are students from different socio-economic statuses (SES), students with different learning styles, aptitude, attitudes, perceptions and skills. Hence, it is important to differentiate the instructions of the teacher to cater to the needs of each individual learner (Creemers, 1994). Differentiated instructions can be implemented by looking at the needs of the different learners (Walberg & Paik, 2000). It is important to take note that differentiated instruction does not imply different students have different set of objectives to achieve, differentiations imply that the teacher modifies her teaching according to the learning needs of each student, ensuring each student achieves the same goals but not necessarily taking the same path or doing the same activities (Creemers & Kyriakides, 2006). A study conducted in the U.S, tried to determine if there was a marked difference between effective and less effective teachers against the test scores in students reading in a cohort study of 2 years period. In addition, student ratings were also collected about the teacher behaviour. The results of this research showed that more effective teachers scored comparatively more statistically significant scores than the less effective teachers. It was also seen that teachers who

are considered more effective had better instructional differentiation scores, better expectations of students and better assessments and feedback with the lessons being delivered in a clear systematic manner from lesson objectives made clear to clarity in lesson structuring and objectives being linked well to lessons.

Research shows that variables associated with teacher characteristics (for example., teacher's age, teacher's experience, teacher's educational qualification) on student learning remains an open question. Even though there is much a much more constant association with student achievement and teacher behaviours in the classroom (for example lesson orientation and structuring, content delivery, instructional time and questioning), it is still one of the purposes of this research to check if there are any associations with teacher background characteristics (for example age., qualification and years of experience) and student learning.

Teacher effectiveness including traditional measures (such as teacher experience and teacher qualification) is revisited to see if there were any kind of significant effect on student achievement. Teachers' years of teaching experience refers to the number of years the teacher has dedicated in the field of teaching as a teacher. Many studies have proven that there is a significant relationship between teachers' years of teaching experience and student achievements (Wayne & Young, 2003). For instance, a study conducted in the United States with 4000 teachers, researchers found that teachers' teaching experience was positively associated with student achievement in reading (Clotfelter, Ladd & Vigdor, 2006). Similar studies (Wiswall, 2013; Papay & Craft, 2015; Ladd & Sorenson, 2017) also found that teachers' teaching experience was positively associated with student learning achievements.

However, certain other studies (Blomeke, Olsen & Suhl, 2016; Hanushek & Luque, 2003; Luschei & Chudgar, 2011; Wilson & Floden, 2003) did not find

any significant relationships between teacher experience and student learning outcomes. Another interesting find from a group of researchers (Boyd et al.2006; Rivkin, Hanushek & Kain, 2005; Staiger & Rockoff, 2010) concluded that teachers' teaching experience only mattered in the beginning years of a teachers' teaching career and played a little or no role later in her/his life.

Many studies (for eg. Aaronson, Barrow & Sander, 2007; Blomeke, Olsen & Suhl, 2016; Hanushek & Luque, 2003; Harris & Sass, 2011; Luschei & Chudgar, 2011) have also concluded that there are no significant relationships between teacher qualification and student achievement. A meta-analysis carried out by Wayne & Young (2003) found that there was no significant relationship between a teachers' undergraduate coursework and their future students' achievement in English and other subjects. However, several researches (Akiba, LeTendre & Scribner, 2007; Gustaffsson and Nilson 2016; Montt 2011; Wilson & Floden, 2003) found that teachers' teaching related degrees mattered in student achievement and had a significant effect on student learning outcomes. Palardy & Rumberger (2008) found evidence that students made greater achievements in reading ability when taught by fully certified teachers. Similarly, a study conducted by Darling-Hammond (2000) found out that those teachers who had completed a training and were awarded a teaching certification were far more effective than those who had none. Overall, it is clear that the literature on teachers' teaching qualification and the connections to student achievement remain uncertain. Although the impact of teacher experience and qualification remains largely an open question, studies have shown a more consistent relationship between student achievement and teacher behaviour in the classroom (for example behaviour related to delivery of instructional content).

As mentioned earlier, this research endeavour was undertaken in the

Maldives, therefore the next section will present a brief introduction to the Maldives education system followed by a review of effective teaching within the Maldivian context. This is for the benefit of the reader to understand the educational system in the Maldives, and in particular, throw light on effective teaching within the Maldives. Although not as comprehensive, a few studies from Maldives have been used in examining the effects of some aspects of teaching quality.

In order to put the study in perspective, the next section will give a brief introduction to the Maldives, the Maldives Education system followed by studies that have been conducted in the context of Maldives with regards to quality and teacher effectiveness and its impact on student learning.

A brief introduction to the Maldives education system

Maldives is a group of islands located in the Indian Ocean. This archipelago is made up of 1,190 islands out of which only 198 are inhabited (NBS, 2015). The population of Maldives is approximately 400,000 (NBS, 2015). However, the current population of Maldives is 544,443 projected as of Monday, November 30, 2020, based on Worldometer elaboration of the latest United Nations data (Worldometer, 2020) Tourism and fishing are the two main sources of income for the country. The Maldives gained its' independence from the British regime in 1965. Since then Maldives have had seven presidents among whom his Excellency Maumoon Abdul Gayoom served 30 years making him Asia's longest serving leader. With introduction of multi-party politics which gave the opportunity to his Excellency Mohamed Nasheed to be selected as the first democratic leader in 2008. The present president of the Maldives is, his excellency, Ibrahim Mohamed Solih (presidentsoffice, 2020).

The Education system of Maldives for primary and secondary levels was

formally established during the 1960's following the setup of Ministry of Education. A total of 212 public schools have been established across the country to provide schooling to over 78,000 students (MoE, 2016).

This gave birth to the present structure of Education system leading to greater literacy rates with the country having 98% literates which is the highest in the South Asia and Indian Ocean region. (MoE, 2016). The medium of instruction was both in English and Dhivehi - the national language of Maldives. Between 1940 and 1950, amidst the World War 2, Education began to materialise and gained popularity as an important driving force for the growth and progress of the country. The Government promoted and encouraged island communities, to provide facilities for their children. early in the educational history of the country, each existing school in the Maldives held the responsibility of developing and formulating their own curriculum. The national curriculum was published in the Maldives in the year 1979 by the Ministry of Education. It was designed for a five year primary Education. This laid the foundation for the development of the Middle school curriculum which was officiated soon after and gave birth to the first official National Curriculum that comprised of the primary and middle school cycles in all subject areas. The secondary curriculum content is designed according to the O-level and A-level examinations offered by EDEXCEL. The subjects Islamic studies and Dhivehi language, the content of which is locally designed for the secondary levels. The basic education of Maldives extends to a time period of 9 years in formal and non-formal education for children in the age group of between 7- 15 school age years (UNESCO, 2015).

It is a known fact that due to the structure of island nations, isolation, insularity, and access to different services is one of the major challenges faced by people living in highly dispersed island populations separated by vast oceans from

island to island (Royle, 2001). However, according to the UNICEF's country report it is clear that the Maldives education system has made significant improvement in the country's Education history. With the wider access to education, the number of schools has increased and many policies for improvement in education is in place for example., no child left behind policy (Nazeer, 2017). It was reported that there were 188 schools (in the year 2007) and the number has increased to a total of 211 schools (in the year 2009). Primary Education is free, universal and compulsory which is being offered in 214 schools among which 14 schools (two more schools were established after the research was conducted) are located in the capital (Ministry of Education, 2018). Maldives is also the first nation in the South Asia to provide 12 years of compulsory education and 14 years of free schooling for all students (MoE, 2016). In addition, it is the first nation in South Asia to gain the status of an 'MDG Plus' country by achieving 5 of the 8 Millennium Development Goals much more in advance of its timeline of 2015 (MoE, 2016).

Maldives education indicators including adult literacy rate of 98.4% shows that Maldives has achieved seven years of universal primary education and secondary enrolment level has been maintained close to the universal for the past ten years. In addition, it is also evident that the education system has led to an increase in students pass percentage in G.C.E. O'Level 5-subjects (27%) in 2009 and 77% in 2017 (MoE, 2018).

Effective teaching within the Maldivian context

The country face several challenges in the facet of education. The disparities across the Maldivian islands is felt in all sides of education affecting employment opportunities for island populations and access to a qualified and motivated teaching workforce (Manik & Di Biase, 2020; Nazeer, 2017). The last

15 years in the Maldives, has seen the rapid expansion of school educational services with the importance the world has placed in investing and advancing in the primary years of children's life and education. (UNESCO, 2015). With this increase in the number of schools/institutes catering to the well-being and education, it has become critical to ensure high quality programmes and services are being offered at this stage of children's schooling (Nazeer, 2017). To ensure the successful delivery of these programmes, it is not wrong to assume the need of the hour is high quality teachers.

To monitor the offered educational services is not an easy task. It is not only important to monitor the performance of these schools/ institutes but also equal importance and emphasis needs to be placed on continuous improvement of the educational services that are being offered, ensuring the maintenance of the quality of these institutes.

There is a growing need put in place a sustainable mechanism to ensure quality and effective delivery of teaching and learning in Maldivian schools. Quality encompasses both the children's "whole" school environment and experiences that are inside the classroom and outside the classroom that would positively benefit their overall development and wellbeing. These may include: the curriculum, teachers and staff, interactions and the environment to which children are exposed to. However, quality is a relative term, and hence, the way one defines quality may differ from country to country and may differ with the rapidity of changing times. The definition of quality therefore, should not be considered as a static concept (Kamerman, 2001).

A study by Ngang, Abdulla & May (2010) to study the impact of teacher leadership and effectiveness was conducted on a total of 181 teachers from six primary schools in Male' (the capital city of Maldives). A quantitative survey

method using questionnaire and the findings revealed that there is a significant relationship between each dimension of teacher leadership and school effectiveness. Multiple regression analysis was done among the seven dimensions of teacher leadership, autonomy dimension contributes 47.1% to school effectiveness and become the most significant predictor. However, the other two dimensions include positive environment dimension which contribute 6.5% while open communication dimension contribute 2.9% to school effectiveness. The overall findings indicated that there is 56.5% impact of teacher leadership on school effectiveness. This study helped teachers, Principals and the education ministry to plan, implement, access and maintain high level of teacher leadership which in turn to promote higher level of school effectiveness.

Another study was conducted to study school effectiveness through a study intended to investigate the instructional leadership practices of selected Principals in Maldives by Ahmed (2016). Using a multi-case study and data was collected through an in-depth semi-structured individual interviews by using purposive sampling method and using participants from three schools which consisted of three Principals, three supervisors and three teachers from the said three selected schools. Using the revised instructional leadership behaviour model of Hallinger and Murphy (1990) the results of this study revealed that Principals practiced six dimensions of instructional leadership behaviours and patterns as in the conceptual framework of the study on hand. It was revealed that even though all the three schools that were studied worked with a mission and vision of school they were not very clear about giving more weight towards promoting learning or prepare students for examination. Also, another interesting finding was that they were not clear about Principals role as an instructional or administrative leadership. The study identified important behaviours that required Principals to involve

themselves more directly when it comes to instruction and evaluation.

A Snapshot of the Maldivian School System: Analytical Report of Issues and Challenges from External School Reviews of 2016 & 2017 (QAD, 2018) analysed the school review reports (SRRs) from 2016 and 2017. It identifies key issues and common challenges across the 136 schools across the Maldives and provided analysis of the issues and challenges. This report is grounded in evidence, analysis and real life examples. It also provided brief research based information on key aspects influencing student learning quality. The report also proposes policy level recommendations to address systemic issues arising from the analysis. A review through literature reveals that the work undertaken by Di Biase- who worked at the Maldives National University in the area of student-centred pedagogy as part of a post-tsunami aid project. She suggested a design-based research (DBR) as an interventionist approach, can be implemented in the authentic setting of a Maldivian island school. (Di Biase 2017; Di Biase & Maniku, 2019; Di Biase, 2020). This research undertaking, is perhaps, the closest steps taken towards quality instructional improvement at the teaching (classroom) level that has been made in the Maldives. Through this study, a contribution towards improving the disparity between policy and practice in implementing a more learner-centred pedagogy was explored keeping in line with the principles of the national curriculum framework of the Maldives. An intervention was made specifically to address the policy-practice gap through the suggestion of the development of a structured model of active learning where the focus was on building a learner centered model moving away from dichotomy of teacher-centred approaches practices that are still largely evident in the Maldives. The study suggested the need for a strong pedagogical model to be in place reflecting the local priorities. Drawing on Bronfenbrenner's (1979) ecological framework factors within the school and

island context was also explored that could pave path for active learning which was suggested as guidelines for others implementing similar reforms in related contexts (Di Biase, 2017; Di Biase, 2019).

The National Assessment of Learning Outcomes (NALO) was conducted in 103 schools in the Maldives in order to get information on the performance of students at school, atoll and national level. Under the technical assistance of World Bank (2018) the NALO specifically looked at the performance of students against a set standard of measures. A total of 3136 students and 284 teachers from Grade 4 were selected for this assessment. Quantitative methods of structured test papers, based on the learning outcomes covered in English Syllabi, were designed along with a questionnaire for both students and teachers in Grades 4 in the academic year 2017. The students' test papers were focussed on determining their achievements in learning outcomes, the questionnaire was formulated to determine the students' demographics and learning habits that may be related to their learning outcomes in English. The teachers' questionnaires focussed on identifying teachers' demographics and classroom practices that may be related to student learning outcomes. The findings of this study were also compared with previous NALO studies conducted in 2015. The results indicated that students' performance in English language improved only by 0.27 percent in Grade 4 in 2017 as compared to the previous year. All the three consecutive years' findings i.e., 2015, 2016 and 2017, indicated that Maldivian girls performed better than boys in English. Further research needs to be done to investigate other factors associated with students' performance.

This was one of the studies that gave valuable information about student learning and had implications for all the stakeholders such as the students, parents, and community. However, it is important to recognise that this did not formulate a

connection or an action plan in order to increase the teachers' professional development from the point of view of increasing student learning in primary schools. It is also evident that the above study is not intertwined into teachers' instructional practices hence the suggestions for quality assurance through teacher development was lacking.

It is important to highlight that the Ministry of Education introduced the policy of "Ihaa" (as cited in Ali, 2018) the concept of cluster schooling whereby, "lead" government school would be the main resource and support to a number of nearby island schools. Each cluster consisted of 6 to 11 schools. The main aim was to achieve efficiency in management and supervision of schools, through providing professional support and establish more accountability and overall work on improving the school system' (as cited in Ali, 2018). A follow up study after the implementation of the new policy of cluster schooling revealed that "had not been sufficiently resourced and not comprehensively conceptualised to engender the intended school improvement" The study further observed that "set within a context of small developing islands, the policy lacked the essential ingredients for a collaborative venture of this kind to succeed". Hence, the cluster policy was short-lived and has now effectively ceased to exist (as cited in Ali, 2018).

The teaching and learning component of the Baraabaru school guidelines are the current guidelines that are used by the Ministry of Education Maldives to monitor school teaching and learning aspects. Having embraced the concept Child Friendly Schools, CFS the Ministry of Education retitled the guidelines as the "Child-Friendly Baraabaru Schools" (CFBS) and with it, the Ministry of Education took on a new school evaluation model that used common indicators linked to the child-friendly school concept. One of the primary objectives with which this guideline works included ensuring quality teaching and learning. Information was

collected from schools based on the five dimensions of: 1. Inclusivity 2. Learner-centred Teaching and Learning 3. Health and Safety 4. Family and Community Partnership 5. Leadership and Management (MoE, 2010). Once again it is observed this guideline is merely addressing the standards to be maintained at a school, regional and system level, however, it fails to come down to the specifics at the teacher (classroom) level.

Using more active and participatory student focussed approaches, the focus should be now more on research works undertaken on these lines and look at the precise factors and dimensions that connect teacher's professional development to student learning from a theory driven perspective.

Summary of chapter 2

As discussed in the detailed literature review, the four decades educationl effectiveness research has shown that the most important predictors for student achievement lies in the teaching factors (Scheerens & Bosker, 1997). It was also revealed through this review that the endevour in searching for teaching effectiveness factors is a complex undertaking with various complex and unified relationships that seem to exist between student, school, and community support for learning (Carlson & Cowen, 2015). With the help of advanced statistical approaches and new methodological developments in the field of EER, designs such as multilevel modelling and using longitudinal designs, the EER has taken its research undertakings to newer heights (Creemers & Kyriakides, 2008).

This review has revealed that the time spent on tasks and the opportunities that are presented to learn (OTL) had significant effect on student learning outcomes. The teachers' lesson organisation (for example, structuring, questioning, application) has also been found to have a significant effect on student learning outcomes. The various models of educational effectiveness are visited in order to understand the evolvement of EER modelling. This brings us to the Dynamic Model which incorporated involvement of direct instruction (e.g., structuring and questioning) and the constructivist (eg., modelling and differentiation strategies) approach (Creemers & Kyriakides, 2006). The present study uses the the conceptual framework of the DM in finding the teaching factors most relevant for student achievements in Maldivian primary schools. With this research, the aim was to detect factors and stages of effective teaching in the Maldives. As observed in the literature review, teacher effectiveness research in the context of searching for teaching effectiveness factors based on a comprehensive research driven model, is not an area explored directly in the Maldives.

To summarise, the teacher factors of the Dynamic Model are: *orientation, structuring, questioning, teaching modelling, applications, management of time, teacher role in making classroom a learning environment and assessment*. The model also works on the assumption that each of the factors can be measured using five dimensions: *frequency, focus, stage, quality and differentiation*. The research questions this study seeks to answer are: 1. What are the factors and dimensions of effective teaching identified in a Maldivian classroom? 2. Are the factors and dimensions able to detect teaching effects on student learning outcomes? 3. What are the stages of effective teaching in a Maldivian classroom? 4. Are there any overlaps in the use of Dynamic Model and the Differentiated Model as tools of observation? 5. Were the Dynamic Model and the Differentiated Model relevant to the Maldivian context?

In the subsequent chapter, the methods and procedures employed in the collection of data in the present study are discussed in detail.

CHAPTER 3

METHODOLOGY

This chapter covers the methods that were employed in the present study in order to collect data. First, a justification is given for the chosen research design. The chosen research design is then explained in great detail. Next, the methods and procedures employed in the collection of data are described. The validity and reliability have been established for the primary model i.e., DM, that has been used in this study, therefore, a justification is also given on how the methods chosen paved paths to answer the research questions for the study on hand.

Justification of the chosen research design

Methodology is the core of any research (Cohen et al., 2000). It helps the reader to determine the approach the researcher has used to collect the data. The study on hand uses quantitative research methods to collect data pertaining to the various factors and stages of effective teaching impacting student achievement in Maldivian primary schools in the capital city, Male'. The study focusses on finding the teaching effects of the factors and dimensions of the DM and whether they are applicable in the Maldives. In addition, teacher observations were done by using two instruments of the Dynamic Model and one instrument from the Differentiation Model in order to identify effect of the factors on student learning and in addition, identify stages of effective teaching that takes place in a Maldivian classroom. Students insight on the actual teaching and learning was also collected through a Likert scale of the Dynamic Model (henceforth referred to as the student questionnaire) to collect data from students' perspective about their teachers'

classroom behaviours. This perspective is important since students are at the receiving end of education that is imparted by the teacher (Creemers, Kyriakides, & Sammons, 2010). They have first hand contact with their teacher and therefore, their perception becomes extremely important. Through the findings of this research, it has been in a position to demonstrate stability in student ratings (Marsh, 2007). Studies by (Driscoll, Peterson, Crow, & Larson, 1985; Peterson & Stevens, 1988; Scriven, 1994; Taba, Tylor, & Smith, 1998) were able to determine that student ratings as a reliable source of measure of teaching behaviour from students at primary years too. However, as with the case of this study, it is important to highlight that a combination of student ratings together with other data sources, as in the case of this study (i.e., classroom observations), may provide a better insight as to the functioning of the teacher factors and the five measurement dimensions thus, support the reliability and validity of student ratings. Therefore, through numerical measures such as factor analysis, conclusions were derived from the data collected through the student questionnaire.

Validity is determined when the sampling is representative and when the instruments used are appropriate for the study on hand (Cohen et al., 2000). Reliability measures are those factors that are consistent over a period of time (Cohen et al., 2000). Therefore, for any study to be deemed effective, it must have two of the above properties i.e. validity and reliability (Kline, 1998). This research made an attempt to get data that is valid and reliable on the dependent variable of student achievement in English with in two time periods. This way, it is possible to examine changes in the factors over two-time measures and check how the factors are related in the functioning aspects of specific factors (Creemers, Kyriakides & Sammons, 2010). As mentioned, two tests within two time periods were administered to see if there is a change in student results within these two-

timelines. Therefore, the design leans towards the advantages of a longitudinal design. Generally, when data is collected at least in two points of time it can be considered a longitudinal study and helps to make better judgement about what is being measured (Gustaffson, 2010). The study was conducted within a school year. The reason for the study to be conducted in one school year was due to the fact that teachers will change for the set of students every year. The students do not remain with one teacher for more than one year in the primary classrooms of the Maldives. Another reason was, this was a PhD study and hence, it would have been difficult to spend two or more years in data collection. With all these reasons it was, therefore not practical to have three testing points considering feasibility and costs that would incur. Goldstein (1968, p. 98) states the main advantage of longitudinal studies over cross-sectional studies is the efficiency of the estimation of change, thus allowing researchers to identify changes in the variables under investigation (e.g. student achievement) and determine the various causal effects. Another very important advantage is the efficiency in longitudinal design over cross sectional design and the estimation of change over time in the variables measured (Goldstein, 1968). According to Moerbeek (2008) for the data to obtain enough statistical power, it has to rely on factors such as size of sample, duration of the study, in order to check how the independent variables have an impact on the dependent variable. Keeping in line with the advantages of the longitudinal design over cross sectional one (Galbraith, Stat & Marschner, 2002) the method was chosen.

The different phases of the study

As a first step, a document was obtained from the University of Cyprus as a “no objection” to carry forward with the research in the Maldivian schools. Thereafter, the Maldivian Ministry of Education’s research and planning unit was

contacted to get the necessary approvals to conduct the research in Male' schools. Once the formal letter of approval to conduct research was obtained, schools were contacted with the Ministry's letter and other necessary documents as a package.

The first meeting was with the Principals of schools where formal consent slips for teachers and students to fill was handed to the Principal. The Principal then gave instructions to teachers as to how the research will be conducted. The class teachers took charge to distribute the consent slips to students to be signed by the parents. Once the consents were obtained, the real research data collection process started.

Confidentiality of data was assured in all stages of data collection. It is important to note that the cooperation given by the teachers and the students is appreciated because tests were conducted at two points of time and data collected from over 350 students and observations of 31 teachers is not an easy feat to complete in one academic year.

Participants

The study was conducted in the urban capital city of Maldives which has a total primary school population of 14 schools. The Male' region was selected as firstly, it was more accessible in the process of data collection, and secondly this is the most populous city in the country with maximum number of primary schools situated in one island. All the primary schools ($n=14$) in the Male' region was approached to conduct the research but only 8 schools agreed to participate in the research. Using the stage sampling procedure, the main four wards/ districts of the region were selected i.e., the city is divided into six divisions, four of which were randomly selected: Henveiru, Galolhu, Maafannu and Macchangoalhi. There are a total of 14 schools catering to grade 4 in these mentioned regions. All the 14

schools were approached, however only 8 schools consented for the study. Therefore, 8 schools representing about 50 % of the primary school population in the region were selected. Out of this, 5 were public schools whereas 3 were private. All grade 4 classes/ teacher (n=31) and their students who received parental consent to participated (n = 350) participated in the study.

The method of sampling chosen for this research is multi-stage sampling. Multi-stage sampling is convenient, less time consuming and less expensive (Koul, 2008). It is important to note that, the research on hand is particularly concerned to study teachers and students at the classroom level and not at school level.

The multi-stage method of sampling is used when the population under study's distribution and sampling is not convenient for several reasons. In multi-stage sampling however, there is a limitation due to the element of sample bias which is due to the unequal sizes of the sub samples, for example., school 1 may not yield the same number of subjects from school 2. This is evident in this study too, whereby the first consent had to be taken from Ministry of Education of Maldives, a second consent from the management of the school and an additional consent had to be taken from the parents of the under-age children in order to be part of the research. Not all Maldivian parents gave consent for their children to be part of the research even with the low level of risk of the research on hand. So, students whose parents gave consent became the samples of this research. All the schools (catering to grade 4) were listed and those schools that granted permission to conduct research (n=8) was selected, then all the students of grade 4 was given the parental consent form to be part of the research, however, only those parents who gave consent were selected as the samples. Thus, combining the cluster sample approach with random sampling, the stage sampling process, also known as multi-stage sampling method was utilised. Questionnaires were administered and

observation of teachers were carried out.

Gender ratio is almost 1:1 while teacher and student ratio are 1:28 (MoE, 2016). In this study, students whose parents gave consent became the final sample ($n= 350$). Thus, it is important to highlight all the student parents were approached ($n= 1089$) for gaining consent however, only half of the student population ($n=500$) consented for the study. Few forms had to be discarded due to reasons such as grossly incomplete forms, and total random attempts of answering (for example marking the whole Likert scale at one point for all answers). Few forms were also discarded based on the fact that some students were not present for both prior and post measures. Thus, the sample that was finally selected ($n= 350$) which was evenly distributed among the different classes. So, on an average the distribution was approximately 12 students per class. It is important to address the issue of missing data. As expected, there were some missing data at the student level on prior or post measures of testing. The missing data was due to the fact that there were some students missing on the day of the pretest or the post-test administration day but this was completely random and there was no specific reason for students not to participate. Another reason for the missing data was the fact that the tests were not high-stake tests and administered only for research purposes so the stress on it was lacking from the school side. Thus, the missing cases were not an issue at the student level and going in line with the objectives of the study. It is important to highlight that the school sample for this study is not a representative sample at a country level which was not part of the focus of the study. The focus was not to have a representative sample at the level of the country but rather the focus was to see the relationship between teacher factors and student achievements and in addition, identify the stages of effective teaching in the Maldives. Therefore, the intention of this research was to have enough sample of teachers and all the class

teachers (n=31) of the consenting schools participated which is a good number for this study on hand.

Using questionnaires and surveys are quantitative methods that involves data collection that is quantifiable and statistically analytical (Wolf, 2004). This research also studied the effect of different variables on student learning outcomes at two specific points of time i.e. in Term 1 and at the end of Term 2, without considering their prior education or further developments from the time of measuring their achievements. Hence, this study had two measurements points which supersedes over cross sectional designs.

Through the direct classroom observation of teachers', rich, thick data was collected about all the classroom behaviours of the teacher and through the survey questionnaires administered to students, the perception of students on their teachers' instructional quality was also collected.

Instruments

The study particularly looked at the factors and stages of effective teaching in Maldivian schools. Student and teacher background characteristics (See Appendix B), classroom observations by the researcher and also student ratings on teaching quality of their class teachers were collected as data. In this aspect, under the supervision of a team of teachers and the researcher as the lead, an English test (See Appendix A1 & A2) was developed for testing standards of English reading comprehension and writing.

The instruments that were used to collect teacher observation data came from the Dynamic Model. The instruments that were used were the high inference observation instrument (See Appendix F), the second low inference instrument (See Appendix E) and the student questionnaire (See Appendix C) from the DM.

In addition, the differentiated instrument key from the Differentiated Model of instruction was also used (See Appendix G). The former mentioned instruments from the DM have been validated in various studies conducted in parts of Europe, and the latter mentioned instrument has been validated by one study in Cyprus. In addition, all the instruments, including the tests that were administered at two measurements points, were first piloted before the actual administering.

Variables

Dependent Variable

Student achievement in English reading comprehension and writing skills was the dependent variable of the study. English is the medium of instruction in primary schools of the Maldives and hence, it is important students have a good grasp of the English language and related skills in order to attain success in all areas of the curriculum. All the subjects of the curriuclum are taught in the English language except for the native language of the country i.e., Dhivehi and the teachings of Islam & Quran, English is also the medium through which most information is accessed through the internet. Therefore, the importance of the English language cannot be minimised to a Maldivian student. It is observed that the new national curriculum framework of the Maldives centred more around the student as a step towards providing holistic education (Manik & Di Biase, 2020). As per the national curriculum framework of the Maldives, the National Institute of Education (NIE, 2014) prescribes the key learning areas of : Language & Communication, as that which aims to develop students' literacy skills and hence, enable them to use language in various contexts. The skills of listening, speaking, reading, viewing, writing and representing are the key skills in the English language that students are expected to excel. These skills are emphasised as being

important within the school life scope and beyond the scope of school life too.

In this research undertaking, the prior and post measure used are the tests students will undertake in two testing points in English reading comprehension and writing skills. (See Appendix A1 & A2). The test items were constructed with the expected student learning outcomes in mind as per the curriculum framework for English language & communication, for example., using a variety of strategies to read and comprehend texts, thereafter have the capability to extend meaning on what is read, demonstrate awareness of how to reflect upon own reading and viewing strategies, have the knowledge to decode written texts through reading, are able to create their original writing both personal or imaginative and are able to reflect on and assess their own writing.

The test paper items were constructed with the help of group of teachers from the schools that the sample were taken from. The test items were weighed against the expected student learning outcomes. However, the papers were set for about 45 minutes since it was not possible to get more time with students without compromising too much of their class time. The test paper consisted of two main parts: to read a passage and to answer a few multiple-choice questions which would determine their reading comprehension skills, and to write two grammatically correct passages on given topics to determine their writing skills. The writing test checked aspects such as content, grammar, spelling and sentence structuring. From a curriculum perspective, it checked if the following learning outcomes were achieved: to check if students used a variety of strategies before reading to enhance comprehension of texts; to check if students used strategies after reading to extend meaning, to check if students were able to demonstrate awareness of how to reflect upon own reading and answer a given set of questions, to check the level of understanding a text upon reading and apply the knowledge of language forms and

features of texts to derive meaning, to check if students were able to create a variety of clear personal and imaginative writing (NIE, 2014).

Frequencies were first run and some items recoded based on the frequencies for the pre and post-test. Next, one factor model (i.e., factor analysis) was run for each test to examine whether each test consisted of one factor, followed by a Rasch analysis (Andrich, 1988) for each test.

Variables at the level of the student

Student questionnaire from the Dynamic Model

For the student data sets, the students completed the student questionnaire with some help from class teacher or a parent in class (see Appendix C). The questionnaire was in regard to the eight teaching factors of the Dynamic Model and their dimensions was used. Specifically, with the use of a five-point Likert scale, students were asked to mark on the scale the extent to which their teacher behaves as per the factors and dimensions in their classroom. The original questionnaire was revised according to researchers experience as a Principal of a primary school and the questions which were likely to be not answered by students were dropped. The questionnaire was then piloted and administered.

Socio-Economic Status Questionnaire

This questionnaire for students was prepared with the intention of gaining information about their demographics and socio-economic status (See Appendix B). Frequencies were first run for the responses that were given by the students. Next, a Rasch analysis was run but before that, some recodes were made, for instance., for the question, educational qualification of the mother, the original categories were as follows: (a) no education to studied less than grade 7 = category 1; (b) studied between grade 7-9 = category 2; (c) studied upto grade 10 = category

3; (d) studied upto diploma = category 4; (e) studied upto degree or higher= category 5.

However, there was only 2% of the sample under category 2, and 4% of the sample under category 1. So, recodes had to be made in order to get higher percentages. Therefore, the category 1 & 2 were combined to form category 1 (coded as 1). Similarly, 3 & 4 were recoded into another group and categorised as category 2 (coded as 2). The original category 5 yielded a high frequency score of 29.4% and this group became category 3 (recoded to Code 3). The limit for each of these categories is set at 8 percent.

Thus, with the new categories, it was necessary to run the frequencies with the new recodes. Hence, code 1 & 2 were recoded as code 1. Code 2 & 3 were recoded as Code 2. Finally, code 5 was recoded as 3.

Similar procedures were followed for the educational qualification of the father too. Next, recodes were also made for the employment status of child's mother and father. After the recodes, the final categories were : (a) unemployed / stay at home mother / father = category 0 ; (b) No specific skill group (eg.,labourers, fishermen, farmers) = category 1; (c) having some basic qualification but holding less power in society (eg., secretaries, army officials firemen or policemen in the lower ranks, without necessarily having a higher level of education) = category 2; (d) having a degree or higher qualification and exercise some power in society(eg., nurses, teachers, lawyers, doctors) = category 3;(e) Owns a business = category 4, indicating that the people in this group exhibited self sufficiency.

In addition, the following categories were also derived and coded for the analysis: kind of house child lives in: own home = code 1, rent = code 2; number of bedrooms: Open space = code 0, 1 bedroom = code 1, 2 bedrooms = code 2, 3

or more bedrooms = code 3; number of air-conditioning units: no AC = code 0, 1 AC = code 1, 2 or more ACs = code 2. Questions were asked if the family owned any of the following for example., a bicycle, motorbike, car or any other vehicles. Durable goods at home were also checked for example., mobile phone, water heater, microwave oven, computer/ laptop, TV, refrigerator, iron, stove. In addition, , study materials that the child have at home for him/ her to aid studying were sought for example., if he / she had a desk to study in the sitting room, a room of their own, a quiet place to study, a computer/ iPad they can use for school work, what kind of study resources they had at home for example., story books , text books, reading materials.

Additionally, the students were also asked about their perceptions about the importance of studying, the level of parental involvement in students' study behaviour, students' trust in parents, and if they sought any tuition help. The details of which will be presented in the next section.

Student – other variables measured

Student perception of the importance of studying

A question was also asked regarding the student's perception of the importance of studying. This was treated as a single item and in the multilevel analysis in the later stages of this research, this item will be tested against the student test scores to check if students' perceptions played a role in student achievements.

Parental involvement in student study behaviour

Another set of questions were asked regarding the parental involvement in student's study behaviour. For this set of constructs, factor analysis was run in order to find out if all the items under this construct can be clubbed together to form a

single score and hence, establish one single factor. The eigen value after the factor analysis will then determine if it can be treated as one single factor. A high Eigen value and high factor loadings on a single factor, would indicate that it can be treated as a single factor.

Student trust in parents

Another set of questions were asked regarding the student trust in parents. Similar to the parental involvement in student's study behaviour, factor analysis was run in order to find out if all the items under this construct can be clubbed together to form a single score and hence, establish one single factor. The Eigen value after the factor analysis will then determine if it can be treated as one single factor. A high Eigen value of the factor loadings on a single factor, would indicate that it can be treated as a single factor.

Personal tutor who aids the student after school

A question was also asked regarding whether student got additional help from a personal tutor who aids the student after school at the comfort of his/ her own home on one-to-one basis. This was treated as a single item and in the multilevel analysis in the later stages of this research, this item will be tested against the student test scores to check if this item played a role in student achievements.

A tuition class to which student attends after school

A question was also asked regarding whether student got additional help from a teacher who would give tuition help to a group of students similar to a school setting but with lesser number of students in the group. This was treated as a single item and in the multilevel analysis in the later stages of this research, this item will be tested against the student test scores to check if this item played a role

in student achievements.

Variables at the level of Classroom - Quality of Teaching

The following instruments were used to measure the quality of teaching by studying the different variables at the level of the classroom: one high inference instrument (See Appendix F) and the second low inference instrument (Appendix E) and also a student questionnaire (Appendix C) for collection of data based on the teaching observation and feedback from students.

The High inference observation instrument

The High inference observation instrument uses a Likert scale to determine the measurement of items and measures the eight teacher factors which includes: *Orientation, Structuring, Teaching, Modelling, Questioning Techniques* and *Application* of the Dynamic Model (See Appendix F).

The Second Low inference observation instrument

The Second Low inference observation instrument refers to the five factors of teacher behaviour in the classroom which includes:*orientation, structuring, teaching, modelling, questioning techniques* and *application*. The instrument is designed to collect data in an assimilative manner (See Appendix E).

Observation of Differentiated Instruction instrument

This evaluation tool is not part of the Dynamic Model however; this instrument was also used to identify the characteristics of teachers' differentiated instruction within the classroom. This instrument was used in this study to analyse if an additional instrument is needed to pick up factors of differentiation in a classroom. The observation key for Differentiation Model of Instruction (See Appendix G) was created based on the main characteristics of differentiated instruction (Valiandes, Koutsolini, & Kyriakides, 2011). The instrument consisted of 18 criteria on a 5 points likert scale (See Appendix G).

Teacher – other variables measured

Teachers were also asked to fill a short questionnaire (See Appendix D) in order to find out if their age, qualification and years of experience have an effect on student learning outcomes.

Stages of effective teaching

As previously mentioned, the DM argues that, there exists a relationship among factors that operate at the same level. Thus, the concept of grouping of factors was presented. In the present study too, an attempt was made by using the Rasch model to test the unidimensionality of the scale to search for stages of effective teaching.

As a first step, the Rasch Model was run for measuring the teacher factors, in order to determine if factors and dimensions of the Dynamic Model are situated in different stages of effective teaching in the Maldives. The objective of running the Rasch model was to check if the class activities of the measurement instrument can be ordered according to their level of difficulty. According to Green & Frantom (2002) the Rasch Model helps to place teachers and class activities on the same scale thus, allowing the examination of the range of teaching practices to see of if these tasks can be placed from an easy to difficult scale.

The next step was to identify the reliability of teacher items by making an estimate on the teaching practices observed and check how the tasks can be put on a continuum based on the level of difficulty.

The stages of effective teaching are identified through positioning of the teaching dimension (e.g., frequency dimension of the orientation factor) through various analysis, which revealed the teachers who performed well (i.e., those scoring

higher than the position of this skill on the scale) as well as those teachers who didn't perform well (those scoring lower than the position of this teaching skill).

Next, a cluster analysis was performed in order to check if the teaching skills could be grouped into different levels of difficulty of teacher behaviours that spans over a scale from being relatively easy to more difficult from the five dimensions of the eight teacher-level factors included in the DM.

Data analysis

The analysis of data is based on the sample of all students who have scored in both the prior and post tests ($n=350$). The multilevel analysis is then performed to find effects of teachers' teaching behaviour on student achievements. The data is hierarchical in the sense that students were nested in classrooms with the teacher and hence, multilevel modelling was considered appropriate for analysing the data (Goldstein, 2003). Multilevel modelling enables an effective way of identifying those variables at the student and teacher that are associated with student learning outcomes (Snijders, 2011).

Descriptive statistics were run prior to Multilevel modeling to give an overall picture of the data. Next the multi-level modeling enabled an effective way of identifying those variables at the student and teacher that are associated with student learning outcomes (Snijders, 2005; Steele, 2008). The random intercept model was used in order to conduct the multi-level analysis at two different levels (i.e., at the student and teachers). The empty model was run using the following formula. Then each of the factor scores were entered into the empty model to check effects on student learning.

$$Y_{ijk} = \beta_0 + V_{0k} + U_{0jk} + R_{ijk} \quad (\text{empty model})$$

The Random Intercept model was used in order to conduct the multilevel analysis at two different levels (i.e., at the student and teachers). The empty model (intercept) signifies random differences between groups (Goldstein, 2003). With the two-level model that was used for the analysis, the residuals in student achievement are split into two components, corresponding to the two levels of the data structure (Leckie & Charlton, 2013). The first model is an empty model with no predictor variables. This model of multilevel modelling is called as the variance components model. The reason being it decomposes the variation that is found in the dependent variable (student achievement) into separate level-specific variance components. As a final step, the data was subjected to cluster and multilevel analysis in order to identify the stages of effective teaching in the Maldives.

Summary of chapter 3

The chapter has highlighted the different methods that were used in the collection of data and in this endeavour have also brought into light the research questions. In this study, Grade 4 students and teachers' data were analysed. Out of 14 schools that taught Grade 4 level students, data was collected from 8 schools ($n= 8$). The final student sample was ($n= 350$) The study was conducted in the capital city of the Republic of Maldives that is Male'. All the class teachers of Grade 4 of the 8 consenting schools participated in the study ($n=31$).

As already mentioned, the study used a longitudinal approach to determine the effectiveness of teacher in looking at student achievement particularly in English reading comprehension and writing skills. The longitudinal study spanned only for one year in data collection, considering the cost and time factors. The achievement scores cover only one academic year. It is a known fact that

longitudinal studies are both time consuming and costly (Cohen et al., 2000). There are also many threats including student drop out, teacher drop out, and so in order to minimise on these factors, one school year was considered for data collection. Moreover, there is general consensus among researchers that observations done at two time periods even within the same year still is a longitudinal study.

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CHAPTER 4

DATA ANALYSIS AND RESULTS

The subsequent sections would present the statistical analysis of the data that was collected for this study. As a first step, descriptive statistical analysis was performed in order to get a general impression of teachers' teaching behaviour detected in the classroom during the class observations. The second step was to perform multilevel statistical analysis to see the significant effect on student achievement when treated with the various teachers factors and dimensions of the Dynamic Model and the Differentiated Model. Finally, the teacher effects on student achievements are presented.

Descriptive statistics: For the teacher sample

Table 1 below gives the background information of the teachers from the teacher sample for the study. In the table, the percentages for each of the teacher groups are specified. The following observations arises from table 1. First, it can be observed that all of the teachers in the sample were female (100%). This is because the majority of teachers in primary grades in the Maldives are female. In fact, none of the schools from which the data was collected had class teachers who were male. This means that from this research, the effect of gender cannot be determined for teacher on student achievement. On the hand, looking at the age range, it can be observed that there is a good distribution for teachers' age except for the group of teachers above 45 years, which represented only 6.5% (n=2) of the teacher sample. The main reason why the teacher's age groups were divided into four groups is firstly, to check if the teacher sample looks like or is a representation of the population in terms of these four age group variables and secondly, to check if there is an effect of teacher age on the student achievement during the multilevel

analysis. The smaller number of teachers in the age group above 45 years (n=2), is mainly due to the trend that that Mdivian teachers tend to leave schools and pursue higher education. With the various scholarship opportunities available to teachers through the Ministry of Higher Education of the Maldives it is evident that they leave other countries at some point in their career to pursue higher studies (Ibrahim, 2018). Therefore, with almost an equal distribution of teachers age across the teacher sample in the first three groups, it would be easy to detect if there is an effect of teachers' age on the student achievement.

Looking at the qualification of teachers, it is observed that none of the teachers has a PhD qualification. It is important to highlight that in the primary levels of Maldivian schools; it is uncommon to find teachers with a PhD qualification. Therefore, this kind of distribution is not unusual as in the case of the Maldives with only Maldives with only 158 PhD holders with published theses (WordPress, 2017) in a country with over a population of 400,000 people (NBS, 2015). The current population of Maldives is 544,443 projected as of Monday, November 30, 2020, based on Worldometer elaboration of the latest United Nations data (Worldometer, 2020). Looking at the teaching experience, it can also be observed the sample is a more or less equal distribution of teaching experience across the teacher sample.

Table 1. Descriptive statistics of the teacher sample in terms of age, experience and qualifications

Variables	Categories	Frequency	Percentages
Gender	Male	0	0.00%
	Female	31	100.00%
Age	Under 25	8	25.80%
	Between 26 - 35	12	38.70%
	Between 36 – 45	9	29.00%
Highest Qualification	Above 45	2	06.50%
	Diploma	9	29.00%
	Degree	14	45.20%
	Masters	8	25.80%
Teaching Experience	PhD	0	00.00%
	0-3 years	7	22.60%
	4 -7 years	8	25.80%
	8-13 years	11	35.50%

Descriptive statistics: Data emerging from the student questionnaire

Table 2 gives the descriptive statistics arising from data that emerged from the student questionnaire. The following observations arises from table 2. The mean score that was obtained for the teacher factors were between 1.23 and 4.25 respectively. The highest means obtained were in the factors of structuring (focus dimension) with a mean score of 4.25; classroom as a learning environment / teacher – student interaction (frequency dimension) obtained a mean score of 4.06 and Assessment (frequency dimension) with a mean score of 4.143. The high mean scores indicate more occurrences of effective teacher behaviours in the classroom. The teacher factor with the lowest mean score was found to be the teacher factor of questioning under the differentiation dimension with a mean score of only 1.23 and closely followed by the teacher factor of classroom as a learning environment / dealing with misbehaviour (frequency dimension). These two low mean scores are an indication that the students thought that these factors were lacking in the teacher as compared with the rest of the factors.

Table 2 - Descriptive statistics: Data emerging from the student questionnaire

Teacher Factors	Dimensions	Min	Max	Mean	SD
Orientation	Quality	3.2	4.5	3.98	0.24
Structuring	Focus	3.6	5.0	4.25	0.23
	Stage	2.7	4.1	3.20	0.26
	Quality	3.2	4.1	3.79	0.17
Application	Stage	2.7	4.3	3.26	0.39
	Quality	2.4	3.3	2.83	0.15
	Differentiation	1.9	2.8	2.39	0.16
Management of Time	Frequency	2.7	4.8	3.04	0.24
Questioning	Frequency	2.1	4.3	2.72	0.23
	Quality	3.0	3.9	3.39	0.15
	Differentiation	0.7	2.5	1.23	0.38
Modelling	Modelling	3.3	4.2	3.81	0.19
Classroom as a learning Environment / Teacher – Student Interaction	Frequency	3.2	4.5	4.06	0.27
	Quality	3.0	4.4	3.77	0.30
Classroom as a learning Environment / Dealing with Misbehaviour	Frequency	1.2	3.8	1.73	0.28
	Focus	1.5	4.6	3.75	0.36
	Quality	1.8	3.1	2.41	0.18
Assessment	Frequency	2.8	4.6	4.14	0.38
	Quality	3.3	4.9	3.89	0.24

Note: The lowest minimum (min) score that can be obtained is 0 and the highest maximum (max) score that can be obtained is 5. The frequencies are recorded in seconds except for questioning which is in minutes.

Secondly, it can be observed that overall, all of the standard deviations are very low for all the teacher effects. It is also evident from the table, the standard deviation of the means for all the teacher factors was between 0.15 and 0.38 which is an indication that the teachers did not vary a great deal in their teaching behaviours according to the students' point of view. For instance, with the quality dimension of application and also the quality dimension of questioning, the standard deviation scores were comparatively small ($SD = 0.15$) which is an indication that the statistical power for detecting effects of teacher factors based on the questionnaires would also be less. Thus, these were some of the factors which were the most difficult to detect. On the contrary with the factor of differentiation

of the questioning dimension, the standard deviation is bigger ($SD = 0.38$) and similarly the focus dimension of dealing with misbehaviour the standard deviation is also bigger ($SD = 0.36$) and hence, teacher's effects can be detected. Results emerged from student questionnaire are also compared with those emerged from the other instruments in the next sections.

Descriptive Statistics: Data emerging from the High inference observation instrument

Table 3 gives the descriptive statistics arising from data that emerged from the High inference observation instrument. The following observations arises from table 3. The data shows that the mean score for all dimensions were between 3.33 and 4.62 respectively which is quite high which means occurrences of those behaviours for example, dealing with misbehaviour. One explanation for the high mean score could be due to the fact of the presence of the researcher as an observer. The fact that the observer was there in the classroom, the detections of the misbehaviour was very less. The highest means obtained were in the dimension of time management with a mean score of 4.62 and Teacher-Student Interaction dimension with a mean score of 4.02. As mentioned previously, high mean scores indicate more occurrences of effective teacher behaviours in the classroom as in this case as per the researcher's observations. The teacher factor with the lowest average mean score from all the factors was found to be the teacher factor of questioning under the differentiation dimension with a mean score of 3.33 which is also practical and cannot be considered too low.

Unlike the data emerging from the student questionnaire, it is observed with the high inference instrument, the overall standard deviations are quite big. As mentioned earlier, this could be due to the presence of the researcher as an observer

in the classroom that could have contributed to this result. It is also evident from the table, the standard deviation of the means for all the teacher factors was between 0.20 and 1.06 which is comparatively higher than what is evident from the student questionnaire. The teacher factors of orientation and learning environment: teacher-student interaction had the highest standard deviation scores ($SD = 0.92$ and $SD = 0.96$ respectively). The general picture, therefore, is better from the data arising from the high inference observations as compared to the student questionnaire. The standard deviations are relatively high but there are cases when some effects cannot be detected for instance the dealing with classroom misbehaviour the standard deviation was low ($SD = 0.21$). Similarly, for time management ($SD = 0.52$) and application ($SD = 0.57$) the recorded standard deviations are comparatively low. Looking at the minimum and maximum scores, it is evident that for almost all factors there was considerable variations which is an indication that teacher behaviours varied considerably across factors.

Table 3. Descriptive Statistics: Data emerging from the High inference observation instrument

Factors	Min	Max	Mean	SD
Orientation	1.3	5.0	3.99	0.93
Structuring	1.0	5.0	3.77	1.06
Questioning	1.3	4.1	3.33	0.68
Application	2.0	4.4	3.65	0.57
Time management	2.8	5.0	4.62	0.52
Classroom as a Learning Environment:				
Student-Student Interaction	1.6	5.0	3.90	0.88
Classroom as a Learning Environment:				
Teacher-Student Interaction	2.5	5.0	4.20	0.96
Classroom as a Learning Environment:	3.2	5.0	3.79	0.21
Classroom Misbehaviour				
Modelling	1.2	5.0	4.02	0.96

Note: The lowest minimum (min) score that can be obtained is 0 and the highest maximum (max) score that can be obtained is 5. The time management factor is recorded in minutes.

Descriptive Statistics: Data emerging from the Second Low inference Observation Instrument

The second low inference observation instrument refers to the five factors of the Dynamic Model of teacher effectiveness that is *frequency, stage, focus, quality* and *differentiation*. By using the instrument, the researcher recorded the observed lesson and then recorded the activities that took place in the classroom under the five factors of the dimensions with specific time teacher spent for each of the activities. The second low inference observation instrument has five factors namely, *orientation, structuring, application, new learning modelling, and questioning*. Under each of these factors there are the dimensions namely, *stage, duration, focus, quality* and *differentiation*. All the dimensions of the model follow a scale. The stage dimension has to do with the sequence of activity and the minimum possible value for stage dimension is 0 which indicates that there was no sequence of activity observed and the maximum possible value for this dimension is 5, which indicates that there was an excellent sequencing of activity observed. The Duration dimension for all dimensions is measured in minutes except for questioning, which is measured in seconds. The duration refers to the length of time that is spent. The possible length for a lesson ranges between 40 - 45 minutes in a Maldivian classroom. The duration has to do with the frequency. The focus, quality and differentiation dimensions also follow a scale. The minimum possible value for these three dimensions is 0 which indicates that there were no activities on these dimensions observed and the maximum possible value for these dimensions is 5 which means that there was an appropriate and commendable number of activities on these dimensions observed.

Table 4 gives the descriptive statistics arising from data that emerged from the the second low inference instrument. The following observations arises from

table 4. At first glance of the data emerging from table 4, it is alarmingly evident that there are many dimensions with minimum values as 0. This is an indication that these teaching factors did not occur at all in some of the Maldivian classrooms. This means that there are some Maldivian teachers that do not give any structuring, application, modelling or questioning activities in their classroom. This is especially true for the differentiation dimension in all of the factors where the minimum value is observed to be 0. Even in the orientation factor, it is evident that there are no differentiation activities by teachers. It is also evident that enough time is spent on orientation activities with a mean average of about 6 minutes (orientation – duration mean =11.84 minutes). This is good but not enough when considered out of 45 minutes of class time. Looking at the standard deviations, the differentiation dimension recorded the lowest score, indicating clearly that the teachers have not been able to cater to the needs of the children in a mixed ability classroom by differentiating instructions.

It is also evident that enough time is spent on structuring activities that is about 3 minutes with structuring factor duration mean recorded at 2.92 minutes. Once again, this is satisfactory but not good enough when considered out of 45 minutes of class time. Similar to Orientation, the standard deviations in structuring under the differentiation dimension has the lowest score, indicating that the teacher did not cater to the needs of the children in a mixed ability classroom by differentiating instructions.

It is also clearly visible from the table that the teachers have spent about 12 minutes (Application – Duration mean =11.84 minutes) on application activities on an average. This is an indication that, Maldivain teachers spends enough time on Application activities in the class. There are, however, great variations. The observer detected teachers who spent 0 minutes to teachers who spent 35 minutes

on application activities which is a critical issue that needs to be addressed in a Maldivian classroom. In class time ranging from 40-45 minutes, if the teacher spent 35 minutes only on an application activity, then this needs to be taken as a critical issue to be addressed. It is also evident that the standard deviations are high on most of the dimensions of the application factor and thus, can easily detect the effects. However, the general conclusion from the table, for Application factor, is that the matter of large variations needs to be addressed as a matter of urgency.

It is also observed that a teacher has spent about 22 minutes on Modelling factor on the Duration dimension. This is an extreme case and it is once again problematic for the country and needs to be addressed. If a teacher spends 22 minutes out of the 45 minutes classtime, then she leaves very less time for the other factors and stages of teaching that needs to take place in the classroom. The good news is however, similar to the case with application factor, the standard deviations are high on most of the dimensions of this factor and thus can easily detect the effects. It is also evident that in the modelling factor, the dimension of differentiation cannot pick up effects despite the fact that there are teachers who spent a lot of time in modelling. The reason being that the mean value for differentiation is only 0.28 which is very small. This is a strong indication that the needs of the children in a mixed ability classroom by differentiating instructions is not being catered to.

In the questioning factor, once again it is alarming to see Maldivian teachers who don't ask any questions to students during the 45 minutes that she spends in teaching time in the classroom. This is an indication that there were teachers who didn't bother to raise questions to students. In the questioning dimension, the waiting time, indicates the amount of time the teacher waits after raising a question to the students. This is indicated in seconds. The average mean

recorded on this factor is about 20 seconds (mean =20.71) which is once again a disagreeable finding. The researcher wants to draw the attention to one specific case of a teacher here, who's waiting time went over 53 seconds after she asked a question. It was intolerable that she waited this long looking at her watch. She did not ask additional prompting questions or give hints or clues to try to get answers from the students. It is highly disturbing to note that that these kinds of things are happening in a Maldivian classroom and very unfair on the part for the students. Looking at the table, it is seen that teachers have spent a considerable amount of time on questioning and application activities which obtained a mean score value of 7.61 and 20.71 which obtained the highest mean score from all the teaching factors. Looking at the standard deviations, the differentiation dimension has the lowest score, indicating the teachers were not able to cater to the needs of the children in a mixed ability classroom by differentiating questioning.

Table 4. Descriptive statistics emerging from the second low inference observation instrument

Factors	Dimensions	Min	Max	Mean	SD
Orientation	Stage	1.0	4.0	1.50	0.80
	Duration	1.0	23.0	5.95	3.62
	Focus	0.0	2.0	0.44	0.69
	Quality	1.0	3.0	2.15	0.84
	Differentiation	0.0	1.5	0.72	0.48
Structuring	Stage	0.0	5.0	2.45	1.28
	Duration	0.0	12.0	2.92	2.14
	Focus	0.0	3.0	0.35	0.59
	Quality	0.0	2.5	1.23	0.63
	Differentiation	0.0	1.5	0.57	0.47
Application	Stage	0.0	7.0	4.14	1.65
	Duration	0.0	35.0	11.84	6.90
	Focus	0.0	2.0	0.51	0.61
	Quality	0.0	2.0	1.55	0.56
	Differentiation	0.0	1.0	0.77	0.42
Modelling	Stage	0.0	9.0	3.99	2.48
	Duration	0.0	22.0	7.61	6.48
	Focus	0.0	3.0	1.53	1.22
	Quality Teacher role	0.0	3.0	1.87	1.20

	Quality - appropriateness of the model	0.0	2.0	0.82	0.50
	Quality Stage of the lesson	0.0	2.0	0.78	0.69
	Differentiation	0.0	1.0	0.28	0.45
	Stage	0.0	18.0	8.95	3.55
	Waiting time in seconds Frequency	0.0	53.0	20.71	10.53
	Focus	0.0	3.0	1.51	0.96
	Quality -type of question	0.0	2.5	1.45	0.54
Questioning	Quality reaction if no answer from pupils	0.0	9.0	5.25	3.20
	Quality feedback reaction to student	0.0	3.0	2.35	0.67
	Quality feedback reaction about the answer	0.0	3.0	2.38	0.63
	Differentiation	0.0	1.0	0.71	0.44

Note: The lowest minimum (min) score that can be obtained for quality and focus dimension is 1 and the highest maximum (max) score that can be obtained is 3. The lowest minimum (min) score that can be obtained for differentiation dimension is 0 and the highest maximum (max) score that can be obtained is 1. The duration for all factors is in minutes except for questioning which is in seconds.

Descriptive Statistics: Data emerging from the observation of differentiated instruction instrument

Table 5 shows the descriptive statistics emerging from the differentiated model instrument. This tool is not part of the Dynamic Model, however, this instrument was also used to determine the level of differentiation observed during the teachers' lesson.

The following observations were made from table 5. Over all, the data emerging from this instrument, could be considered normal. The mean scores are relatively high in all cases especially in assessment ($n=4.06$). The standard deviations are relatively high which means there was enough power to detect the effects. Looking at the standard deviations, it is evident that the instrument was not able to detect the effects. This is an issue since there was a lot of power to detect

the effects, as some of the standard deviations were very good. Similar to the high inference instrument, there were very high scores obtained on the different factors of this instrument. However, there is a marked difference between these results obtained and the differentiation data that emerged from the low inference instrument. The low inference instrument results clearly indicated that the differentiation was very low, however, this instrument picked up that there was in fact differentiation by the teacher. This instrument has given us a completely different picture. This might have to do the fact that the instrument was never validated and may need further investigation. We cannot trust this instrument unless we have a more systematic validation studies done on the instrument which shows that the mean score was between 3.57 and 4.06 respectively. The highest means obtained were in the factor assessment with a mean score of 4.06 which indicated more occurrences of effective teacher behaviours pertaining to this factor as per the researcher. Among all the teacher factors, the lowest mean score was found to be in the teacher factor of teaching and learning environment which recorded a mean score of 3.84. It is also evident from the table, the standard deviation of the means for all the teacher factors was between 1.35 and 1.09 which is comparatively higher than what is evident from the student questionnaire and the high and the low inference differentiation factor.

Table 5. Descriptive statistics from the data emerging from the Differentiated Model

Factors of differentiation	Min	Max	Mean	SD
Lesson preparation	1.00	5.00	3.57	1.35
Teaching and learning environment	1.00	5.00	3.84	1.07
Assessment	1.00	5.00	4.06	1.09

Note: The lowest minimum (min) score that can be obtained on all dimension is 1 and the highest maximum (max) score that can be obtained is 5.

After the descriptive statistics were run, the next step was to conduct the multilevel analysis in order to check if the teacher factors explain the student achievements. The results of the multilevel analysis of the impact of factors on student achievement are presented in the subsequent section.

Using Multilevel Analysis to find the impact of teacher factors of the Dynamic Model on student achievement in English language

Table 6. shows the parameter estimates and (standard errors) for the analysis of achievement in English language (students within classes) at the end of the school year. As stated in chapter three, MLwiN software (Goldstein et al., 1998) was used for the multilevel analysis. MLwiN is a software that is not only used to run multilevel analysis but also can run complex analysis using different equations to find the effect of different independent variables on the dependent variable (as in this research, the student achievement in the post test result). All the other variables are the independent variables such as the SES score, pretest score, variables at the student level (student perception of importance of studying, parental involvement in students' study behaviour, student trust in parents, tuition class after school, private tutor who comes home to teach) and the factors and dimension scores of the different instruments used in this study (for example, the high inference, the second low inference, the differentiated instrument and the student questionnaire).

The intercept or the empty model (model 0) consists of only the constant, is an unconditional model without explanatory variables that does not describe how much variation in achievement is between classrooms and how much variation in achievement is between students. The first step was to run a two-level model

(classroom/teacher at level 1 and student at level 2) with no explanatory variables (i.e., empty model) to determine the variance at each level. It is important to note that factors of teaching that leads to student achievement is made apparent by the variance in achievement as designated for, by the factor in reference to the percentage of in a simple variable decomposition lying between classrooms and within students (Scheerens & Bosker, 1997). Adequate variance has to be taken at 10% or more to be significant (Raudenbush & Bryk, 2002). As a standard practice, an adjustment is made to the student achievement score for background factors (for example., the SES score) and only after which the effects of teachers can be determined (Scheerens, 2013).

The first step was to determine the intercept which was an estimate 0.37 with a standard error of 0.18. The empty model (Model 0) had no independent variables. The variance was split into two (i.e., 0.99 and 7.67) to get the total variance of 8.67. This means that 1 out of 8.67 is situated at the class level which means that there was approximately 13% variance. As it can be observed in the first column of the table (model 0), 11.43% of the variance in achievement is at the level of the classroom (teachers) and 88.57% is at the level of students. This is an indication that an extremely high proportion of the variance in achievement lies at the student level.

Multilevel Analysis – Results from the Socio-Economic Status (SES) questionnaire

Then the variables were introduced into the empty model. (Model 0) For instance, for the model 1, the independent variables of gender, the SES and the pretest were entered first to check the effect of these independent variables on dependent variable (i.e., student achievement). The objective was to find out if any of the independent variables had any statistically significant effect on the dependent

variable (i.e., student achievement or the post test results). To find this, a simple division calculation was computed between the test score and the standard error. (i.e., 0.326 was divided by 0.219) in order to yield the result that should be more than 1.98 in order for the tested variable to produce statistically significant effect. For example, to check the effect of SES questionnaire, it is evident that there is no significant statistical significance as the standard error is bigger than the effect of the variable (Refer table 6). However, the pretest had a statistically significant effect because performing the calculation of division between 0.927 with 0.05 yielded 18.54 which is statistically significant. So, the model was run again but this time without SES scores as SES did not have a statistically significant effect. So, for the final model 1, the variables considered were constant and pretest.

For model a, the rest of the additional variables at the student level (i.e., student perception of importance of studying, parental involvement in students' study behaviour, student trust in parents, tuition class after school, private tutor who comes home to teach) were added. It was found that none of the variables had significant effect on the student achievement as for each of the variable as the standard error was bigger than the effect. Only for the student perception of the importance of studying the standard error was smaller than the effect however, it was still not at a significant level (>1.98).

Multilevel analysis - results from the student questionnaire

The next step was to check the effect of the teacher factors of the Dynamic Model on student achievement from the student questionnaire. Therefore, this section will present the results arising from the analysis relating to the student questionnaire.

Nineteen different versions of model 2 (i.e., models 2a -2s) were conducted for each of the factors emerging from the student questionnaire. In running each of

the models, the factor scores were added one by one to model 2. Model 2a was run with the constant and the orientation factor-quality dimension from the student questionnaire was introduced to the model. It was found that it had statistically significant effect when 0.791 was divided by 0.58 which yielded a result of 1.37 which is ($z > 1.3$) which is considered considered statistically significant (Refer table.6).

The next step was to add the second teacher factor structuring factor -focus dimension but this did not have a statistically significant effect because the standard error was bigger than the effect. Likewise, all the models were created in this method for all the factors from the student questionnaire. In the table below, the results revealed that three factors from the student questionnaire that is Orientation (in the quality dimension), application (in the differentiation dimension) and misbehaviour (in the focus dimension) was found to be statistically significant at 1.35, 1.48 & 1.30 respectively.

As was indicated in the descriptive statistics section (Refer table 2), the very small values of the standard deviation of the teacher factors pertaining to the data emerging from the student questionnaire revealed that the statistical power for detecting effects of teacher factors was less.

Multilevel analysis - results from the high inference observation instrument

Nine different models were conducted for each of the factors under the instrument. In each version of model, the factor scores of the instrument were added one by one to the model. Table 6 presents the results. Similar to the student questionnaire, some factors emerged as having significant effects on student achievements (i.e Orientation, Application, Student-Student Interaction and Teacher-Student Interaction was found to be statistically significant at 1.3, 1.56, 2.17 & 1.9 respectively. In addition, the classroom level factors of classroom

disorder and modelling was also found to be statistically significant at 1.3 and 1.9 respectively.

Multilevel analysis – results from the second low inference observation instrument

As with the student questionnaire and the High inference observation instrument, a similar procedure was run with the low inference observation instrument data with different models that were run for each of the measurement dimensions (*frequency, stage, focus, quality* and *differentiation*) of the five factors of the Dynamic Model (*orientation, structuring, application, modelling* and *questioning*). In each of the version of the model, the scores under each of the dimensions of the teacher factors were added factor by factor. Table 6 presents the results. As it can be observed in the table 6, the orientation factor was found to had effects on student achievement and the dimensions of stage, focus and quality had a statistically significant on student achievement ($p<.05$). It is also observed that Structuring factor was found to had effects on student achievement and the dimensions of stage, quality and the differentiation had a statistically significant on student achievement ($p<.05$).

In Application factor it was found to have effects only at the differentiation dimension which was statistically significant ($p<.05$). The differentiation dimension of the modelling factor also revealed statistically significant effects. The stage dimension of the questioning factor also revealed statistically significant effects.

Table 6. Parameter estimates and (standard errors) for the analysis of achievement in English language (students within classes) at the end of the school year

Factors	Model 0	Model 1	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e	Model 2f	Model 2g
Fixed Part									
<i>Intercept</i>	0.37 (.18)	0.35 (.13)	0.36 (.13)	0.37 (.13)	0.36 (.13)	0.35 (.13)	0.36 (.13)	0.36 (.13)	0.35 (.13)
<i>Student level</i>									
Prior achievement		0.94 (.05)	0.95 (.05)	0.95 (.05)	0.94 (.05)	0.94 (.05)	0.94 (.05)	0.94 (.05)	0.94 (.05)
<i>Class level</i>									
<u>Student questionnaire</u>				0.79 (.58)					
Orientation – Quality					1.24 (.92)				
Application – Differentiation						0.57 (.39)			
Misbehaviour - Focus									
<u>High inference</u>									
Orientation						0.18 (.13)			
Application							0.35 (.23)		
Student – Student Interaction								0.32 (0.15)	
Teacher – Student Interaction									0.25 (.13)
Variance components									
Class	11.43%	5.92%	5.27%	5.16%	5.78%	5.58%	5.46%	5.31%	4.39%
Student	88.57%	42.66%	42.87%	42.97%	42.46%	42.68%	42.66%	42.47%	42.55%
Explained		51.42%	51.86%	51.87%	51.76%	51.74%	51.88%	51.86%	51.06%
Significant test									
χ^2	1742.38	1488.84	1485.99	1486.09	1486.66	1486.26	1486.43	1484.18	1485.24
Reduction		253.54	2.85	2.75	2.18	2.58	2.41	4.66	3.6
Degrees of freedom		1	1	1	1	1	1	1	1
p-value		.001	.05	.05	.05	.05	.05	.001	.01

Table 6 (continued). Parameter estimates and (standard errors) for the analysis of achievement in English language (students within classes) at the end of the school year

Factors	Model 2h	Model 2i	Model 2j	Model 2k	Model 2l	Model 2m	Model 2n	Model 2o	Model 2p
Fixed Part									
Intercept	0.35 (.13)	0.36 (.13)	0.37 (.13)	0.36 (.13)	0.37 (.13)	0.38 (.13)	0.35 (.13)	0.34 (.13)	0.35 (.13)
<i>Student level</i>									
Prior achievement	0.94 (.05)	0.94 (.05)	0.95 (.05)	0.95 (.05)	0.95 (.05)	0.94 (.05)	0.95 (.05)	0.95 (.05)	0.94 (.05)
<i>Class level</i>									
<u>High inference</u>									
Classroom Disorder	0.80 (.61)								
Modelling		0.26 (.14)							
Teacher's age			0.13 (.10)						
<u>Low inference</u>									
Orientation - Stage				0.31 (.16)					
Orientation - Focus					0.45 (.20)				
Orientation - Quality						0.33 (.15)			
Structuring - Stage							0.24 (.10)		
Structuring - Quality								0.36 (.20)	
Structuring – Differentiation									0.35 (.25)
Variance components									
Class	5.89%	4.80%	5.58%	5.49%	5.38%	4.66%	4.95%	5.77%	5.47%
Student	42.44%	43.04%	42.66%	42.50%	42.38%	42.92%	42.65%	42.36%	42.75%
Explained	51.67%	52.16%	51.76%	52.01%	52.24%	52.42%	52.40%	51.87%	51.78%
Significant test									
X ²	1486.14	1485.65	1486.11	1485.35	1483.92	1483.98	1483.59	1485.80	1486.16
Reduction	2.7	3.19	2.73	3.49	4.92	4.86	5.25	3.04	2.68
Degrees of freedom	1	1	1	1	1	1	1	1	1
p-value	.05	.01	.01	.01	.001	.001	.001	.001	.05

Table 6 (continued). Parameter estimates and (standard errors) for the analysis of achievement in English language (students within classes) at the end of the school year

Factors	Model 2q	Model 2r	Model 2s	Model 2t
Fixed Part				
<i>Intercept</i>	0.34 (.13)	0.38 (.13)	0.36 (.13)	0.35 (.13)
<i>Student level</i>				
Prior achievement	0.94 (.05)	0.94 (.05)	0.94 (.05)	0.94 (0.05)
<i>Class level</i>				
<u>Low inference</u>				
Application – Differentiation	0.40 (.30)			
Modelling – Quality		.31 (.18)		
Modelling – Differentiation			0.50 (.28)	
Questioning - Stage				0.05 (.03)
Variance components				
Class	6.27%	4.98%	4.95%	5.63%
Student	42.20%	42.95%	42.96%	42.63%
Explained	51.53%	52.07%	52.09%	51.74%
Significant test				
X ²	1486.22	1486.03	1485.93	1486.16
Reduction	2.62	2.81	2.91	2.68
Degrees of freedom	1	1	1	1
p-value	.05	.05	.01	.01

Note: For Model 1 the reduction is estimated in relation to the deviance of Model 0;

For Model 2a-2t the reduction is estimated in relation to the deviance of Model 1

Multilevel analysis - results from the differentiated instrument

Three different versions of model 5 (i.e., models 5a -5c) were conducted for each of the factors. In each version of models, , the factor scores of the models were added one by one to model 5. However, it was found that none of the teacher factors under the differentiation instrument was found to have a statistically significant on achievement.

Multilevel analysis – results from additional teacher variables

Meanwhile as with studies conducted previously, whereby, many studies have failed to identify consistent and statistically significant effect of teacher

educational experience on student achievement (Blomeke, Olsen & Suhl, 2016). A study conducted by Wilson & Floden, (2003) were also unable to identify consistent relationships between a teacher's educational qualification and their students' achievement. Similarly, so was the case in the present study. It was revealed that, with the exception of the teachers' age, all other variable examined (e.g., teacher educational qualification and experience) were not statistically significant for student achievement.

In the subsequent section, the results that emerged, in searching for stages of effective teaching in the Maldives are presented.

Results from the analysis to identify the stages of effective teaching in the Maldives

The table below shows the results arising from the analysis to identify the stages of teaching in the Maldives. The table below indicates how the factors and their dimensions were found to be situated in different stages of effective teaching.

The outputs of the Rasch model are also presented. Two items of the student questionnaire had to be removed. As earlier testified, through this study the measurement dimension framework proposed by the Dynamic Model (see Kyriakides & Creemers, 2008b) was checked to detect effects on student achievement. In addition, the study used the Rasch model to identify the extent to which the five dimensions of the teacher factors could be reduced to a “common unidimensional scale” (Kyriakides, Creemers, & Antoniou, 2009).

In the attempt to search for stages of effective teaching, a score on each item was created for the 31 teachers by calculating the mean score from the responses of the students of the respective class. Next, the Rasch Model was applied to the sample of teachers against the student items concerning the teacher skills. Two items of the student questionnaire had to be removed. The remaining 43 items resulted in a scale with the various approaches to test the fit of the Rasch model to the data.

Figure 5 shows the Infit and Outfit Item analysis of Estimates. The analysis revealed a good fit with the performance of the teachers in teaching skills. The teaching skills were found to be between the ranges of 1.00 to 1.00 in the Infit and Outfit mean square which is a perfect fit. The Infit t ($n= 0.16$) and the Outfit t ($n=0.13$) indicated values closer to 0. The reliability of the estimate was found to be 0.72.

Regarding the summary of case estimates, it was found that the reliability was 0.70 which is quite high. The Infit and Outfit mean square was found to be 1.01 and 1.00 respectively which is once again closer to 1. The Infit t (n=0.07) and Outfit t (n=0.05) values were found to be closer to 0.

	.63	.71	.83	1.00	1.20	1.40	1.60
MNSQ	+	+	+	+	+	+	+
1 item 1	.	.	*	*	.	.	.
2 item 2	.	.	*	*	.	.	.
3 item 3	.	.	*	*	.	.	.
4 item 4	.	.	*	*	.	.	.
5 item 5	.	.	*	*	.	.	.
6 item 6	.	.	*	*	.	.	.
7 item 7	.	*	*	*	.	.	.
8 item 8	.	*	*	*	.	.	.
9 item 9	.	*	*	*	.	.	.
10 item 10	*	.	.
11 item 11	.	*
12 item 12	*	.	.
13 item 13	.	.	*	.	*	.	.
14 item 14	.	.	*
15 item 15	.	.	*
16 item 16	*	.	.
17 item 17	.	.	.	*	.	.	.
18 item 18	.	*
19 item 19	.	.	*
20 item 20	.	.	*
21 item 21	.	.	.	*	.	.	.
22 item 22	.	.	*
23 item 23	.	*
24 item 24	.	.	*	.	.	*	.
25 item 25	*	.	.
26 item 26	.	.	.	*	.	.	.
27 item 27	.	.	.	*	.	.	.
28 item 28	*	.	.
29 item 29	.	.	*	.	*	.	.
30 item 30	.	.	.	*	.	.	.
31 item 31	*	.	.
32 item 32	*	.	.
33 item 33	.	.	*
34 item 34	.	.	*
35 item 35	*	.	.
36 item 36	.	.	*
37 item 37	*	.	.
38 item 38	.	*
39 item 39	*	.
40 item 40	.	.	*
41 item 41	.	.	*
42 item 42	.	*
43 item 43	.	*

Figure 5. Infit and Outfit Item analysis of Estimates

The next step was to do a pattern clustering. This is a procedure that was developed by Marcoulides and Drezner (1999) which determined if teaching skills pertaining to teacher behaviour can be grouped to different levels in order of

difficulty. This method through the Rasch model showed that teachers exhibited six types of teaching behaviours (identified as six stages of teaching) which were similar to those identified by the study conducted in Canada (Janosz, Archambault, & Kyriakides, 2013). Figure 6 shows a summary of the main characteristics of the six stages of effective teaching that emerged in the Maldives.

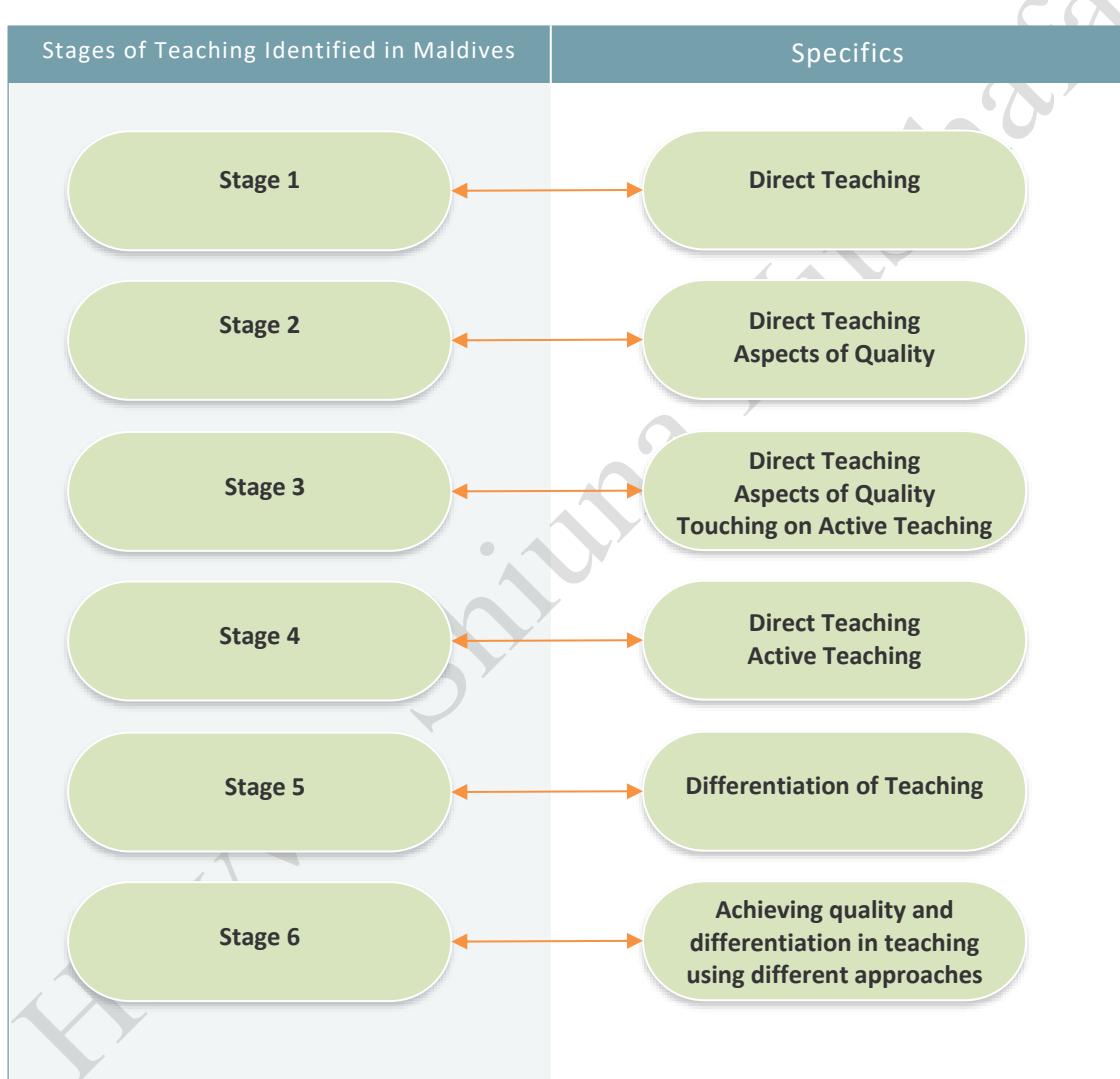


Figure 6. A summary of the main characteristics of the six stages of effective teaching in the Maldives

The six stages of effective teaching identified in the Maldives

Table 6 shows the six stages of effective teaching that emerged in the Maldives. The following observations can be made from the tables looking at the content of the six stages of teaching. It is interesting to note that the stages that emerged in the Maldives are similar in structure particularly to the study that was done in Canada (Janosz, Archambault, & Kyriakides, 2013). Even though in the Maldives six stages were identified, unlike in Cyprus, where five stages were identified, the rationale behind the stages of effective teaching remained the same. The stage five of Cyprus was similar in characteristics to the stage six that emerged from the Maldives. The final stage consisted mainly of factors born out of the constructivist approach including modelling and differentiation.

Similar to the case of Cyprus and Canada, the first stage that follows the Maldivian classroom routines exhibited factors such as the frequency of structuring and the management of time which are the quantitative characteristics or the very basics of direct teaching. The researcher, therefore, names the stage as ***Stage1 - Basic elements of direct teaching***. As identified through the cluster and multilevel analysis, it can be established that the first stage of teaching is the basic element of direct teaching. This finding is also in line with stage 1 identified in both Cyprus and Canada (Kyriakides, 2009; Kyriakides, Archambault, & Janosz, 2013). (See Figure 7). In this stage, it is seen that the teachers utilised time by incorporating direct teaching which is made of quantitative characteristics and includes teaching tactics such as classroom routines. This is a finding that has been addressed by the DM about teachers gradually moving from relatively simple types of teacher behaviour to more complex ones in the classroom. The teachers in this stage are still not in the advanced stages of teaching which incorporates the

constructivist and differentiated teaching approaches.

The stage two, as identified in Cyprus, was interestingly split into stage two, three and four in the Maldives. The more demanding aspects of the classroom learning environment moved to stage four in the Maldives, unlike in Cyprus, where this stage was part of stage three together with the rest of the teaching factors. Therefore, it can be rightly said that in the Maldives, there is a better discrimination of characteristics of stage two, three and four as compared with Cyprus, where the stages were divided into two groups. (See Figure 7). However, it is important to note that the flow and rationale behind this split into three groups is still in line with the findings from the grouping of factors in Cyprus. Next, the stage two of effective teaching in Maldives was identified. The researcher names the stage as ***Stage2 - Incorporating aspects of quality in direct teaching***. In this stage, it was identified that teachers in the Maldives are once again in line with the findings of the stages of teaching from Cyprus and Canada (Kyriakides, 2009; Kyriakides, Archambault, & Janosz, 2013). Teachers in this stage are still in the direct teaching phase, however, it can be observed that certain elements of quality teaching are being incorporated. (See Figure 7). Next, the stage three of effective teaching in Maldives was identified. The researcher names the third stage as ***stage 3 - Incorporating aspects of quality in direct teaching and touching on active teaching*** – This stage is once again in line with the findings of the stages of teaching from Cyprus and Canada. (See Figure 7). Teachers in this stage are still in the direct teaching phase, however, it can be observed that factors such application in the quality dimension, questioning in the focus dimension and questionning quality feedback reaction (about the student answer) were picked up in a Maldivian classroom, like in the case of Cyprus, indicating a shift towards active teaching.

The more demanding aspects of teaching then became the part of stage 4 in Maldives, whereas in Cyprus, it was picked up in stage three. Next, the stage four of effective teaching in Maldives was identified. The researcher would like to call the ***stage 4 - Direct and Active teaching***. In addition to direct and active teaching elements, this stage also comprised of teachers asking questions on almost all the dimensions such as factors operating on focus, stage, quality dimensions and in addition, the teachers' role in making classroom a learning environment. This stage is in line with the stage 4 characteristics of Cyprus. (See Figure 7). Next, the stage five of effective teaching in Maldives was identified. ***Stage 5 - Differentiation of teaching***. Labelled as stage 4 in a Cypriot class room, the identified stage 5 of a Maldivian classroom coincides with teaching aspects and findings from Cyprus. (See Figure 7). Except for differentiation in the time management factor, this stage had similar teaching behaviours and activation of differentiation aspects of teaching was detected. The sixth stage, as identified in a Maldivian classroom, is once again similar to the stage 5 of the Cypriot Classroom. Next, the stage six of effective teaching in Maldives was identified. ***Stage 6 - Achieving quality and differentiation in teaching using different approaches*** – This stage is identical in characteristics to stage 5 of Cypriot classroom. (See Figure 7). This stage is about achieving quality and differentiation in using different teaching approaches. In this stage, the Maldivian teachers demonstrated teaching behaviours using active teaching factors on application, questioning and structuring in the differentiation dimensions. The shift from quantitative characteristics of teaching to a more constructivist and differentiated approach is observed. The qualitative aspects of teaching can be actively detected in Stages 6 in the Maldives.

Table 7. The Six Stages of Effective Teaching Identified in The Maldives

Stage 1 - Basic elements of direct teaching	Application Frequency	1
	Management of time Frequency	1
	Misbehaviour Frequency	1
	Questionning Frequency	1
	Structuring Frequency	1
Stage 2 - Incorporating aspects of quality in direct teaching	Application Focus	2
	Application Stage	2
	Misbehaviour Focus	2
	Questionning Quality Type	2
	Structuring Stage	2
Stage 3 - Incorporating aspects of quality in direct and touching on active teaching	Application Quality	3
	Misbehaviour Quality	3
	Questionning Focus	3
	Questionning Quality feedback reaction about the answer	3
	Questionning Quality feedback reaction to student	3
Stage 4 Direct and active teaching	Questionning Quality reaction if no answer from pupils	3
	Questionning Stage	3
	Structuring Focus	3
	Structuring Quality	3
	Modelling Focus	4
Stage 5- Differentiation of teaching	Modelling Frequency	4
	Modelling Stage	4
	Orientation Focus	4
	Orientation Frequency	4
	Orientation Stage	4
Stage 6 - Achieving quality and differentiation in teaching using different approaches	Teacher Student Interaction	4
	Application Differentiation	5
	Questionning Differentiation	5
	Structuring Differentiation	5
	Modelling Quality	5
Stage 6 - Achieving quality and differentiation in teaching using different approaches	Appropriateness of Model	
	Modelling Quality Stage	5
	Modelling Quality Teacher Role	5
	Student Student Interaction	6
	Modelling Differentiation	6
Stage 6 - Achieving quality and differentiation in teaching using different approaches	Orientation Differentiation	6
	Orientation Quality	6
	Student Student Interaction	6
	Quality	

It is evident that, through the stages of effective teaching, the teacher moved from quantitative characteristics comprising of direct teaching to qualitative characteristics, then to the classroom as a learning environment, and finally to differentiated learning and actively exhibiting qualitative characteristics of new learning. Similar patterns of which, were observed in all the three countries of Cyprus, Canada and Maldives. Therefore, the rationale for stages of effective teaching remains the same. Its only the splitting between the stages that is observed to be slightly different from country to country. In Canada, stage four and five of Cyprus merged into one stage and they had a total of four stages as opposed to five stages in Cyprus. The findings of this study are line with theories related to the stage models of professional development (e.g., Dreyfus and Dreyfus 1986; Berliner 1994; Feiman-Nemser and Remillard 1996; Sternberg et al. 2000).

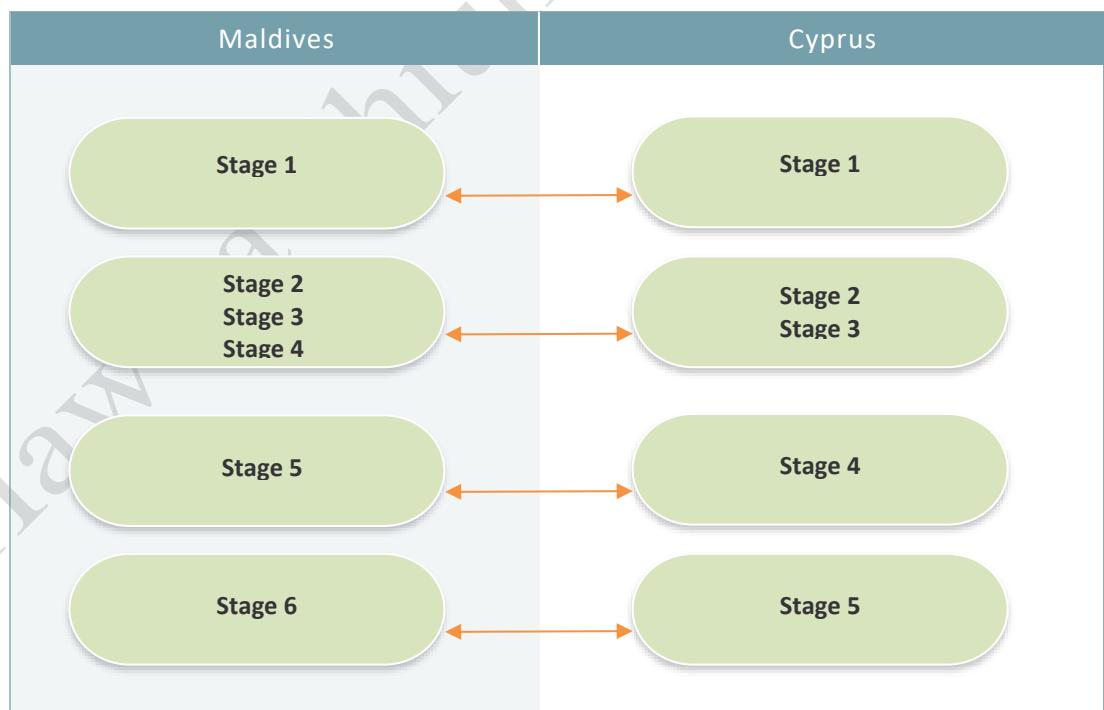


Figure 7. Demonstrating the split in stages of teaching
(Maldives and Cyprus)

Summary of Chapter 4

This chapter detailed the statistical and the multilevel analysis that was performed in order to identify the factors of effective teaching in a Maldivian classroom. From the data emerging from the student questionnaire, it was revealed that some teaching factors were found to have statistically significant effects on student achievement. As was indicated earlier, the very small values of standard deviations from the student questionnaire revealed that the statistical power for detecting effects of teacher factors based on the questionnaire was lesser. The High inference observation instrument, also showed similar results where some of the teacher factors had statistically significant effects on student achievement.

As far as the second low inference observation instrument was concerned, the frequency dimension of application had a statistically significant effect on student achievement, the rest of the frequency dimensions of the factors (i.e., *orientation, structuring, teaching modelling and questioning*) were not significant. Under the stage dimension, whereas structuring had a significant effect, the rest of the factors were not significant. Under the focus dimension, whereas teaching modelling had a significant effect, the rest of the factors were not significant. Under the quality dimension, whereas teaching modelling and questioning had significant effects, the rest of the factors were not significant. Under differentiation, whereas application had a significant effect, the rest of the factors were not significant.

As far as the differentiated instrument was concerned, it was found that none of the factors had significant effects of achievement. It was also found that the other teacher variables such as teacher experience and qualification did not have significant effect on student achievement. However, the teachers' age had a

significant effect on student achievement in the Maldives.

The stages of teaching have also been established in a Maldivian classroom.

The study identified six stages of effective teaching in a Maldivian classroom through rigorous statistical analysis. As the findings suggest, the stages of teaching as emerged in the Maldives are slightly different from the stages that emerged in Cyprus and Canada but its important to note that they have similar structure and rationale.

It is expected that these findings have implications for theory and research in the Maldives. Policy initiatives, particularly, can be recommended for improving teaching and learning in schools in the Maldives. In chapter five, the results will be discussed in detail. The implication for teacher effectiveness research for Maldives are then drawn.

CHAPTER 5

DISCUSSION

The study on hand is primarily based on the conceptual framework of the Dynamic Model of Educational Effectiveness in order to identify the factors, dimensions and stages of effective teaching in Maldivian classrooms. Using multilevel modelling techniques, various factors, dimensions and stages of teaching were identified at the level of the student and the class (teacher) to have an impact on student learning. In the subsequent sections, the key research findings and implications are then discussed. The chapter will also state the limitations of the research undertaking and finally suggestions for further research.

Key findings

The data that was analysed from the Student questionnaire, revealed that the teacher (class level) factors of orientation (in the quality dimension), application (in the differentiation dimension) and misbehaviour (in the focus dimension) was found to have statistically significant effects on student achievement indicating that these factors from the DM were picked up in a Maldivian classroom. From the perspective of the students, the teacher factor with the lowest mean score was found to be questioning under the differentiation dimension closely followed by the teacher factor of classroom as a learning environment/dealing with misbehaviour under the frequency dimension. These two low mean scores is an indication that the students thought that these factors were lacking in the teacher as compared with the rest of the factors. It is also evident that the low standard deviations for all the teacher effects in the student questionnaire is an indication that the teachers did not vary a great deal in their

teaching behaviours from the students' point of view.

The data that emerged from the High Inference instrument observation indicated that the teacher (class level) factors of the Dynamic Model including *orientation, application, student student interaction, teacher student interaction, classroom disorder* and *modelling* had statistically significant effects on student achievement. These findings showed that there were more frequent occurrences of teacher behaviours in the classroom per the high inference observations. Contradictory to the student questionnaire, there was also less misbehaviour detected as per the findings. This could be due to the fact that the observer was present in the classroom and thus, less misbehaviour on the part of the students.

The measurement dimensions of the Dynamic Model's second low inference instrument including orientation (in the stage, focus and quality dimensions), structuring (in the stage, quality and differentiation dimensions), application (in the differentiation dimension), modelling (quality and differentiation dimension) and questioning (in the stage dimension) had statistically significant effects on student achievement. The data that emerged from the second low inference instrument also showed that there are many dimensions with minimum values as 0. This is an indication that these teaching factors did not occur at all in some of the classrooms. This means that there are some Maldivian teachers that do not give any structuring, application, modelling or questioning activities in their classroom. This is especially true for differentiation dimension in all of the factors where the minimum value is observed to be 0. Even in the orientation factor, it is evident that there are no differentiation activities by some teachers. It is also evident that the standard deviations emerged for all the measurement dimensions of the five teacher factors showed that the teachers did not vary a great deal in their teaching behaviours. For example, under

the differentiation dimension, for orientation, the mean recorded was 0.72 ($SD=0.48$); under the structuring factor the recorded mean was 0.57 ($SD=0.47$), under the application dimension the mean was 0.77 ($SD=0.42$); and under modelling, the mean was 0.28 ($SD=0.45$) and finally the questioning dimension, the recorded mean was 0.71 ($SD =0.44$) (see Chapter four, Table 4). In a classroom, it is important to recognise that there are students with different learning abilities and students coming from different socio-economic backgrounds. Hence, undifferentiated instructions are of little or no value. Differentiated instructions therefore can improve the learning of students (Creemers, 1994).

At this point, it is evident that Maldivian teachers were not able to pay equal attention to each of the teacher factors and dimensions. If they did, there would have been better results (Creemers & Kyriakides, 2006). It is expected that the teacher should provide students strategies for learning in the different dimensions, but it is also expected students also develop their own strategies for problem solving (Kyriakides et al., 2002). When looking at the dimension of questioning, it was found that it is important that the teacher poses a combination of both product and process questions (Creemers & Kyriakides, 2009).

The data that emerged from the differentiated instruction instrument could not capture any teaching effects on student achievement. Similarly, results from the student background factors questionnaire including SES did not have a significant effect on student learning. Finally, except for the age of the teacher, it was also revealed that none of teacher background factors had a significant effect on student learning. To revisit the research question that this research seeks to answer as to whether the factors of effective teaching has been identified, it is evident that many of the factors and dimensions of the Dynamic Model were picked up that could explain student achievement. Thus, the study has indicated

that there is a definite evidence of functioning of not only factors but also the five measurement dimensions (i.e., *frequency*, *focus*, *stage*, *quality* and *differentiation*) of the Dynamic Model in relation to student achievement. It has also been established through this study that the teacher (classroom) level factors play a pivotal role in student learning and that student achievement has been directly linked to the effectiveness factors and dimensions operating at the level of the teacher.

In addition, the stages effective teaching in a Maldivian classroom was also identified where the factors and dimensions of earlier findings were found to be positioned in different stages from direct teaching towards more advanced level of teaching involving constructivist and differentiated approaches that took place in a classroom.

Thus, the overall findings from the research provided rich evidence that teaching quality plays a more important role rather than SES or other variables in developing a classroom context. In addition, classroom observations were deemed more appropriate in comparison to the data obtained from student questionnaire, as classroom observations were able to detect more teaching effects. Hence, for Maldives, it is argued that keeping in line with the Dynamic Model, the combination of student ratings together with classroom observations may provide a better insight as to the functioning of the teacher factors and the five measurement dimensions and thus, support the reliability and validity of student ratings combined with class observations.

The research questions with which this endeavour started has been satisfactorily answered in identifying the teaching effects and stages of effective teaching in the Maldives. In addition, the relevancy of the Dynamic Model to a Maldivian classroom has also been established. No overlaps were found in the use

of the two different models for checking the differentiated factor. However, a common consensus has been established that more research studies are needed in order to establish the validity and reliability of Differentiated Model's observation instrument through more research works.

In the next section, the advantages of using triangulated approaches to collecting student data, as in the case of this study will be discussed.

Triangulated approaches to measure teacher effectiveness

It is a well known fact that teaching is a complex act. In the research on hand , an attempt was made to triangulate various data sources in order to attain valid and reliable data on teacher effectiveness (Hill et al., 2012). Four instruments were used in this research in order to measure the quality of teaching (i.e., high-inference, second-low inference observation instruments, a student questionnaire and a differentiated instrument). The data from all the instruments with the exception of the differentiated instrument were able to detect teacher effects on student achievement. It was also possible to check effects of teacher behaviours in relation to the different dimensions of the teacher factors.

Complex statistical analysis was performed using different equations to find the effect of different independent variables on the dependent variable from the data that was generated through this study.

The multilevel analysis revealed that most of the teacher factors under the High- inference observation instrument were found to have statistically significant effects on student achievement. In addition, all the dimensions of the five teacher factors under the Second low-inference observation instrument and the Student questionnaire were also significant in detecting teacher effects on student achievement. This is in line with earlier studies conducted (e.g., Creemers &

Kyriakides 2010; Panayiotou et al., 2014). Berk (2005) points out that the use of multiple sources of measures on quality teaching helps in strengthening data source while at the same time detect the weaknesses in any single source. As the results revealed, with the exception of the differentiated instrument, the other two instruments (i.e., the high-inference, and second-low inference observation instruments) and in addition, the student questionnaire. The teacher effects were proven to have an effect on student achievement, providing answer to the substantial research question of whether the Dynamic Model and the Differentiated Model were relevant to the context of Maldives. It is important to highlight that the low inference instrument results clearly indicated that the differentiation factor was very low in Maldivian teachers however, the differentiation instrument picked up that there was in fact differentiation by the teacher. This instrument has given us a completely different picture. This might have to do the fact that the instrument was never validated and may need further investigation. We cannot trust this instrument unless we have a more systematic validation studies done on the instrument. If not for the triangulation with the other two instruments (i.e., the high-inference and second-low inference observation instruments) and the student questionnaire, a possibility of wrongful conclusion could have been drawn. Thus, it is vital without an exception, to use standardised validated measures to check and draw conclusions about teacher effects and most importantly, use more triangulated approaches in the data collection for obtaining more valid results.

Implications for teachers' professional development in the Maldives.

The government strategic plan of the Maldives of 2014-2018 envisioned that the Maldives to be number one among small nations that provides the best quality education and training to all (Ministry of Education, 2020). However, there is

strong evidence to still improve the quality of education in the Maldives and that the country is far from achieving the vision. For instance, National assessments in 2008 for learning outcomes of Grade 4 students showed that learning levels in primary grades were unsatisfactory. The mean score for English was 32%, with 50% set as the pass rate (Asian Development Bank, 2015). There is no significant change in Grade 4 English since the 2008. The gender gap along with the learning gaps continues to persist in the 2017 in the The National Assessment of the Learning Outcomes (Ministry of Education, 2020). The National Assessment of the Learning Outcomes (NALO) results also indicated that the passing rates of students in the Maldivian atolls were consistently lower than of their counterparts in the capital city Malé (Asian Development Bank, 2015). These results are an indication to pay particular attention to reducing disparities across geographical locations and gender along with the most important factor of all and that is the student learning outcomes (Ministry of Education, 2020). In response to the dilemma the Maldives faces with severe lack of quality education being imparted in Maldivian Schools, this research has paved path to look at teachers's professional development from a theory oriented, model driven perspective which in turn is expectable to raise the standards of student learning in the classroom.

As specified, the quality of education at all levels is a major challenge facing Maldives, both in terms of inputs and outcomes (Asian Development Bank, 2015). The need of the hour is trained teachers. Research works undertaken (for example Hanushek, 2011) has emphasised that the role and quality of teacher in student learning outcomes cannot be minimised. The Maldives has a high proportion of untrained primary school teachers. Approximately 23 percent of primary school teachers are untrained. This shows that these untrained teachers teaching in primary schools will have a cumulative effect further up into the

secondary education system as well (Asian Development Bank, 2015).

To try to address the issue at the core, a lot of programmes have been formulated towards improving the teacher quality in the Maldives. However, a walk through most of the teacher observation instruments that are being used in some Maldivian schools shows that most instrument has been set, targeting school level factors in many of the evaluating criteria's (e.g., measuring the number of classroom equipment, and availability of learning materials available in class) and not special attention given to the dimensions and factors of teaching which are of principal importance for learning. The professional development (PD) needed for teachers is invested in various modes of training that are often inadequate or inappropriate (Schweisfurth, 2011; Schwille, Dembele, & Schubert, 2007). This gap could be filled by beginning to advocate and start teachers' professional development programmes based on the the Dynamic Integrated Approach (DIA). (Antoniou & Kyriakides, 2011).

“Effective professional development is on-going, includes training, practice and feedback, and provides adequate time and follow-up support. Successful programmes involve teachers in learning activities that are similar to ones they will use with their students, and encourage the development of teachers' learning communities. There is growing interest in developing schools as learning organizations, and in ways for teachers to share their expertise and experience more systematically” (OECD, 2005). It is evident that very few research-based studies try to assess and find out the impact that teacher professional development has on student success. In this sense, teacher effectiveness once again fails to define and improve teaching practices with regards to teachers' professional development. Hence at the teachers' level (class), the teacher behaviour and instructions are of immense importance to guide the teachers through specific

teaching factors and dimensions.

It is important to highlight, there are two major approaches to teachers' professional development which are namely, the Competency-Based Approach (CBA) and the Holistic Approach (HA) (Kyriakides et al., 2012). In the Competency-Based Approach, teachers' competency is the main focus whereby, teachers are taught teaching skill development strategies by people of expertise and teachers are supposed to master each skill separately this method has been criticised for not allowing space for critical and creative thinking in the teacher. The Holistic Approach, on the other hand , encourages teachers to independently reflect on their teaching experiences and beliefs. In a research undertaken by Demetriou & Kyriakides (2012), they concluded that teachers professional development is significantly improved when training programmes are more school driven and using the teacher effectiveness research as a base. School teachers stands at the forefront of the arena of the educational system. Therefore, school based, school driven professional development programmes are the need of the hour. This would help to close the gap between theory and practice and raise the standards of teachers.The proposed Dynamic Integrated Approach (Antoniou & Kyriakides, 2011) to professional development of teachers has been proven to improve student learning in parts of Europe (Antoniou & Kyriakides, 2011). By using the conceptual framework of the Dynamic Model and the Dynamic Integrated Approach (DIA) as proposed, the study sought to get a better understanding of the factors and stages of effective teaching in the Maldives. It has been established through research that teacher reflection is an important part of teacher development nonetheless, according to DIA, it is necessary but not adequate as a standalone factor. In this context, teacher professional development should be based on validated theoretical models of EER which will ultimately raise

educational standards (Antoniou & Kyriakides, 2011) and solve the problem of the country with teachers who lacks specific classroom level skills of teaching.

Takin this into consideration, the DIA is based on the grouping of factors of the Dynamic Model of Educational Effectiveness (Creemers & Kyriakides, 2008) with theories of teacher development and training in the forefront to develop an integrated approach (Creemers, Kyriakides, & Antoniou, 2013a).

It is reasoned that through this study that using the approach of DIA (Creemers, Kyriakides, & Antoniou, 2013a) whereby, utilizing the research findings on teacher effectiveness specifically with that of teacher skills that leads to student learning outcomes can form a basis for teachers' professional development in the Maldives. Through the establishment of stages of teaching, it is also assumed that teachers can be divided into professional support groups whereby, they can be given professional development training based on their needs and areas for improvement. Thus, a very specific and focussed attention can be given for that particular teacher to improve on the areas that is lacking.

Hence, for the Maldives, it is argued that keeping in line with the Dynamic Model, teachers' professional development should focus on how to address specific groupings of teacher factors associated with student learning instead of isolated teaching factor, as proposed by the Competency Based-Approach (CBA) (Sprinthall, Reiman, & Sprinthall, 1996). Hence, professional development should include the whole range of teacher factors without isolating individual professional needs per teacher.

Research shows that it is not enough that there is only mere transfer of factors across countries (Reynolds, 2000; 2006) however the DM examines factors operating at the different levels of education and irrespective of region and context, generic factors of teaching have been identified through the use of the model.

So, despite its complexity, various studies confirm that the model has been proven to made positive differences in the educational improvement at teachers (classroom) and school levels (Antoniou, 2013; Antoniou & Kyriakides, 2011, 2013; Antoniou, Kyriakides & Creemers, 2011; Creemers & Kyriakides, 2010b; Kyriakides, Archambault & Janosz, 2013). Hence, this study may be in a position to contribute to the field of EER and to the field of teacher professional development, with the main claim that a dynamic integrated approach should be followed in professional development efforts of the country.

This study was also able to establish a set of valid instruments for the measurement of factors operating at classroom level that were shown to have an effect on student achievement. Therefore, stakeholders can use this questionnaire to collect data about quality of teacher behavior in classrooms and develop school improvement plans to address factors found to be associated with student learning outcomes.

Through this study, it was established that teaching factors and dimensions operating at the teacher (class level) as per the DM were detected in a small island nation like the Maldives too. Therefore, through the use of this model, a contribution has been made for improving teaching and learning in classrooms in the Maldives. The objectives with which this study set out has been successfully attained.

Implications for Educational Effectiveness Theory

The study used the conceptual framework of the Dynamic Model from the perspective of Maldivian schools. In this study it was revealed that teacher factors and dimensions of the Dynamic Model were detected in a Maldivian classroom and in addition, impacted student achievement in English. It has also successfully identified

the stages of effective teaching in a Maldivian classroom. Based on the teacher effect sizes that were revealed, it is right to conclude that the Dynamic Model is an appropriate measure for detecting teacher effects on student achievement in a Maldivian classroom and hence, contributes to the EER literature from the perspective of Maldives and small island nations. Specifically, the research findings have provided further empirical support to the generic nature of the teacher factors and dimension of the dynamic model. It is also revealed that these factors and dimensions operating at the teacher (classroom) level are equally effective in an educational context such as the Maldives.

Policy implications and recommendations

Important policy implications can be drawn from this study from the identification of the factors, dimensions and stages of teaching from a Maldivian perspective. It is recommended that different teacher training courses be established and set priorities for teacher professional development based on the DIA model rather than on isolated factors of teaching and learning. For instance, with the successful identification of stages of teaching in the Maldives necessary routines such as teaching skills related to direct teaching approach (i.e., Stages 1 and 2), so that with appropriate professional development, teachers can move to higher stages that includes the use of “new learning” constructivistic approaches and differentiated strategies (i.e., in stages 5 and 6). This research also provide support to the argument that it is important to do away with the notion that all teachers possess effective cognitive skills without training. There is a need to orient new programmes of teacher training that involves instilling in teachers the desired performance skills or cognitive skills (Cornford, 2002). However, this argument in no way, limits the importance emphasised on reflecting thinking and critical analysis on the part of the teacher. Finally, it is important

to recognise that the generalisability of the research findings about the stages of teaching be tested in different countries illustrating how the stages of teaching skills and the DIA can be used by policy and practice in teacher training and professional development. It is hoped that findings from this research helps the educational stakeholders in the Maldives to re-examine how teachers' professional development programmes can be built on the findings from the DIA and the Dynamic Model of Educational Effectiveness. It is agreed more links needs to be established between EER and research on teachers' professional development. Such links could also lead to the establishment of theory- driven and evidence-based policies to improving the teacher professional programmes in the country.

A study done by Ball & Forzani (2011) proposes that a shift is needed as a way from individual "style" to open-ended "learning from experience" as the building blocks of teaching practice, and emphasises instead teachers must give importance to building more common professional standards that is required in the classroom. This reasoning resonates very well with the situation in the Maldives too.

Limitations of the study

One of the main limitations of the present study was that even though the Dynamic Model of Educational Effectiveness recommends to use three observation instruments of the model, only two of the instruments (the low inference and the second high inference instrument) were used in the present study. If the First-low inference observation instrument was used, additional data could have been collected on teacher-student, student-student interactions, and classroom management. In addition, English that which is learnt in schools, maybe influenced by teachers teaching them the language. Thus, the limitation of only looking at the English language comprehension and writing skills of students have limited the study. Another,

disadvantage was the fact that the classroom observation was solely done by the researcher and hence, cross validation on observation data was not possible (Hill et al., 2012). Another limitation was the fact the study's data collection was limited to only one school year and hence, the long-term effects of the teacher factors cannot be determined. This study collected data from only the subject pertaining to English reading and comprehension skills. This limits the ability to understand how the findings might be if other skills of the language such as listening and speaking were considered. In addition, other subject domains outcomes such as Mathematics were not measured. The study was also limited to only the capital city Male' therefore, further studies in other parts of the country are needed preferably using longitudinal designs. Another limitation is the fact that the school level factors of the Dynamic Model (e.g., policy for teaching and learning) were not explored due to factors such as time constraint and costs.

Maldives is going through a sea of changes and this model reflects the need for teachers' continuous learning, adaptation, and development. It is assumed that teachers could always learn to teach in new ways through working with, learning from, and teaching colleagues. DM reflects the emerging diverse expectations on teachers as a school practitioner in the era of continuous change. Teachers and students develop strategies to cope with this, and so life improving the quality of teaching and learning. By identifying training needs, the learning environment can be restructured through a process of continuous negotiation between the teacher and student, then becomes a continuous improvement process.

Research contribution & suggestions for further research

The quantity of teaching (e.g., time on task and opportunity to learn) that this research did not touch upon can therefore be an area of further research, but this

will require some investment in resources since it can be more of a challenge to measure the quantity of teaching than the quality. It has been established that the teaching factors of the DM is relevant for student achievements in Maldives and further research exploring the effects on learning outcomes by the school level factors of the model can be an area of further exploration. Gaining a better understanding of not only aspects relating to the quality of education but also to issues related to equity can be further enhanced as more and more international studies (for example Kelly 2012; Kyriakides et al, 2013; Van Damme & Bellens, 2017; Kelly, 2015; Kyriakides & Creemers, 2018; Creemers & Charalambous, 2018; Kyriakides et al, 2019; Schmidt, 2018; Mejia-Rodriguez & Kyriakides, 2019) are being led to understand how to provide equity opportunities to students especially coming from different economic and social backgrounds. The next step could be to check whether the stages identified as effective teaching had an impact on student learning. With the establishment of the DIA model to teachers' professional development programmes. an action research with the integration of the DIA approach could be undertaken to check if it leads to better student learning in the Maldives.

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APPENDIX

Appendix A1: The Pre-Test Items

Grade 4

Dear student,

This assessment is given for Research purpose only and confidentiality of results is guaranteed. This assessment can be completed within 45 minutes to – 1 hour.

INSTRUCTIONS: THERE ARE 3 QUESTIONS. PLEASE ANSWER ALL THE QUESTIONS IN THE BOOKLET.

QUESTION 1

READ THE FOLLOWING LETTER AND ANSWER THE QUESTIONS THAT FOLLOWS:

Dear Azka,

At the moment I am in this beautiful country – Ukraine. It's such a beautiful country. It's winter and there's snow everywhere!

Do you know that my grandmother is a Ukrainian? My father is half Maldivian and half Ukrainian. My father's mother is from here. Her house is on the outskirts of the main town, and it has a beautiful flower garden in the front yard, and a large back yard where we can play outside on the days when it's not raining.

At the moment I am sitting inside the house looking out of my window. Outside my window, I can see a beautiful dahlia flower. Do you know they have so many Dahlias here? It is my favourite flower. The dahlias look like pink balls hung all over the tree. I don't like to pick it even though it is tempting. As for the weather, it's not too cold here yet, but we've had a lot of rain and snow.

I can't wait to see you again when I get home. I miss you so much and can't wait to be back in the Maldives!

With love from Ukraine,
Arya.

Tick the correct answer

A. Which phrase best matches Arya's description of Ukraine?

- a. Warm and sunny []
- b. Rainy and snowy []
- c. Bright and wintry []
- d. Rainy and sunny []

B. What is Arya's letter mainly about?

- a. She is lonely and wants to come home. []
- b. She is telling her friend about her visit to Ukraine. []
- c. She wants to go back to Maldives. []
- d. She loves Ukraine more than Maldives. []

C. What is a synonym for *outskirts* as used in this passage?

- a. Outside of town []
- b. Inside the town []
- c. Near the sea []
- d. Near the forest []

QUESTION 2

**READ THE FOLLOWING PASSAGE CAREFULLY AND TICK
THE MAIN IDEA OF THE PASSAGE.**

Cheetahs and jaguars are part of the same animal family. However, the main difference between these two animals is the pattern of spots present in their body. In terms of strength, leopards are also more muscular than jaguars. The

jaguar's tail is also generally shorter than the leopard's tail. Jaguars love to spend time in the water, while leopards will avoid it.

Determine the main idea of the passage by ticking the correct option below.

- The similarities between cheetahs and jaguars ()
- The differences between cheetahs and jaguars ()
- The cheetah being superior to jaguar ()

QUESTION 3

WRITE ABOUT 10 -15 SENTENCES ON ANY ONE OF THE FOLLOWING TOPICS.

- My favourite period or teacher in school and give reasons for your answer.
- Write about the internet influence on kids today.

QUESTION 4

WRITE ABOUT 10 - 15 SENTENCES ON ANY ONE OF THE FOLLOWING TOPICS.

- Do you believe that we must limit the use of plastic in our daily lives? (eg: plastic bags, straws, bottles etc) Justify your answer.
- Do you believe it's time Maldivians changed their staple diet habits with the newer habits incorporating healthier food and eating habits? Justify your answer.

Appendix A2: The Post-Test Items

Grade 4

Dear student,

This Assessment is given for Research purpose only and confidentiality of results is guaranteed. This Assessment can be completed within 45 minutes to – 1 hour.

INSTRUCTIONS: THERE ARE 3 QUESTIONS. PLEASE ANSWER ALL THE QUESTIONS IN THE BOOKLET.

QUESTION 1

READ THE FOLLOWING PASSAGE AND ANSWER THE QUESTIONS THAT FOLLOWS:

Let me tell you an interesting story about a little boy who once went fishing and he caught a magic eel. The eel was slimy as he pulled it out of the river and as it emerged out of the water, it whispered in a small tiny voice, “I am no ordinary eel, set me free and I will grant you three wishes.

The haughty little boy looked at the eel and laughed, “I don’t need any wishes, my life is good as it is”. He then threw the eel back into the sea.

The next day, he went fishing again and he caught the same magic eel. As it emerged out of the water, it whispered in a small tiny voice, “I am no ordinary eel, set me free and I will grant you three wishes.

So, this time the little boy thought, “hmm let me test if this eel is telling the truth”. So, he said “ ok, I would like to wish to catch a basket full of fish, a new fishing rod and plenty of snacks while I fish” .

And magically, all the things he wished for appeared in front of his eyes!

“Now let me go” whispered the eel.

The selfish little boy thought about how lucky he is that he caught this magical eel and he had no intention to let it go!

The little boy said, “grant me three more wishes and I will let you go”. The eel whispered “ I can’t, you have to let me go and catch me again” .

The little boy got very angry and caught the eel by its tail. As soon as he touched it disappeared into thin air along with all the things he wished for, never to be seen again!

Tick the correct answer

A .What is the moral of the story?

Magical wishes do come true []

An eel can be magical []

To love eels []

Not to be haughty or selfish []

B. What is the meaning of the word haughty?

Haughty means angry. []

Haughty means proud and arrogant. []

Haughty means sad. []

Haughty means lonely. []

C. What is the antonym for *Grant* as used in this passage?

refuse []

agree []

give []

allow []

QUESTION 2

READ THE FOLLOWING PASSAGE CAREFULLY AND TICK THE MAIN IDEA OF THE PASSAGE.

There is an interesting story told about a mouse and a lion. One day the mouse was caught in a bad place with the lion. The poor little mouse please to set him free and in return he would do the lion a great favour one day.

The lion laughed at the mouse and he said “you are a silly little mouse, what could you possibly do for me that I couldn’t do it myself. Since the lion was in a good mood he said to the mouse, “I will let you go this once, but I can promise you, you will not be doing me any favours I can assure you that”.

As it turned out, the lion was caught in a bad place too when he got himself trapped in a net laid down by hunters in the forest.

No animal dared to help the lion for its roars scared all of them until the mouse heard him, he gnawed through the net with his strong little teeth and set the mighty old lion free!

What was the important lesson the lion learned in this story?

Never underestimate an animal, by its size

He shouldn’t be so humble.

A mouse is so helpless as compared to a lion

QUESTION 3

WRITE ABOUT 15 SENTENCES ON ANY ONE OF THE FOLLOWING TOPICS.

My favourite person.

The reasons why I love to come to school

QUESTION 4

WRITE ABOUT 15 SENTENCES ON ANY ONE OF THE FOLLOWING TOPICS.

What would you ideally consider the best holiday destination is for you? Justify your answer.

If you had three wishes, what would it be and why

Appendix B: Socio -Economic Status Questionnaire

SECTION A :

Dear Student,

We are conducting a study on the quality of teaching in your school. . In this regard, we would like to know more about your family and home background. Please answer the following questions as accurately as possible.

Name of student (Optional)

Grade.....

School

SECTION A: PARENTAL EDUCATION AND STATUS

For each question tick only one box if applicable

A) What is the highest educational qualification of the child's mother?

- No Education
- Studied upto Grade 7 - 10
- Upto Grade 12/ Diploma or Foundation studies
- Vocational/technical/commercial course
- Tertiary education (Degree College, University or higher)

B) What is the highest educational qualification of the child's father

- No Education
- Studied upto Grade 7 - 10
- Upto Grade 12/ Diploma or Foundation studies
- Vocational/technical/commercial course
- Tertiary education (Degree College, University or higher)

C) What is the employment status of child's mother

- Stay at home Mother
- Typical 9 – 5 job (eg Admin officer, secretarial level jobs)
- Public servant (eg. teacher, nurse, doctor, manager etc)
- Owns a business
- Others (please specify)

D) What is the employment status of child's father

- Stay at home father
- Typical 9 – 5 job (eg Admin officer, secretarial level jobs etc)
- Public servant (eg. teacher, nurse, doctor, manager etc)
- Owns a business
- Others (please specify)

E) What is the kind of home the child and family lives in

- On rent
- Own home
- Others (please specify)

F) Number of AC units in your household

- No air conditioning unit
- 1 air-conditioning unit
- 2 or more air conditioning unit

G) What is the main source of cooking in your household

- Kerosene stove
- Gas stove
- Electric stove

H) What is the kind of toilet in your household

- Closed bathroom with tiles
- Open top toilet no tiles

I) What are the following vehicles you use (tick as many applicable)

- bicycle
- motor bike
- car
- Others (please specify)

J) What are the following durable goods you have in your house (tick as many applicable)

- Mobile phone/s
- Water heater
- Micro wave / oven
- Computer /laptop

- TV
- Refrigerator
- Iron
- Stove
- AC unit

K) How many bedrooms are there in the house?

- Open space /studio style
- 1 bedroom
- 2 bedroom
- 3 or more bedrooms

L) A total of how many people live in the house

- 2 people
- 3 people
- 4 people
- Please specify the number of people if more than 4 -----

**What are the study materials that the child have at home for him/ her to aid studying
(tick as many as applicable)**

- A desk to study in the sitting room
- A room of your own
- A quiet place to study
- A computer/ Ipad you can use for school work
- Resources – story books , text books , reading materials

SECTION B

Students – Other Variable Constructs

Note: a child (with/without the help of a parent) can fill this section

*Tick the appropriate box to indicate the situation in your home learning environment
(Only one box)*

(a) I do believe it's important for me to study

- Strongly believe
- Believe
- I don't believe studies is important

(b) My parents inspect my books to be sure I have done my home work

- Never
- Rarely
- Sometimes
- Almost Always

(c) My parents help me to do my homework

- Never
- Rarely
- Sometimes
- Almost Always

(d) My parents take interest in my studies and asks about school and studies in general

- Never
- Rarely
- Sometimes
- Almost Always

(e) I tell my parents about my school friends and activities

- Never
- Rarely
- Sometimes
- Almost Always

(f) My parents know where I go after school

- Never
- Rarely
- Sometimes

Almost Always

(g) My parents know the parents of my friends and interact with them

Never
 Rarely
 Sometimes
 Almost Always

(h) My parents have conversations with me about my friends and school in general

Never
 Rarely
 Sometimes
 Almost Always

(i) I go for after school for tuition class

Yes
 No

(j) I have a private tutor who comes home to teach me

Yes
 No

Appendix C: Student questionnaire of the Dynamic Model of Teacher Effectiveness

Dear Student,

We are conducting a study and would like to know your opinion about your teachers and the quality of teaching in your classroom. The answers you give will not be shown to your teachers or anyone else in your school or even your parents. It will remain confidential.

Please answer all of the questions. To answer the questions, please circle a number on each line. Please ask the interviewer if you do not understand what to do.

PART A

After each statement you read there are five numbers. Think carefully the number that most fits your opinion and circle it:

- 0: if this **never** happens in your class
- 1: if this **rarely** happens in your class
- 2: if this **sometimes** happens in your class
- 3: if this **often** happens in your class
- 4. If this **almost always** happens in your class
- 5. If this **always** happens in your class

		Never	Rarely	Sometimes	Often	Almost	Always
1.	We start the lesson with things that are easy to understand. As the lesson goes on what we cover that is more difficult.	0	1	2	3	4	5
2.	The teacher gives us exercises at the beginning of the lesson to check what we have learnt from the previous lesson	0	1	2	3	4	5
3.	My teacher helps us to understand how different activities (such as exercises, subject matter) during a lesson are related to each other	0	1	2	3	4	5
4.	A few days before a test/assessment, my teacher gives us similar exercises to those that will be in the test or assessment.	0	1	2	3	4	5
5.	My teacher tells my parents how good I am or what I am good at, when they meet (or in my school report)	0	1	2	3	4	5
6.	When the teacher is teaching, I always know what part of the lesson (beginning, middle, end) we are in.	0	1	2	3	4	5
7.	When doing an activity in any subject, I know why I am doing it.	0	1	2	3	4	5

8.	When we go over our homework in class, our teacher finds what we had problems with and helps us to overcome these difficulties	0	1	2	3	4	5
9.	Our teacher has good ways of explaining how the new things we are learning are related to things we already know.	0	1	2	3	4	5
10.	At the end of each lesson, the teacher gives us exercises, written or game on what we have just learned.	0	1	2	3	4	5
11.	During lessons our teacher often covers the same things that we have already learned or done exercises in	0	1	2	3	4	5
12.	The teacher immediately comes to help me when I have problems doing an activity	0	1	2	3	4	5
13.	The teacher gives more exercises to some pupils than the rest of the class.	0	1	2	3	4	5
14.	The teacher gives some pupils different exercises to do than the rest of the class.	0	1	2	3	4	5
15.	The teacher gives all pupils the chance to take part in the lesson.	0	1	2	3	4	5
16.	Our teacher encourages us to work together with our classmates during lessons	0	1	2	3	4	5
17.	Some pupils in my classroom work together when our teacher asks us but some pupils do not.	0	1	2	3	4	5
18.	Our teacher makes us feel bad that we can ask him/her for help or advice if we need it.	0	1	2	3	4	5
19.	Our teacher encourages us to ask questions if there is something that we do not understand during the lesson.	0	1	2	3	4	5
20.	During the lesson, our teacher encourages us and tells us that we are doing good work (i.e. she/he says to us "well done").	0	1	2	3	4	5
21.	When we are working in teams, our teacher encourages competition between teams.	0	1	2	3	4	5
22.	During class exercises, some of my classmates hide their work and answers so that none of the other pupils can see it	0	1	2	3	4	5
23.	When a pupil gives a wrong answer the teacher helps her/him to understand her/his mistake and find the correct answer.	0	1	2	3	4	5
24.	When the teacher asks us a question about the lesson he/she asks us for the answer but does not ask us to explain how we worked out the answer.	0	1	2	3	4	5
25.	When one of the pupils in the class is having difficulties with the lesson, our teacher goes to help him/her straight away	0	1	2	3	4	5
26.	There are some pupils in the classroom that tease some of their classmates if they don't know something during lessons.	0	1	2	3	4	5
27.	I know that if I break a class rule I will be punished or questioned why.	0	1	2	3	4	5

28.	Sometimes teacher has to stop teaching the class because one of the pupils are being mischievous	0	1	2	3	4	5
29.	When a pupil gives a wrong answer in lessons, the other children in the class make fun of her/him.	0	1	2	3	4	5
30.	Our teacher keeps on teaching us even though it is break-time or the lesson is supposed to be over.	0	1	2	3	4	5
31.	When I finish a task before my classmates my teacher immediately gives me something else to do.	0	1	2	3	4	5
32.	When the teacher talks to a pupil after they have been mischievous, sometimes after a while, that pupil will be mischievous again	0	1	2	3	4	5
33.	We spend time at the end of the lesson to go over what we have just learned.	0	1	2	3	4	5
34.	There are times we do not have the necessary materials for the lesson to take place (e.g., calculators, rulers)	0	1	2	3	4	5
35.	There are times when I do not have anything to do during a lesson.	0	1	2	3	4	5
36.	During a lesson, our teacher asks us to give our own opinion on a certain issue.	0	1	2	3	4	5
37.	Our teacher asks us questions at the beginning of the lesson to help us remember what we did in previous lesson	0	1	2	3	4	5
38.	Our teacher uses words that are hard to understand when he/she asks us a question	0	1	2	3	4	5
39.	When we do not understand a question, our teacher says it in a different way so we can understand it	0	1	2	3	4	5
40.	When a pupil gives wrong answer wrong to a question, our teacher gets another pupil to answer the question.	0	1	2	3	4	5
41.	When I give a wrong answer to a question the teacher helps me to understand my mistake and find the correct answer.	0	1	2	3	4	5
42.	Our teacher praises all pupils the same when we answer a question correctly.	0	1	2	3	4	5
43.	When we have problem solving exercises and tasks in lessons, our teacher helps us by showing us easy ways or tricks to solve the exercises or tasks	0	1	2	3	4	5
44.	Our teacher encourages us to find ways or tricks ourselves to solve the exercises or work s/he gives us.	0	1	2	3	4	5
45.	I am there when my teacher talks to my parents for my progress.	0	1	2	3	4	5
46.	When we are having a test I finish up within the time given to us.	0	1	2	3	4	5

PART B

In this part there are some statements. For each statement circle the answer that shows what usually happens in your class during your lessons.

1. We have tests or assessments

- Every week
- Every two weeks
- Every month
- Every term
- Never

2. The teacher gives corrected tests or assessments back to us

- Within a week
- Within two weeks
- Within three weeks
- In a month or even longer
- She/he never returns them.

3. The teacher explains to us what s/he expects us to learn from our lessons. This happens:

- in every lesson
- in most of the lessons
- only sometimes
- very rarely
- never.

**4. When no student raises his/her hand to answer a question, the teacher usually
(please choose one answer)**

- answers the question and moves to something else
- repeats the question using the same words
- restates the question using simpler words
- asks an easier question
- Gives us hints or clues to help us answer the question.

You may write in the space below any other comments you may have to add to the answers above.

Appendix D: Teacher Questionnaire

Dear Teacher,

We are conducting a study on the quality of teaching in your respective school. We would like to know the following on your professional profile.

Confidentiality in the use of the information you provide is guaranteed.

Name of teacher (Optional)

Grade

School

PART A: TICK AS APPLICABLE TO YOU

1. My age is

- Under 25
- Between 26 – 35
- Between 36 – 45

2. My years of teaching experience

- 0 -3 years
- 4 -7 years
- 8 – 13 years
- More than 14 years

3. My Highest Degree/Certificate obtained

- Diploma
- Degree
- Masters
- Doctoral

Appendix E: Second Low-Inference Observation Instrument (Lio2) of the Dynamic Model Of Teacher Effectiveness

(1) ORIENTATION														
DIMENSION S	Instructions for coding													
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 √ for any type of differentiation you observe.													

(2) STRUCTURING																
DIMENSION S	Instructions for coding															
Sequence of the activity	Ordinal number of the activity as observed during the lesson.															
Duration	Duration in minutes.															
Focus	<u>Relation with:</u> 1. previous lessons 2. structure of the day lesson 3. the unit/number of lessons.															
Quality: clarity	1. clear for the students 2. not clear for the students															
Differentiation	Put down the sign √ for any type of differentiation you observe.															
(3) APPLICATION																
DIMENSION S	Instructions for coding															
Sequence of the activity	Ordinal number of the activity as observed during the lesson.															
Duration	Duration in minutes.															
Focus	<u>Relation with:</u> 1. only a part of the lesson 2. the whole lesson 3. the unit/a number of lessons.															

(4) NEW LEARNING-MODELLING

(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	<u>Relation with:</u> 1. only a specific task 2. the whole lesson 3. the unit/a number of lessons.																	
Quality: type	1. product 2. process.																	
Quality: reaction if no answer from pupils (in case there is an answer put an X).	1. restate (easier words) 2. pose an easier question 3. move to another question or answers the question him/herself.																	
Quality: feedback-reaction to student	1. negative comment to incorrect and partly correct answers. 2. positive comment to correct answer only. 3. positive comment to correct answer and constructive comments to incorrect and to partly correct answers. 4. no comments.																	

Quality: feedback - reaction about the answer	<ol style="list-style-type: none"> 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. 																		
Differentiation:	Put down the sign √ for any type of differentiation you observe.																		

Appendix F - High-Inference Observation Instrument of the Dynamic Model

Observer's Name:
Teacher's Name:
School: Date: Time:
..... Class: Number of Students:..... Subject:

DIRECTIONS: Use the scale to note the extent to which you agree with the following statements. (*Scale: 1: Minimum point5: Maximum point*).

	STATEMENT	MINIMUM POINT					MAXIMUM POINT
1.	The orientation activities that were organized during the lesson helped students understand the new content.	1	2	3	4	5	
2.	The teacher explained how each activity served in fulfilling the aims of the lesson.	1	2	3	4	5	
3.	The teacher explained the structure of the lesson in a way that was clear for the pupils.	1	2	3	4	5	
4.	The teacher explained how the lesson of the day was linked to previous or to subsequent lessons of a unit.	1	2	3	4	5	
5.	The teacher asked pupils to discover the purpose of doing specific activities.	1	2	3	4	5	
6.	The teacher explained how the different activities were linked to each other.	1	2	3	4	5	
7.	The teacher posed questions to link the lesson of the day with previous or subsequent lessons.	1	2	3	4	5	
8.	The teacher posed revision questions to examine what pupils had understood from the lesson of the day.	1	2	3	4	5	
9.	The lesson transited from easier to more complex activities.	1	2	3	4	5	
10.	The observed application activities referred (were linked) to the whole lesson.	1	2	3	4	5	
11.	The observed application activities referred (were linked) to certain parts of the lesson.	1	2	3	4	5	

12.	The observed application activities referred (were linked) to previous lessons as well.	1	2	3	4	5
13.	The application activities were nothing else but a replication of the activities that were organized during the presentation of the new content.	1	2	3	4	5
14.	The teacher asked pupils to deal with application exercises that were more demanding than those used for teaching the new concept.	1	2	3	4	5
15.	The teacher organised application activities that resulted in something that could be exploited for new learning.	1	2	3	4	5
16.	The teacher used to differentiate the application exercises that s/he gave to the pupils, according to their abilities.	1	2	3	4	5
17.	The teacher spent the teaching time on learning activities.	1	2	3	4	5
18.	The teacher challenged pupils to express their opinions on certain issues.	1	2	3	4	5
19.	During the lesson, the teacher gave only to some pupils the opportunity to participate in the lesson.	1	2	3	4	5
20.	The teacher encouraged pupils to co-operate with each other.	1	2	3	4	5
21.	During the lesson, pupils co-operated on their own initiative.	1	2	3	4	5
22.	Each pupil was engaged in individual work assigned to him/her by the teacher.	1	2	3	4	5
23.	The teacher encouraged competition between pupils.	1	2	3	4	5
24.	The teacher was interacting with pupils for the whole of the lesson.	1	2	3	4	5
25.	During the lesson, some pupils were co-operating with each other while others did not.	1	2	3	4	5
26.	Pupils interacted with each other during the whole of the lesson.	1	2	3	4	5
27.	Interaction between pupils contributed in achieving the lessons goals.	1	2	3	4	5
28.	The teacher discouraged the negative aspects of competition.	1	2	3	4	5
29.	There was pupil misbehaviour in the form of verbal harassment during the lesson.	1	2	3	4	5

30.	There was pupil misbehaviour in the form of serious verbal harassment during the lesson.	1	2	3	4	5
31.	There was pupil misbehaviour in the form of bodily harassment without putting others in danger during the lesson.	1	2	3	4	5
32.	There was pupil misbehaviour in the form of bodily harassment putting others in danger during the lesson.	1	2	3	4	5
33.	The lesson was interrupted by the misbehaviour of some pupils.	1	2	3	4	5
34.	The teacher was forced to make remarks to some students because they were talking to each other.	1	2	3	4	5
35.	In the case of misbehaviour in the classroom, the teacher ignored it deliberately.	1	2	3	4	5
36.	In the case of misbehaviour in the classroom, the teacher reacted and temporarily solved the problem.	1	2	3	4	5
37.	In the case of misbehaviour in the classroom, the teacher reacted and managed to solve the problem.	1	2	3	4	5
38.	In the case of misbehaviour in the classroom, the teacher reacted but did not manage to solve the problem.	1	2	3	4	5
39.	The lesson was interrupted by external factors.	1	2	3	4	5
40.	The aims that the teacher had set before the lesson were met during the 40-minute period of the lesson.	1	2	3	4	5
41.	The activities that were organised during the lesson helped each pupil to advance conceptually, according to his/her abilities.	1	2	3	4	5
42.	The majority of pupils were engaged in activities that were provided by their teacher.	1	2	3	4	5
43.	During the lesson the majority of the pupils were on task.	1	2	3	4	5
44.	Less able pupils considered the lesson activities as very difficult.	1	2	3	4	5
45.	More able pupils considered the lesson activities as very easy.	1	2	3	4	5
46.	The teacher used to pose questions that were clear for the pupils in terms of their content.	1	2	3	4	5
47.	The teacher used to correct pupils' misconceptions using their wrong answers.	1	2	3	4	5

48.	When teacher posed a question that was not clear for the pupils, she/he used to rephrased (restate) it.	1	2	3	4	5
49.	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.	1	2	3	4	5
50.	Pupils were puzzled by the procedures or strategies that the teacher presented to them for overcoming problematic situations.	1	2	3	4	5
51.	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.	1	2	3	4	5
52.	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.	1	2	3	4	5
53.	The teacher used to explain the procedures and strategies to the pupils and then she/he requested using them.	1	2	3	4	5
54.	Pupils understood the procedures and strategies that were presented by the teacher.	1	2	3	4	5
55.	Pupils used on their own initiative, ways or strategies presented by the teacher, to solve similar problems.	1	2	3	4	5

Appendix G - Observation of Differentiated Instruction Instrument

1 = Cannot observe it

4 = Yes can observe for the most part of the lesson

2 = Sometimes but not enough

5 = Completely compatible

3 = Rather or quite enough

LESSON PREPARATION

The teacher

	DETAILS OF ITEMS	1	2	3	4	5
1	Defined a clear and appropriate aim of teaching and learning (=what all students should know/ do/ feel/ think at the beginning/end of the lesson)					
2	Defined the core/essential knowledge (concepts, information, cognitive/metacognitive/technical skills and strategic thinking, values and attitudes) of the new lesson – (concept teaching)					
3	Specified the necessary previous knowledge that students should master in order to participate in the learning process and construct new knowledge					
4	Specified the transformative activities that can support learning for advanced learners					
5	Scheduled an inductive teaching based on inquiry learning					
6	Identified the appropriate learning activities for sequenced/gradual learning (= previous knowledge, core, transformative)					
7	Developed/ prepared the necessary learning material for effective teaching and learning for all students in mixed readiness classroom					
8	Prepared a variety of teaching means and material that respect students' different preferences					

TEACHNG AND LEARNING ENVIRONMENT

	DETAILS OF ITEMS	1	2	3	4	5
1	Teaching emphasizes skills and thinking strategies					
2	Classroom work cultivates metacognition					
3	Instructions are clear					
4	Teacher's voice does not dominate the classroom talk					
5	Classroom organization is not monolithic; students work individually, in pairs, and in groups for cooperative learning.					
6	Teacher respects each student's different pace by giving students time to think and construct their answer					
7	During lesson each student differentiates his/her work according to his/her own needs in pre-prepared sequenced/gradual activities					
8	All students do not work in the same activity; when					

	somebody finishes one activity goes on to the next one.				
9	Teaching is not mono-level; it brings previous knowledge in the classroom and gives advanced learners the opportunity to deal with challenging tasks beyond the main aim of the lesson.				
10	Students have the choice to select between activities aiming at the same learning outcome those that respect their different learning style/ way to work				
11	All students work and communicate with their pairs and groups				
12	Teacher gives individual support to students during their work				

ASSESSMENT

	DETAILS OF ITEMS	1	2	3	4	5
1	There is continuous formative assessment and feedback, both individual and to whole classroom.					
2	The home work, if any, is differentiated; previous knowledge is included					