

**Impact of Cognitive Developmental Theories on the
Teaching and Learning Process at a Private US
curriculum school in Dubai, UAE.
A study conducted in a private American school in Dubai**

تأثير النظريات التنموية المعرفية على عملية التعليم والتعلم في مدرسه خاصه
تعتمد المنهج الأمريكي في دبي، الامارات العربية المتحدة

by

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of the requirements for the degree of
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Abstract

Human development theories pursue to figure out how and why children change and develop over time. Human development theories present the framework to allow the educators to understand, explain and predict children's' behavior. Throughout history, there have been many theories that explain child development. This study focuses on two significant theories, Piaget's cognitive development theories, and Vygotsky's sociocultural theory. The study covered broadly many aspects of these two theories. Their main points and their strategies have been discussed in deep. The study aims to evaluate the application of the strategies of each theory in the classroom. The study conducted in a US curriculum private school in Dubai. Mixed methods of both qualitative and quantitative instruments have been used. Three different teachers have been observed and interviewed to evaluate the implication of the strategies of each theory during the teaching and learning process. Then the findings have been analysed and compared to reach a conclusion. According to this analysis a deep and practical comparison occurred between the two theories. Where some of the teachers tend to Piaget's cognitive theory and some tend to Vygotsky, while others believe that applying the strategies of the two theories in parallel to each other, is a must. Both theories play a significant role in human development. Educators should shift from the old traditional learning process to the new cognitive learning process.

البحث الملخص

تسعى نظريات التنمية البشرية إلى معرفة كيف ولماذا يتغير الأطفال ويتطورون مع مرور الوقت. تقدم نظريات التنمية البشرية إطار عمل يسمح للمعلمين بفهم سلوك الأطفال وشرحه والتنبؤ به. على مر التاريخ، كانت هناك العديد من النظريات التي تشرح نمو الطفل. تركز هذه الدراسة على نظريتين مهمتين، نظريات بياجيه للتنمية المعرفية، ونظرية فيجوتسكي الاجتماعية-الثقافية. غطت الدراسة على نطاق واسع العديد من جوانب هاتين النظريتين. نوقشت النقاط الرئيسية واستراتيجياتها في العمق. تهدف الدراسة إلى تقييم تطبيق إستراتيجيات كل نظرية في الفصل. الدراسة التي أجريت في مدرسة مناهج أمريكية خاصة في دبي. تم استخدام طرق مختلطة لكل من الأدوات النوعية والكمية. تمت ملاحظة ثلاثة معلمين مختلفين ومقابلة لتقييم تأثير استراتيجيات كل نظرية أثناء عملية التعليم والتعلم. ثم تم تحليل النتائج ومقارنتها للوصول إلى نتيجة. وفقاً لهذا التحليل، حدثت مقارنة عميقة وعملية بين النظريتين. حيث يميل بعض المعلمين إلى نظرية بياجيه الإدراكية ويميل البعض إلى فيجوتسكي ، في حين يعتقد آخرون أن تطبيق استراتيجيات النظريتين بالتوازي مع بعضهم البعض ، أمر لا بد منه. تلعب كلتا النظريتين دورًا مهمًا في التنمية البشرية. يجب أن ينتقل المعلمون من عملية التعلم التقليدية القديمة إلى عملية التعلم المعرفية الجديدة.

Dedication

To my bundle of joy, my wonderful daughters Halla and Jana,
who have always been the source of inspiration to achieve all my goals.

To my parents for their endless love, and prayers.

To my dear husband, for all his support at every step.

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List of Acronyms

DSIB	Dubai School Inspection Bureau
NEASC	New England Association of Schools and Colleges
KHDA	Knowledge and Human Development Authority
TIMSS	Trends in International Math and Science Study
PISA	Program for International Student
MOE	Ministry of Education
EDA	Exploratory Data Analysis
SPSS	Statistical Package for Social Sciences
MKO	More Knowledgeable Others
ZPD	Zone of Proximal Development

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

People, especially educators are always wondering how children grow and change over their life span. Definitely, all the educators have their own experience with growth and development, but sometimes they struggle to understand why and how students develop, learn, grow and act the way they do. Educators are always eager for new teaching methods, to help students become independent, engaged more in the learning and teaching process and achieve high educational attainment. Cognitive development serves in adding new concepts to the present store of information. As Thomas (1997) declared, human development theories are used to explain how and why people become, as they are. Schroeder (1992) added that cognitive development theories present a framework to explain and expect human behavior. Understanding human behavior has a great impact on improving the teaching strategies.

Throughout this study, the researcher focuses on two theories Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory. The main concept of each theory has been debated in-depth. Vygotsky's and Piaget's views are compared taking into consideration the pros and cons of each theory. Tom Tylor (2018) stated that it is hard to explore the world of child cognitive educational development without tripping over these two names. The study aimed to figure out the effect of applying Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory in the teaching and learning process

Next, the researcher explains the methodology that has been used to collect the data. A mixed methodology contains a classroom observation and a semi-structured interview has been used. The researcher preferred to use the mixed methods rather than a single method. According to Creswell (2003), using mixed methods to conduct a study has become the recent and the most common in the research sciences rather than using a single method. Following, the data have been analyzed and discussed on a wide basis. A comparison between the different classroom observations and the different semi-structured interviews has been done. Afterward, the researcher reports the conclusion and states the findings based on the gathered data from the methodologies that have

been applied. Finally, the researcher made some critical recommendations regarding the finest actions that should be made by educators to improve the teaching and learning process. Through this whole study, the researcher was trying to give a helpful guide for educators to improve the teaching and learning process that will result in useful outcomes regarding the students' educational and cultural attainment.

1.2 Motivation of the Study

Understanding the way children think, and develop is very significant and interesting as well. Especially after having a deep dive in many thinkers' theories in different eras, which reflect how cognitive development has different aspects. Studying the cognitive development theories from different scopes enrich my knowledge about child cognitive development across each stage in their life span. Reading in this field, enhance my information about the development of children through socialization and interaction with the surrounding. It is interesting to know how children can develop their knowledge and their skills which help them to think about and understand the world around them.

1.3 Statement of the Problem

The goal of the cognitive-developmental theories is to discover and suggest new ways to understand the mind of the children and therefore to assist the teaching and learning process. The research in cognitive-developmental theories has a great and deep impact on educational practice. It affects the learning policies, the teaching strategies, and definitely the development of the students. It gives evidence of the effectiveness of the teaching strategies and practices inside the classrooms (Fleischman, 2006). If it is unknown how the children's minds learn, the effort to design educational strategies and apply the practices will fail as it will not benefit the child as it should do (Schnotz & kurschner 2007; Sweller, Ayres & Kalyuga 2011). The cognitive-developmental theories include the study of children's minds and the individual differences which greatly help in conceptualizing new strategies for teaching and learning processes. The cognitive learning constructs on the previous knowledge, while the traditional learning focuses only on memorizing. Cognitive learning is considered as a powerful alternative to the old-style traditional

learning approach. Despite the importance of cognitive learning, traditional learning is still applied by some educators in the teaching and learning process. For example, the teacher may apply the cognitive strategy by putting the children into groups and give them some activities to explore the new concept of the lesson, while another teacher uses the traditional method by only explaining the new concept on the board. The success of each strategy depends on the ability of the educator to understand the way their students think and therefore to apply the most suitable strategy. Definitely, students whose teachers are using cognitive learning strategies can be better learners than those whose teachers apply the old-style traditional strategy. The present study aims at finding the impact of applying two of the cognitive-developmental theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory) in the learning and teaching process. Teachers should use cognitive learning strategies in the classroom. The quality and effectiveness of these strategies are what determine the teachers' success. Cognitive developmental theories provide constructive, fruitful and long-lasting learning strategies that engage the learners in the teaching and learning processes. Cognitive developmental theories have a great impact on teaching the students to effectively use their brains to make connections and reflect on subjects when learning new concepts, it helps also in acquiring new skills to make them better learners.

1.4 Aim and Objectives

The main aim of the study is to figure out the effect of applying the cognitive-developmental theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory) in the teaching and learning process.

The following subordinate objectives will be discussed, as well.

- To figure out the strategies suggested by Piaget and Vygotsky in their cognitive-developmental theories.
- To make a conclusion concerning which cognitive-developmental theory that students respond to more effectively.
- To determine the strengths and weaknesses of each theory, in comparison to each other.

1.5 Research Questions

The study is mainly concerned with applying the two cognitive-developmental theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory) during the teaching and learning process, which make the students better learners by acquiring new skills. The research study strives to answer the following questions:

The main research question is:

- What are the impacts of the two cognitive theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory) in the teaching and learning process?

The research study will also answer the following sub-questions.

- What strategies of the two cognitive developmental theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory) have been applied in the teaching of Math, English and Science in the classroom?
- What are the perspectives of Math, English and Science teachers in applying the two cognitive theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory) in their teaching and learning process?

1.6 Hypothesis

The research study is carried out to test the hypothesis that if the educators apply the strategies of the two cognitive-developmental theories of Piaget and Vygotsky in the teaching and learning process, instead of the old-style traditional learning, it will result in enabling the children to use their minds more effectively, engage the students in the learning process and finally lead to increase the students' educational attainment. Every teacher should understand how children grow, change and develop to be able to figure out how children learn and what is the best way to teach them (Comer, 2005). The teachers will apply the strategies of Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory to evaluate the performance of the students and to analyse the difference in their engagement and attainment. Different student classrooms will be

observed to analyse the variance in their performance and their attainment. It is expected that the students' response, engagement, and attainment will vary according to the strategies of each theory. There are dozens of evidences on the effectiveness of applying the cognitive-developmental theories inside the classrooms (Slavin, 2009).

1.7 Significance and Relevance of the Study

This study is extremely significant, as all the educators all over the world have desire to improve the student capabilities to learn. Cognitive developmental theories are considered to be one of the most significant aspects of students' learning. It serves in the effective development, which is considered a result of many factors related to the relationships, interaction with the surrounding, use of language, exploring and investigating. Educational attainment is a result of high-test scores. The standardized assessment tests such as Trends in International Math and Science Study TIMSS and the Program for International Student PISA are used to evaluate the student's attainment (alsayary, 2018). The standardized assessment tests such as Trends in International Math and Science Study TIMSS and the Program for International Student PISA include three basic targets knowledge, application, and reasoning. In similar, cognitive learning has three basic aspects knowledge, skills, and understanding. To raise the students' attainment in the standardized assessments, the cognitive learning aspects should be linked with the assessment targets. In order to increase the students' attainment and achieve high results in these standardized tests, it is important to figure out the kind of information being taught, how memory works, how to teach them to think critically, and how students learn through interaction, and with help from others. Therefore, the good awareness of the cognitive-developmental theories, enable the educators to propose a new framework to develop students' skills.

Speaking of UAE, this study also is well-timed as all schools in UAE seek to improve the learning and teaching process, an inspection of the private schools in Dubai is conducted yearly to evaluate their performance. The key criteria to determine the achievements of the schools is students' development and attainment. This annual inspection is done by different organizations the Ministry of Education (MOE), the Dubai Schools Inspection Bureau (DSIB) and Abu Dhabi Education Council (ADEC). If students are taught in new professional methods, rather than the traditional methods, they will perform better and attain more knowledge. Cognitive developmental learning

plays an important role in students' attainment. That's why schools aim to hire qualified teachers who can apply the strategies of the cognitive developmental theories in their classrooms instead of using the traditional strategies. Schools also, provide their teachers with training to improve their skills.

1.8 Structure of the Thesis

The study includes five chapters where chapter 1 guide the readers to the outlines of the research study by presenting the introduction, statement of the study, motivation of the study, objectives, research questions, hypothesis, significance and relevance of the study. Chapter 2 outlines the main concepts that establish the basics of the study. It presents a brief overview of the cognitive developmental theories in general, and displays detailed information about two cognitive developmental theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural Theory). An in-depth comparison between Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory has been explained that boost the research arguments. Chapter 3 presents the methodology of the research study where the research design, research subject, research instrument, and research procedures are described, and the data analysis and collection methods are debated. Chapter 4 displays the main findings of the research and the data analysis. According to the research questions, an in-depth analysis of the quantitative and qualitative method is carried out. Then finally, Chapter 5 displays conclusions, limitations, and suggestions according to the findings obtained from the data analysis and discussion.

CHAPTER TWO: LITRATURE REVIEW

2.1 Overview of the Chapter

It is important to study cognitive development theories to gain an understanding of children's growth and their thought processes. Cognitive development theories cover many areas such as learning and memory, the storage and recall of information, language and speech and social interaction. The children respond and behave differently, as a result of how much information they received and how do they interpret this information, individual differences can vary greatly from one child to another. When educators understand the cognitive-developmental theories, they will be able to apply new learning styles to guarantee each student receives the information in a way that they can best understand it. This chapter begins with the importance of the human developmental theories, and their impact on child development. Then, this chapter presents two major theorists of cognitive development whose ideas are broadly accepted: Jean Piaget and Lev Vygotsky (see Bee & Boyd, 2010; Berk, 2013; Feldman, 2010; Keenan & Evans, 2010; Mahn & John-Steiner, 2013).

The main concept of each theory has been discussed in-depth. Piaget's, and Vygotsky's ideas have implications for educators about how children think and what and how they can learn (Robert E. Slavin, 2015). The stages of Piaget's cognitive-developmental theory have been described. The factors that affect cognitive progress are explained as well. The main points in Vygotsky's sociocultural development theory have been clearly and deeply clarified by the researcher. Vygotsky's and Piaget's views have been compared taking into consideration the pros and cons of each theory. Then perspectives of researchers about Piaget's and Vygotsky's work have been discussed.

2.2 Conceptual Analysis

The theories of child cognitive development describe how children grow, change and develop during their different childhood stages. Cognitive development theories focus on different sides of development including child social development, child emotional development and cognitive

growth. According to the research article presented by Thomas (1997), human cognitive development theories explain how and why people become as they are. Schroeder (1992) added that human development theories predict the people's behavior and give an explanation to the way they act, moreover they provide a framework to give clear clarification to their observations. The research subject of human development is a privileged and varied subject. As educators, we all have our own experience with child development. Still, on the other side it is sometimes challenging to figure out some certain behaviors, children do, and you wonder if this behavior suitable to their age, where do they get this behavior from? Why do they have this behavior? Is it an individual temper or an effect of some family problems? How children grow this way, and how do they learn this way and why children act as they do. As an educator, you always have those questions through your teaching journey. Psychologists of developmental theory did great effort trying to predict, interpret, and understand different behaviors that happened through the lifespans. Several various child development theories have come to light to discuss and explain the different aspects of human development and growth.

- **Why do educators study the cognitive developmental theories?**

As an educator you should have a good background of child cognitive development theories. Educators learn many different skills from the psychological developmental theories that enable them to understand, and explain the different behavior of children. Psychological development theories come up with a framework for explaining the human growth and the learning abilities in different stages of life. Understanding the developmental theories enable the educators to explain the motivation of the human theory and can provide useful awareness of the individuals and society.

- **How the understanding of child cognitive development has reformed over the years?**

Throughout the human history, a little attention was paid to the child cognitive development that happens from birth to adulthood. Studies ignored the child development, children were always considered as small model of adults. A small awareness was granted to the progress in the cognitive skills, physical growth, and to the use of language that happen through the different stages from

childhood to adolescence. Researchers started to show their interest in the area of child development at the earliest of the 20th century, but studies about the child development first tend to get emphasis on the abnormal and exceptional behavior of children. After a period of time, researchers started to pay more attention to other topics about the development of the normal child and the factors that affect the child development.

- **Why is it important to study the cognitive development of children?**

It is extremely important to understand the child development. Studies about the development of children allows educators to fully understand the changes that children pass through their life span, from birth into early adulthood. It provides the educators with fully awareness of various sides of children development including physical, cognitive, social, educational and emotional growth. Therefore, Cognitive development theories present new strategies of teaching, which is considered as an alternative to the traditional old style of teaching. Where, instead of focusing on receiving the information and memorizing, cognitive learning allows the students to use their brain more effectively to make connections when learning new concepts. skills that help them become better learners. Psychology's researchers have developed theories to support and assist in explaining different features and discovering new aspects of child development (Cherry, 2019). These cognitive-developmental theories assist the educators to understand how children think, why children behave as they do, how children grow and change during the life span. In this chapter findings and discussions of classroom observation and questionnaire have been presented.

- **What are the factors of cognitive learning?**

The abilities of students to learn more effectively depends on the building of cognitive learning skills. There are three basic factors of cognitive learning, comprehension, memory and application. Figure (1) below shows the three basic factors of cognitive learning, and how do they work in collaboration with each other.

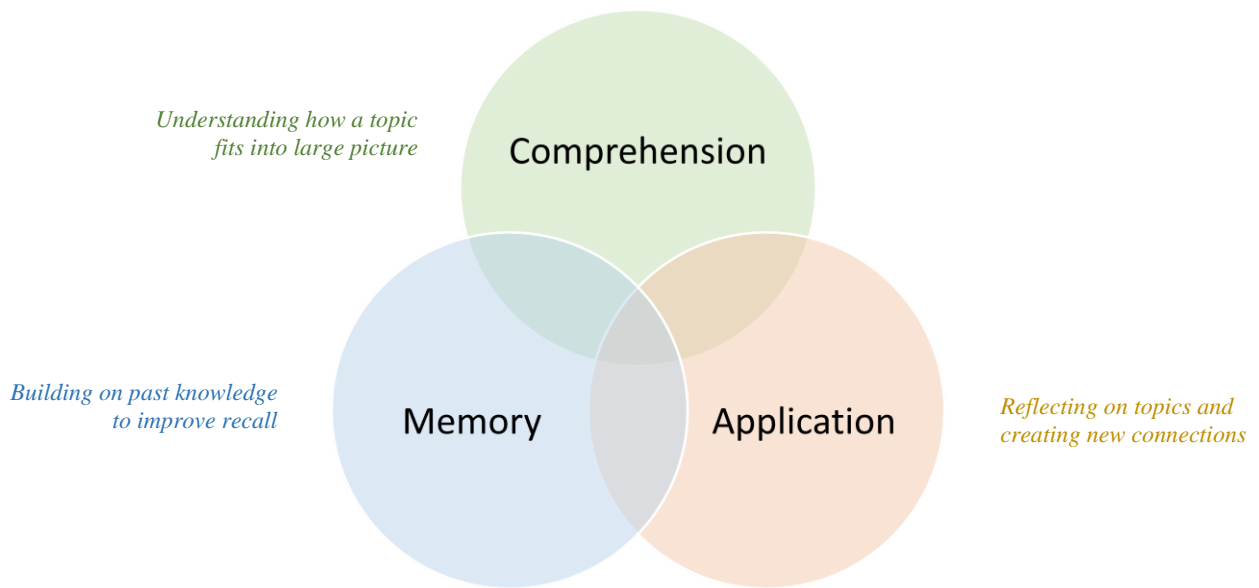


Figure 1: Factors of Cognitive Learning

- **Comprehension**

Students learn to explore, think critically and give reasoning instead of only receiving and repeating what they learned. Students can figure out the “why” behind each topic and how it leads to a deep concept.

- **Memory**

Unlike memorization methods, cognitive learning enables the students to explore and gain a deeper understanding of a new concept. which definitely improves the recall in the long run, so students can construct on previous knowledge.

- **Application**

The cognitive learning approach enables the students to reflect on what they are learning and how to apply it to another subject. This leads to improving the problem-solving skills the students need to create connections between what they are learning.

2.3 Theoretical Framework

Theories of development are of many types. Grand theories, which pursue to describe every specific side of development. Mini-theories, which stress on a specific side of development such as educational growth or social growth. Emergent theories, which arise from the gathering of several mini-theories and may become new systematic and inclusive theories later of the future. Grand theories focus on development as it applies to all individuals. The most basic and popular grand theories are Psychoanalytic theory proposed by Sigmund Freud, Psychosocial Developmental Theory proposed by Eric Erikson, and Cognitive Developmental Theory originated with the work of Jean Piaget. Sigmund Freud, Erik Erikson, and Jean Piaget are all great thinkers with similar aims but different views of human development. Their theories describe human development by passing through different stages as they age, but each theory has its own unique description of each stage, they focus on which abilities children can use in each stage to understand new ideas, and what concepts students are capable to figure during each stage. One of the most popular emergent theory is the sociocultural theory proposed by theorist Lev Vygotsky. Vygotsky's sociocultural theory is a good example of combining various mini-theories, which depend on various researches and ideas and different thinkers' views. In this chapter, ideas of two of the most influential cognitive developmental theorists, Jean Piaget and Lev Vygotsky, have been deeply discussed.

2.3.1 Piaget's Cognitive Developmental Theory

The development of a person's thought processes is an interesting area where many theories have addressed it, one of those theories is Piaget's Cognitive Development Theory. Cognitive theory is not only concerned with the development of the person's thought processes, at the same time it addressed how the thought processes stimulate the understanding and the interaction with the situations and circumstances. Piaget's cognitive developmental theory has had a great impact on the practice of teaching and learning (DeVries, 2008; Hustedt, Epstein, and Barnett, 2013; Ostroff, 2012; Schunk, 2016; Seifert, 2013). Piaget's cognitive development theory is considered one of the most effective theories which helped to define the development of thought processes as well as the mental conditions. Piaget didn't stop there, he also proposed the theory of cognitive

development to plan the steps and sequence of children's intellectual development. According to Berk (1997), Piaget considered that children develop steadily and progressively across life different stages and the experiences gained from one stage form the basis to shift to the following stage. Though students are mostly classified according to their chronological age, their level of improvement and the rate of development may change significantly in each stage (Weinert & Helmke, 1998). Many factors contribute to this difference including the child's capability, experience, maturity, and culture (Papila & Olds, 1996).

- **How Piaget Developed the Theory?**

Piaget is a Swiss psychologist born on August 9, 1896, Neuchâtel, Switzerland. He was an intelligent student, his first scientific paper has been published at the age of 11, he worked as an assistant to Alfred Binet and Theodore Simon, which helped him to expose the academic development of children. Observing his daughter and nephew was the inspiration to get interested in the cognitive development of children. Monitoring his daughter and nephew has strengthened the hypothesis that the children's minds are not just a smaller version of the adult's minds. These days, kid's minds were considered as smaller versions of the adults and that's why children used to be treated based on this hypothesis, however, Piaget was one of the pioneers to identify that children have different ways to think than adults. Moreover, Piaget proposed that intelligence grows and develops through time through a sequence of stages. Piaget suggested that older children don't think faster than younger children, there is a great variation between the way young children think and older children. It was obvious to Piaget that it's not a matter of less or more intelligence between children and adults, it is thinking differently, Albert Einstein commented on Piaget's theory that it is so simple and only a genius thinks about it (Cleverism, 2018). Cognitive development of children was described by the stage theory of Piaget which takes into consideration the changes in cognitive process and abilities. Early Cognitive development includes changes in mental operations, followed by actions and progress process.

- **Piaget's Four Stages of Development**

Theory of cognitive development by Jean Piaget recommended that children pass through four different mental development stages, Sensorimotor stage: birth to 2 years, Preoperational stage: ages 2 to 7, Concrete operational stage: ages 7 to 11, and Formal operational stage: ages 12 and up. Piaget's theory focuses on understanding how children gain their own knowledge at the same time focuses on the children's understanding of the nature of intelligence. Piaget built his theory on a concept that children actively take their role in the learning process, performing experiments, making observations as if they are scientists, they do learn about the world which they interact with, adding to their knowledge and acquire new experiences and add new ideas to the already existing ones. Figure (2) below shows Piaget's four stages of development.

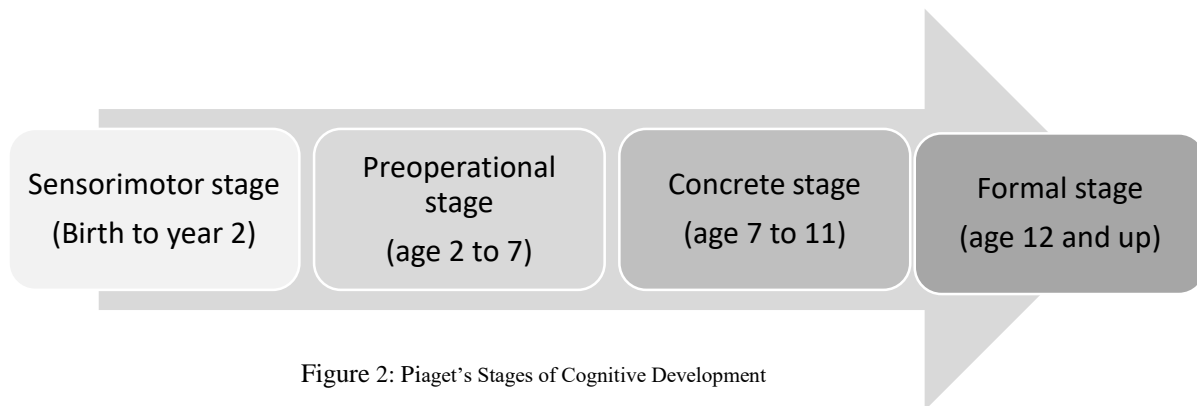


Figure 2: Piaget's Stages of Cognitive Development

First Stage: The Sensorimotor Stage.

The time between the birth and the age of two, at which, all the infant know about the world is limited to the sensory perceptions and motor activities, Infant's behaviors are so limited only to simple motor responses which are caused by the sensory stimuli, infant knows the world through their movements and sensations, through their basic actions. A large deal of growth is needed in the sensorimotor stage. Children acquire language skills from the people they react with. the infant has the ability to understand everything around them, only through the interaction with the environment. In this stage, learning occurs through the assimilation of information and accommodation to new concepts.

Second Stage: The Preoperational Stage.

The time between the age of two years and 6 years, where the child starts to use language to interact with the environment. To understand a new idea, the child needs specific physical events, as the ability to conceptualize specific situations is still not developed.

At this stage, children are mentally incapable to understand the views of others, and the manipulation of information is beyond their abilities. For instance, children at this stage can not understand the concept of constancy.

Third Stage: The Concrete Operational Stage.

The time between the age of 7 and the age of 11, at which children gain and acquire a better understanding of mental operations. Thinking logically about concrete events starts at this stage, however understanding abstracts and hypothetical concepts still difficult. Children at this stage tend to be less egocentrism and start to think that others might think and feel. Kids at this stage start to understand that their own thoughts are unique only for them and not necessarily others share the same.

Fourth Stage: The Formal Operational Stage.

The time between the age of twelve years to adulthood, at which people develop their ability to think about abstract concepts, some other skills develop at this stage such as logical thoughts, systematic planning as well as deductive reasoning. At this stage, cognition development reaches the last stage, as the person no longer needs concrete objects to make decisions. Teens are now capable to think like adults. They are following the scientific method, as they started by asking a question, make a hypothesis, investigate and explore, make an experiment, and finally reach into a conclusion.

- **Cognitive Progress by Piaget**

Understanding the cognitive development requires to study some ideas and concepts introduced by Piaget, below some factors which play a significant role in the growth and learning of children.

Schemas: It explains the mental as well as the physical actions needed to understand and know. Once the children acquire experience, any new information is used to modify or add to or change the previously existing schemas. An example for this; if a child has a schema about a dog and the experience is a small dog, the child might think that all dogs are small having four legs, supposing that the same child encounters a bigger dog, then he will take in this new information and modify the previously existing schemas.

Assimilation: Taking new information to the previously existing schemas and modifying it.

Accommodation: Piaget also introduced the adaptation process, where changing an existing schema after taking new information, this is known as accommodation process.

Equilibration: Piaget believed that all children try to reach a balance between assimilation and accommodation, this is achieved by equilibration. As children progress through the stages of cognitive development, it is important to maintain a balance between applying previous knowledge (assimilation) and changing behavior to account for new knowledge (accommodation). Equilibration helps explain how children can move from one stage to another. Figure (3) below shows the relationship between these factors and how the equilibration factor creates balance between assimilation and accommodation.

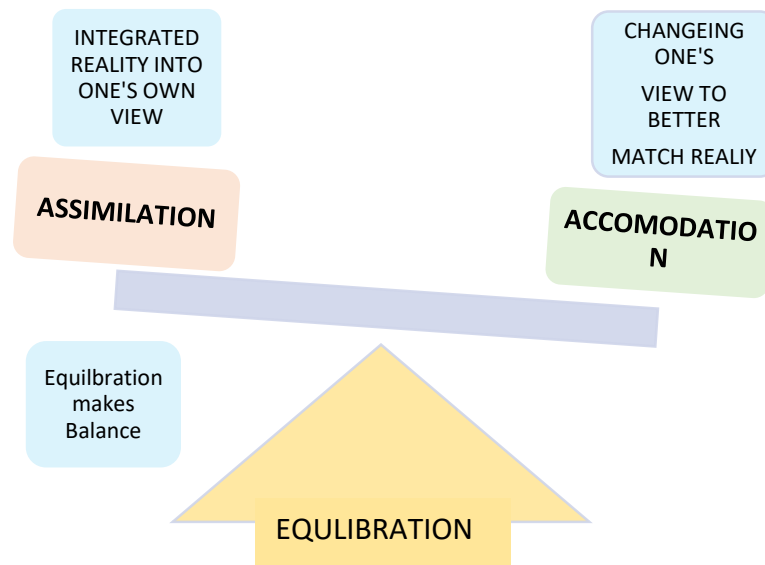


Figure 3: Piaget's Cognitive Development Theory

One of the most important elements of Piaget's theory is that it takes the view that creating knowledge and intelligence is an inherently active process. Piaget's cognitive developmental theory helped to understand the children's intellectual growth. It also stressed that children were not merely passive recipients of knowledge. Instead, kids are constantly investigating and experimenting as they build their understanding of how the world works. Piaget recommended that educators should perform an active, advisor role toward students, as they engage the students and encourage them to participate actively in the learning process. Teachers should get rid of the old traditional teacher role, where they used to push and cram the information to the student while passively sitting and listening.

2.3.2. Vygotsky's Sociocultural Theory

- **About Vygotsky's Work**

The Sociocultural theory is developed by Russian psychologist Lev Vygotsky (1896-1934). Vygotsky's Sociocultural Theory was unknown and unused by the West until it was published in 1962. Vygotsky same like Piaget dealt with the children development differently than adults, he believed that the hands-on activity plays a very important role in the children learning.

Vygotsky's sociocultural development theory proposed that all surroundings such as parents and peers as well as the culture are all responsible for developing higher order functions. Vygotsky work was not well recognized for long time because of some factors such as his early death (Vygotsky, 1896-1934) as well as Stalinist Russia who suppressed his work, however his work was contemporary of other thinkers like Piaget, Skinner and Freud. Recently Vygotsky ideas and work spread widely and considered an important source in the cognitive psychology, child development and education. In general. Vygotsky's Sociocultural theory states the major themes regarding social interaction, the more knowledgeable other (MKO), scaffolding, the zone of proximal development (ZPD) and Tools of intellectual adaptation.

- **The Basic Principles of Vygotsky's Work**

- **Social Interaction**

Learning occurs through social interaction (Vygotsky,1978). Interacting with others helps learning to be integrated in person understanding of the world. The Sociocultural theory is a developing theory in psychology addressed that the society contribute in person's development, highlighting the importance of the effect of the interaction between the individual and the culture where he lives, it is a social process, where the cultural beliefs and attitudes form and shape the learnings. Vygotsky focused on the sociocultural concept where students should interact and share experiences. Vygotsky (1978) states that "Every function in the child's cultural development appears twice: first, on the social level, and later, on the individual level; first, between people and then inside the child". Vygotsky concluded that social learning has not only a major role in the learning process, but it heads the whole development process.

- **More knowledgeable Other (MKO)**

Students should work with the more knowledgeable other (MKO) to gain new knowledge. Interacting with more experienced person help develop the skill and understanding. Vygotsky declared that learning comes first, then followed by development which driven by contribution from MKO.

- **Zone of Proximal Development (ZPD)**

The term "zone of proximal development" in invented by Vygotsky (1896-1934), who believed that learning occurs through the zone of proximal development (ZPD). Vygotsky proposed the concept of the Zone of Proximal development, it is built on the concept that the difference between what an individual can achieve at his own and what he can do with help. The zone of proximal development (ZPD) is defined as the gap between a student's ability to understand a concept with the guidance of adults or peers' cooperation and the student's ability to figure out the new concept independently. According to Vygotsky (1978), learning happened in this zone. Finally, Vygotsky believed that teachers should assist the students to learn and gain knowledge within their zone of proximal development (ZPD). Figure (4) illustrates the concept of the Zone of Proximal Development (ZPD).

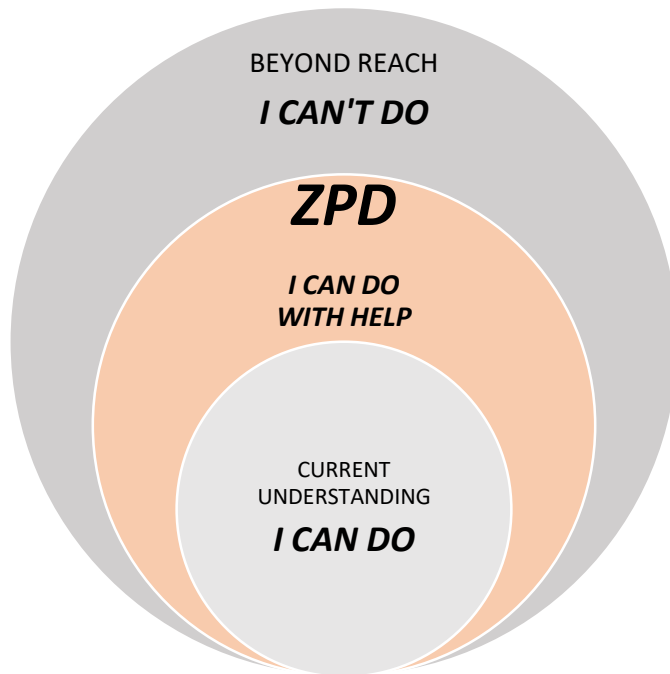


Figure 4: Zone of Proximal Development

- **Tools of Intellectual Adaptation**

Vygotsky proposed that a person born with a basic biological constraints, however children adapt to the culture where they live using their basic mental abilities. Vygotsky referred to this as Tool of intellectual adaptation. For example, while one culture might emphasize memory strategies such as note-taking, other cultures might utilize tools like reminders or rote memorization. Intellectual adaptation enables the students to use their mental functions more efficiently by adapting to their culture. Vygotsky added that students use tools that arise from a culture such as writing and speech to serve as social functions and methods to connect different needs.

- **Inner Speech**

Social speech become inner speech. Inner speech considered as a self-directed discourse, when a person talks to himself/ herself silence. According to Vygotsky's concept, "speech began as a social medium and became internalized as inner speech, that is, verbalized thought" (Katherine Nelson, 2006).

- **Scaffolding**

Vygotsky define the scaffolding as a method that enable the students to accomplish their learning objectives by working with a teacher or high skilled peers (MKO). Vygotsky conducted many researches which led to use scaffolding strategy. This is the reason why the concept is always mentioned to as “Vygotsky scaffolding.” Other scholars later construct on Vygotsky’s work related to scaffolding strategy. Schwieter (2010) affirmed that scaffolding is an effective technique of problem-based learning. Wells (1999) added that the fruitful scaffolding build the learners’ ability to re-do the similar tasks, on their own.

In conclusion, students can highly benefit from group learning activities. Learning through sharing knowledge with expert classmates can be highly effective in achieving progress within the zone of proximal (Roth & Lee, 2007). As Slavin (2011) and Webb (2008) stated cooperative learning activities can be organized with groups of mixed abilities from different levels to assist each other in the learning process. As Gredler (2009) declared, classmates are often working within each other’s proximal development zones, as a result they swap different ideas of slightly more advanced thinking. Cooperative learning is very important as it makes student’s internal speech accessible to others, student benefit when they hear their peers “thinking out loud”, so they can add another vision and another point of view to their reasoning process. Vygotsky (1978, p80) states: “Every function in the child’s cultural development appears twice: first, on the social level, and later, on the individual level; first, between people and then inside the child”.

2.3.3 Vygotsky Versus Piaget

Both Piaget and Vygotsky proposed theories about the child cognitive development, however, each one has his own view. Some of the key similarities between Piaget and Vygotsky are as the following:

- Learning process happens progressively, where new concepts get more complicated and developed as children get older.

- Both declared that students need to be active and perform experiment to develop their thinking process.
- The cognitive development of children passes through sequential stages.
- Both highlight nature and nurture as important factors that affect the development and learning process.

It doesn't seem like there are a lot of similarities, but these few similarities are very significant in realizing the importance of how children learn. The basic point that Piaget and Vygotsky share is that the learning and development process is sequential and needs specific stages to occur before moving to the next stage. Despite of some similarities in both theories, a list of some differences can be concluded as follows.

Both thinkers Piaget and Vygotsky were concerned about the children cognitive development, however Piaget believed that cognitive development is created and driven by the adaptation of children to new experiences, focusing on the child's exploration and investigation, while Vygotsky declared that cognitive development is created and driven by social interaction focusing on the social factors that play big role in the child's cognitive development. Vygotsky (1978) believed that the 'making meaning' process is built on the community. In other words, the environment will influence how the children think and what they think about.

- Piaget declared that students understand new concepts actively through self-discovery and awareness, where Vygotsky affirmed that children need guidance and assistance to learn and develop. Vygotsky believes that adults are the main source of cognitive development as they pass their culture's tools of intellectual adaptation that children internalize.
- According to Piaget, cognitive development is generally alike for all children, but according to Vygotsky, cognitive development is not similar for all children, it varies relaying on culture and time.
- Another significant point is the capability of children to learn, in Piaget point of view, children are capable to learn only when they are ready, while Vygotsky has another view as Children are able to learn when they reach the zone of proximal development (ZPD).
- Vygotsky highlighted the significant role of the Language to unlock the cognitive development, while Piaget stated that Language is only a result of cognitive development. Piaget believed that thought comes before language and language needs thought to develop, but for Vygotsky, thought

and language are initially separate systems, they merge by the age of three, producing verbal thought (inner speech). For Vygotsky, cognitive development results from an internalization of language.

As a conclusion, cognitive development in the eyes of Vygotsky, raises from the social interactions, while cognitive development based on Piaget vision is the exploration and learning of the children who construct his knowledge of his own. Figure (5) illustrates the differences and similarities between Piaget 's theory and Vygotsky's theory.

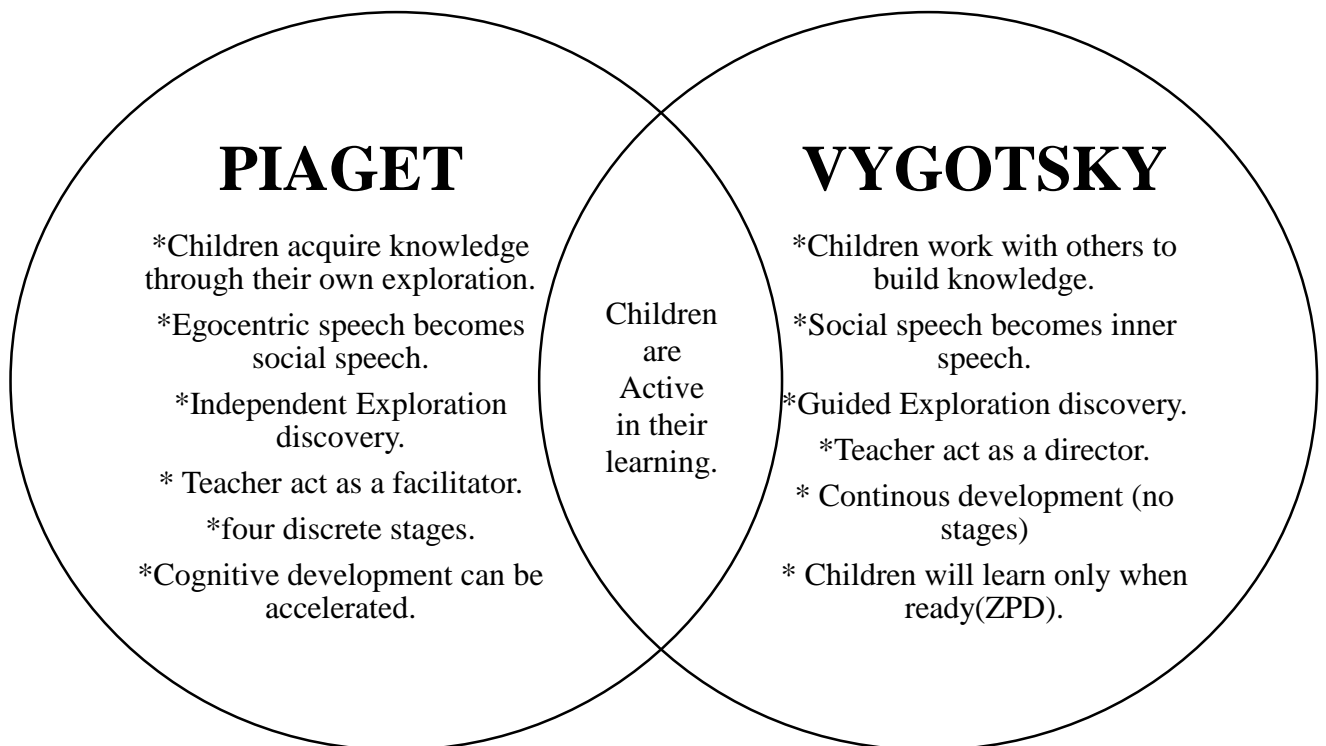


Figure (5): Venn diagram illustrating the differences and the similarities between Piaget and Vygotsky

2.3.4 Review of Literature

Throughout history there have been many different theories about the human cognitive development. Jensen and Nissen (1987) have established a school learning model that stresses on

teachers and their contribution to the teaching and learning processes in the classroom: "Our focus has been to try to stipulate categories for description of the individual potential for acquisition, which - in the pedagogical progression-interacts with the teacher's expression of knowledge" (Jensen and Nissen, 1987, p 73). Kilpatrick (1978), in speaking of the importance of theory and new developments suggested that: " a new wave of cognitive theory was building ... reforms proposed (on the new theories) were justified on the basis of principles derived ... but who can say what tomorrow may bring' (p.93).

This study focuses on two of the most influential cognitive developmental theorists, whose ideas are widely accepted: Jean Piaget and Lev Vygotsky (see Bee & Boyd, 2010; Berk, 2013; Feldman, 2010; Keenan & Evans, 2010; Mahn & John-Steiner, 2013). Jean Piaget is a French theorist in the 1900s, he was the first to present a complete study regarding the childhood psychology (Tylor, 2018). Piaget (1936) was the first psychologist to develop a systematic study of cognitive development. Piaget developed the theory of childhood cognitive development which centered on how the environment would impact the mental development of the child (Tylor, 2018). Lev Vygotsky is a Russian psychologist, who is well recognized for his sociocultural theory (Cherry, 2019). Vygotsky affirmed that social interaction has a great role in children's learning process. The work of Lev Vygotsky (1934) has been considered as the base for other studies conducted in cognitive development. Piaget conducted many observational studies on a wide range of children with different abilities, to determine how can these children think, count, and solve problems (Taylor, 2018). According to Piaget, as we persistently seek to understand the world around us, the thinking processes develop completely across the life stages (Piaget, 1974). Vygotsky highlighted the central role of social interaction in the cognition development area (Vygotsky, 1978). Vygotsky believed that human mental processes can be developed through interactions with others (Taylor, 2018). According to Saul McLeod (2018), Vygotsky believed in the central role of the community in the process of "making meaning". Vygotskian research confirms the fact that children build their experiences through social interaction with the outside world as they get help from adults and their peer classmates (Adhami, Johnson and Shayer, 1998).

According to Piaget, particular teaching strategies have been offered, based on Piaget's four stages and the ability level at each stage (Woolfolk, A., 2004). Regarding the preoperational stage, there have been many teaching strategies that can be used according to this stage. As Woolfolk (2004)

declared, the uses of verbal instructions, as the child has still not proficient in the mental process, would be more useful in this stage. Woolfolk (2004) added that using visual aids, and hands-on activities also help in learning new skills and increasing student engagement. Moving to higher stages involves different strategies in teaching the students by awarding them the opportunity to improve their skills in problem-solving, critical thinking and scientific reasoning (Allyn and Bacon, 2004).

According to La Vygotsky, new teaching strategies have been developed to enhance the teaching and learning process. Woolfolk (2004), highlighted that Vygotsky's theory focuses on learning through social interactions through what he called "dialogues," as students socially communicate with others to acquire the cultural morals of their society. While, Feuerstein(1980) focuses on Vygotsky's concept of mediation, teacher mediation has to be indirect, as the students in the adolescent stage may not easily accept the teacher's advice even if good. Therefore, the teacher needs to work smart and to choose the right mediation for each stage of the lesson. The students are mediating one another, but the teacher has the upper hand to manage the whole learning process. According to Woolfolk (2004), Lev Vygotsky proposed an alternative stages to Piaget's stages of cognitive development. Woolfolk (2004) declared that Vygotsky's Sociocultural Theory turn out to be a major guidance in the field of psychology and education. Vygotsky highlighted the importance of the zone of proximal development. Vygotsky declared that giving appropriate help will enable the students to solve a problem that Piaget considers to be out of the student's mental abilities (Woolfolk, A., 2004).

2.3.5 Summary

A lot of empirical studies have been conducted to discover the impact of Piaget's cognitive developmental theory and Vygotsky's sociocultural theory on the teaching and learning process. These studies cover evaluating the effect of the strategies of these theories on the student's engagement and attainment. All studies agreed on the effectiveness of both theories in improving the learning process. But as Adhami, Johnson, and Shayer (1998) declared, the application of these strategies to teaching is no easy matter. According to Tom Taylor (2018), although both Piaget's cognitive development theory and Vygotsky's sociocultural theory are equally well-known, Piaget

and Vygotsky differ on many points of their theories. Both methods agreed that the students are active learners who can work actively to construct knowledge.

CHAPTER THREE: RESEARCH METHOD

3.1 Overview of the Chapter

All the researches have to be arranged and planned (Nasution, 2009). As a result, every research should have a research methodology. According to Ngongo (2004) and Gay (1992), the research method should contain some basic elements that make up the research method. The basic elements include research plan, research subject, research procedure, research instrument and the data analysis.

3.2. Research Approach

Nasution (2009) stated that research design is considered as a plan to explain the way of collecting and analyzing the data. As a result, the research can be made economically and appropriate to the main target of the research. As Creswell (2014) declared that mixed-methods is a multi-strategy methodology. Mixed-methods involves the gathering, analysis, combination, and interpretation of both qualitative and quantitative data into a single particular study that stresses on a certain phenomenon (Creswell, 2014; Creswell & Tashakkori, 2007). The purpose of the mixed methods approach is to understand the aims and the findings of the research inquiry (Osden Jokonya, 2016). Mixed methods research to support improving the validity of the research by using various sources to gather information (Venkatesh et al., 2013). “Mixed-methods is a term widely used in conducting research studies to describe that the researcher combines quantitative and qualitative research techniques, methods, approaches, or concepts into a single particular study” (Jonson and Onwuegbuzie 2004, *P14-26*). As Creswell (2014) clarified quantitative methods includes many techniques such as experiments, surveys or observations, and qualitative includes different techniques such as focus groups, interviews or semi-structure interviews. In this research paper, the mixed-methods have been used which assist in understanding engagement between qualitative results (observations and semi-structured interviews) and quantitative findings (composite core), reflecting teachers' point of view. Using mixed-methods allowed the study participants to have a voice, and ensure that the findings of the study are supported by participants' experiences, (John Creswell, 2011).

3.3 Research Design

The study used a mixed-methods research design, where it is a process for collecting and analyzing data to understand the aim of the research. It requires collecting and mixing both quantitative and qualitative methods in a single study. As more data has been used from multiple resources, the exist drawbacks in one method had been neglected and recovered from the strength of the other method (Creswell 2013). Actually, mixed methods design is considered as an effective way of data validity and results' accuracy. (Yin 2011; Creswell 2013). The reason why the researcher used the mixed-methods, as one type of research (quantitative or qualitative) is not sufficient to answer the research questions. There four major mixed-methods designs are as the following:

- The convergent parallel design.
- The Explanatory sequential design
- The Exploratory sequential design
- The embedded design

The study used the Exploratory sequential design, which include two phases first to collect qualitative data from small group, then followed by collecting quantitative data form large group (Creswell, 2015). The two phases connected by using the qualitative finding to shape the quantitative phase. For the qualitative phase observations have been done to collect the data that have been used to develop a non-available typology which used in the quantitative phase. The benefit from using this design is that, quantitative component serves in making the qualitative process more reasonable. Figure (6) shows the Exploratory sequential design.

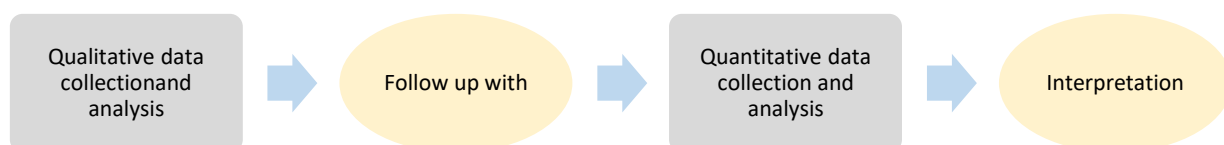


Figure 6: The Exploratory Sequential Design (Creswell, 2015)

The researcher started with conducting a classroom-observation for three teachers (Math, Science, and English) teaching grade 3. Then, semi-structured interviews have been carried with the same previous teachers to articulate detailed ideas about their view toward the cognitive theories. Lastly, the researcher collected and analyzed the qualitative data, then used the results to measure the subsequent quantitative data. The researcher linked the qualitative results to form the quantitative method.

3.3.1 Research Context

The researcher found that a good place to accomplish the study is Dubai (UAE), as Dubai is committed to ensure international standards of education. The UAE Ministry of Education (MOE) is responsible for public schools in Dubai, while Knowledge and Human Development Authority (KHDA) is responsible for growth and quality of private schools in Dubai. There are 194 private schools in Dubai, teaching 17 different curriculums to above than 280,000 students with 182 different nationalities. The Knowledge and Human Development Authority (KHDA) established in 2006 to evaluate growth and quality of private education, KHDA has the authority to inspect private schools in Dubai, and license educational organizations. The Executive Council of the Government of Dubai established the Dubai School Inspection Bureau (DSIB) of KHDA in 2007. DSIB provides inclusive data on the criterion of private school education in Dubai, which serve in school development and improvement. The web site of KHDA directory provides comprehensive information on programs offered as well as reports of school inspection.

3.3.2 Research Sites

The study has been conducted in a private US curriculum school in Dubai (UAE). Authorized permission was gotten by the vice-principal of the school. The researcher abstained from mentioning the name of the school, for ethical considerations. The reasons why the researcher choose this school were: (1) The school showed a good improvement according to the inspectors of the Knowledge and Human Development Authority (KHDA) and evaluation of New England Association of Schools and Colleges (NEASC), where there is a change and improvement in different sides of the school. The school displayed a great development in the students'

achievements. This improvement indicates using new effective strategies in the learning and teaching process. (2) The school has numerous students starting from the kinder garden stages till the high school stages. (3) The school recently made a great effort to shift the teachers from using the old-style traditional teaching techniques to the new cognitive teaching techniques to improve the student's attainment. The school started to apply the “Apple teacher” program which allow the students to use the technology to get more engaged in the teaching and learning process, as tasks are assigned to conduct on the iPad to allow the students to research, explore, discuss and make conclusions. The school provides professional development training, specialized workshops in the latest pedagogy and classroom practices. These workshops are very important to improve teachers' skills, effectiveness, and professional knowledge, to get fully prepared to meet the learning needs of every student and therefore raising the standards of students' attainment. Finally, the choice has been made for a school with a good reputation and seeks improvement in all the learning fields.

3.3.3 Population and Samples

The target population of this study is grade three level for the observation. Then three different subject teachers have been selected for the semi-structured interviews and classroom observations. A Math educator, Science educator and an English educator teaching grade three, has been chosen to conduct this research. The participant teachers have been assorted according to their qualifications, skills and years of experience. The study has been conducted over a period of six weeks from June, 2019 through October 2019 in a private school in the UAE.. A comparison between two developmental theories (Piaget theory and Vygotsky theory) had been done through the practical application during the learning and teaching process inside the classrooms.

3.3.4 Research Instrument and Validation Process

The research instruments are various ways used in guiding researches to gather the data (Ngongo,2004). In other words, the research instruments defined as the designed tools which prepared by researchers to attain their goals when proceeding their research study. According to the previous definition of the research instrument, three instruments have been used within two methods. Validity indicates the accuracy of the measurement of the method (Fiona, 2019). The

Findings of this study agreed with the measurement procedures, which indicates high validity and therefore high reliability. If research has high validity, that means it produces results that correspond to real properties, characteristics, and variations in the physical or social world.

In this study, the research instrument are :

- Qualitative method

A classroom observation (Appendix 3), and

A semi-structure interview questionnaire (Appendix 4)

- Quantitative method

The findings of the class observation have been used to calculate the composite score for each teacher.

3.3.5 Research Procedure

According to Ngongo (2004), the researcher should set a procedure and follow the steps of this procedure to collect the needed data. Based on this, different techniques, the researcher identified step by step the influences for each technique and finally link those different techniques to the main goals of the research study. According to the explanation above, the following procedures are followed to collect data.

- A classroom observation (qualitative method)

Classroom observation is a quantitative method for measuring teachers' skills and students' behavior. A classroom observation checklist (Appendix 3) has been designed to evaluate the teacher applying the cognitive theories during the teaching process. The observation checklist consists of two sections, section one includes twelve items to describe general teacher behavior. Every six items refer to the strategies of one theory. Where, item 1, item 3, item 4, item 5, item 7 and item 9 indicates the strategies of Piaget's cognitive developmental theory, and item 2, item 6, item 8, item 10, item 11 and item 12 indicates the strategies of Vygotsky's sociocultural theory. Section two refers to the student's response to teacher behavior. Section two includes 10 items to evaluate the student's engagement and attainment. The classroom observation checklist is to

evaluate the implementation of the strategies of Piaget's cognitive development theory and Vygotsky's sociocultural theory during the lesson and the effect of these strategies on the student's engagement and attainment. Before conducting the classroom observation, a permission letter (Appendix 1) has been sent to the principal of the school and has been signed by her.

- A semi-structured interview (qualitative method)

A semi-structured interview is a qualitative method of research, where the researcher creates open-ended questions to allow for a debate with the participant instead of asking straight questions waiting for short answers. "Semi structured interview allows researchers to develop in-depth accounts of experiences and perceptions with individuals" (Cousin, 2009, p71). A set of ten open-ended questions have been prepared for the semi-structured interview. The open-ended questions permit the participant teachers to answer freely and broadly covering many sides of the question. Also, they can express their own perspectives by comparing the question to their own previous experience. (Seidman 2013). The semi-structured interview aimed to check on the teachers' feedback in applying the cognitive-developmental theories in their classrooms and how effective is applying these theories in the teaching and learning process. Three semi-structured interviews have been conducted with the same three participants' teachers to figure out their opinion about the theory that they most likely to apply during the teaching and learning process. Three educators teaching three different subjects, Math, Science, and English have been elected due to their skills, qualifications and experience. The interviews aimed to figure out the teacher's opinion about the theory that they most likely to apply during their lessons and the reason why they tend to one of these theories more than the other. The duration for each interview was 30 to 40 minutes, the participant teacher signed a consent form (Appendix 2) before starting the interview. During the interview, notes have been taken and the answers have been taped. After the interview, the answers have been transcribed by the researcher. Lastly, the answers have been reviewed by the participant teachers and the researcher as well.

- Calculating the composite score (quantitative method)

The findings of the qualitative data have been used to measure the subsequent quantitative data. Therefore, the composite scoring has been calculated for the two theories, where measuring the composite scoring, involves the linking of the variable items to create a score. A composite score is a made up of two or more variables that are linked to each other theoretically or statistically (Ley, 1972). After you figure out the composite score, you can start conducting a reliability analysis.

3.3.6 Data Analysis

Ngongo (2004) stated that data analysis has a very significant role in writing a research study. Analyzing and tracking data helps in configuring the findings from various sources of data, and therefore reach the goal of the research. Quantitative and qualitative data have been analyzed separately.

- The data collected from the classroom observation checklists have been analyzed based on the information gathered before by the researcher about the different cognitive developmental theories. The SPSS has been used for the analysis of the classroom observations.
- Followed by descriptive analysis which has been used to analyze the data collected from the semi-structured interview. This evaluation explains the teacher's understanding and using of the cognitive-developmental theories during the teaching and learning process in the classrooms.
- Exploratory Data Analysis (EDA) has been used to analyze data and found connections which were previously unknown. The findings result from exploratory data analysis provide little vision of the case study (John Tukey, 1961).
- Then the findings of all the methods have been compared to each other, which have led to triangulation and validation of the results.

3.3.7 Ethical Consideration

Research ethics is significant in conducting any academic study, where the researchers should protect the identity of their study participants and publish carefully the information that is researched (Fouka & Mantzorou, 2011).

To conduct the research on the school campus, prior permission was taken from the school administration. The principal of the school has received a permission letter to clarify the aim of the study and the reason for choosing the school to conduct the research. A classroom observation form has been attached to the permission letter. The researcher emphasized on keeping the school name confidential. Then a consent form has been sent to the participant teachers to get their agreement on the classroom observation and the semi-structured interview. The teachers have been asked for an audio record for transcription of the data. Then all the audio records have been deleted. The teachers have been informed about their rights to review the transcription and give feedback to add any comment. The researcher emphasized that the identities of the participant teachers were kept confidential.

3.3.8 Role of the Researcher

Creswell (2007) affirmed that the researcher's role in conducting a study is critical. In this study, the researcher is a science teacher with ten years of experience teaching middle and high school. There was no direct contact of the researcher with grade three teachers, as they are working in the elementary section of the school.

The researcher acted as an observer. The main responsibility is collecting data and analyzing the data collected from the classroom observations and the interviews. The researcher was totally aware to be objective through the observations and the interviews and she tended to reflect the truths without any bias to any participants' view. This positively impact the outcome of the study and increase the clarity and the reliability. The main responsibility was collecting and analyzing the data gathered from the classroom observations and the interviews. The researcher has been totally aware to be objective through the observations and the interviews. The researcher was tending to reflect the truths without any bias to any participants' view, which affected positively the outcome of the study and increased the

reliability and validity. The researcher was also responsible for creating and designing the research instruments depending on the developmental theories used.

CHAPTER FIVE: FINDINGS AND DISCUSSION

4.1 Overview of the Chapter

To analyze the gained data, this chapter will debate two important aspects, findings and discussion. The data obtained through semi-structure interview questionnaire and classroom observation, will be analyzed based on the cognitive development theory of Piaget and Vygotsky. The researcher examined the effect of the two cognitive theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory) in the teaching and learning process. The findings bring us a step closer to create a framework to understand how children grow and develop, and therefore to use new learning methods to increase the students' attainment.

4.2. Findings from Observations

In this section, the findings of the classroom observations will be presented. The classroom observation has been done on three educators teaching three different subjects Math, English and Science (see Appendix 5, Appendix 6 and Appendix 7). The observations discuss the applying of the cognitive-developmental theories of Piaget and Vygotsky in the learning and teaching process in the classroom. The classroom observation focusses on two significant aspects related to the implication of Piaget's developmental theory and Vygotsky's Sociocultural theory in classroom and their effect on the teaching and learning process. These two significant factors include:

- The general teacher behavior

It includes 12 items, 6 items describe the teaching strategies based on Piaget's cognitive developmental theory, and the other 6 items describe the teaching strategies based on Vygotsky's Sociocultural theory. Item 1,3,4,5,7 and 9 represent the teaching strategies of Piaget's cognitive developmental theory, while items 2,6,8,10,11 and 12 represent the teaching strategies of Vygotsky's Sociocultural theory. Each item has been measured in a range from 1 to 3. Where 1 refers to never, 2 refers to sometimes and 3 refers to always.

- The student's response to general teacher behavior.

It includes 10 items to indicate the students' engagement and attainment according to each strategy. Each item has been measured in a range from 1 to 3. Where 1 refers to never, 2 refers to sometimes and 3 refers to always.

The data of all the observations of the three teachers have been gathered all in one table (table 1) to show the variance between the teachers' behavior in each class. Each teacher shows different behavior in each item listed in the observation checklist.

No.	OBSERVED ITEM GENERAL TEACHER BEHAVIOUR	Teacher 1			Teacher 2			Teacher 3		
		3	2	1	3	2	1	3	2	1
	Item 1	Act as a facilitator and provide rules/routines that supported the students' needs.	*					*	*	
Item 2	Act as a director and provide clear directions for multiple tasks.		*		*			*		
Item 3	Focus on the process of thinking not only the results.	*				*		*		
Item 4	Arrange different classroom activities.	*					*		*	
Item 5	Engaged students in the exploration.	*					*	*		
Item 6	Encourage students to evaluate and solve problems.		*			*		*		
Item 7	Consider the students' age in the teaching process	*					*	*		
Item 8	Provides opportunities for students to practice under direct supervision of the teacher			*	*				*	
Item 9	Provides opportunities for students to practice independently	*					*	*		
Item 10	Provides opportunities for students to learn from each other			*	*			*		
Item 11	Informs students of objective of the lesson		*		*			*		
Item 12	Monitors student learning continuously		*		*				*	

Table 1: The strategies applied by the teacher

Note: 3: Always 2: Sometimes 1: Never

Table 1, shows some strategies that have been always applied by each teacher and some strategies that have been never used by any teacher and other strategies that have been used sometimes.

Similarly, the data of all the observations of the three classes have been gathered all in one table (table 2) to show the variance between the student' behavior in each class. Students of each class shows different behavior in each item listed in the observation checklist.

	STUDENTS RESPONSE TO TEACHER BEHAVIOUR	Teacher 1			Teacher 2			Teacher 3		
		3	2	1	3	2	1	3	2	1
S1	Learn through working in pairs or groups.			*	*			*		
S2	Learn through working individually	*					*		*	
S3	Discovered central ideas through structured activities.	*				*			*	
S4	Work under direct instructions of the teacher			*	*				*	
S5	Gather evidence through research techniques.	*				*			*	
S6	Brainstorm ideas or alternative possibilities.	*					*	*		
S7	Identified and implemented solutions to problems		*			*		*		
S8	Explored diverse ways to think about a situation/object/event.	*				*		*		
S9	Need help from high-skilled peers			*	*				*	
S10	Learning through interaction with real world.	*			*			*		

Table2: The student's response to the teacher behavior

Note: 3: Always 2: Sometimes 1: Never

Table 2 shows the different student's responses to all of these strategies, which explained as the following: always for some items, sometimes for some items, and never for other items.

4.3 Discussion of Observation

Based on the classroom observations, as indicated on the above tables 1, 2, and 3 the following points have been observed:

- **The role of the children**

The Math teacher considered the children as “little scientists”. Children are encouraged to explore and discover through the interaction with the surrounding atmosphere. The Math teacher supplied the students with different kinds of activities and create different stations where the students can investigate and explore through the interaction with real world. The English teacher considered the children as a 'little apprentice'. The English teacher provided the children with a full support in all the learning situation. In contrast, the Science teacher realized the importance of the two roles of the students as a” little scientist” in specific situation, and a “little apprentice' in another situation.

- **The role of the teacher**

The Math teacher acts as a facilitator and provides support when needed, allowing the students to form their own ideas through self-investigation. While the English teacher act as a director and provide clear instructions to direct the students as they struggle in their missions. As similar, the Science teacher act as a facilitator allowing students to learn by themselves, but she doesn't forget to give instructions and direct the students under specific circumstances.

- **Critical thinking**

The Math teacher didn't focus on the correct answers, as much as the procedures the children use to get to know the answers. The Math teacher appreciated the children efforts to arrive to a specific conclusion whatever they gave the correct answers or not. On the other hand, the English teacher matters about the correct final result, for example, she stresses on writing the correct spelling or not of new words, regardless of the efforts the children made to write the correct spelling. In

contrast, the Science teacher, as the Math teacher, focus on the process of critical thinking, whatever the final answers were accurate or not.

- **Individual variances.**

The Math teacher in parallel with the Science teacher track Piaget's theory where all children pass through the same developmental progression but with various abilities. Therefore, instead of making an activity for the whole class group, the Math teacher and the Science teacher made great efforts to prepare different classroom activities for small groups and for individuals as well, depending on their developmental level. On the opposite, the English teacher focused on teaching the new vocabulary to the whole class together.

- **ZPD**

One strategy that has been applied clearly by the Science teacher is learning through zone of proximal development (ZPD). Where according to Vygotsky (1978), learning happens more effectively when students are working within their zone of proximal development. The zone of proximal development explains the new concepts that the student has still can't figure out but they are able of learning at a certain time, and may be with the help of their teacher or their peers. The science teacher provided the students with hints, clues and prompts to help them during a preassessment. The result of this preassessment were used to create the basics of the instructional experiment. Then the teacher arranged students into groups with different levels of abilities and gave each student instructions to solve a problem. She followed up with the students until they reach to the "teachable moment" where all of the students are exactly at the point of willingness to understand the new concept. The Math teacher and the English teacher applied this strategy as well, but it was not obvious and effectiveness much as the Science teacher did.

- **Scaffolding**

The science teacher used the Scaffolding strategy by offering prompts and hints at different levels. According to Vygotsky theory approach to instruction, teaching must support scaffolding, which

enable the students to carry more responsibility for their own learning (Berger, 2012; Daniels et al., 2007; Ostroff, 2012). The teacher clearly explained the goal of a scientific experiment, first she clarified the learning outcomes they are expected to achieve, then she gave detailed instructions to students to carry out the experiment, then she gave them the significant outlines to perform the experiment, she showed the rubric used to grade and evaluate their work, and finally she asked them to proceed the experiment on their own. This strategy was very successful, as students were motivated to achieve the learning outcomes. Students get to know obviously the reason why they are performing an experiment, they clearly understand the steps of the experiment, and what exactly they will be graded on, all of these factors motivate the students to achieve the learning objectives. In similar, the English teacher used the scaffolding strategy and support the students when they were not able to spell difficult words.

- **Mediation and MKO**

The Math and the Science teacher used the Mediation strategy to explain some complicated skills including reasoning. Vygotsky (1978), considered that some complicated skills, such as problem solving and reasoning, are improved through mediation with grownups and skilled peers (Wertsch, 2007). More Knowledgeable Others (MKO) such as adults and high-level peers tend to help other students using different ways such as simply explaining new concepts, or modeling new knowledge, or breaking down and simplifying complicated skills. In the science classroom, the science teacher helped the students by explaining new scientific concept, and the teacher assigned five high- skilled students to help other learners to understand the new concept. Using the Mediation strategy and (MKO) were very effective, where the grownups or high-level peers (more knowledgeable others) assist the learner to reach the next learning stage. In parallel, the English teacher effectively applied the (MKO) strategy. She assigned the most skilled students to help their peers who have difficulties in reading.

In order to decide whether the teacher apply Vygotsky's Sociocultural theory or Piaget's Cognitive developmental theory, composite scoring has been calculated for the two theories. Measuring the composite scoring, involves the linking of the variable items to create a score. The composite score has been calculated and presented in the table below, where teacher 1 indicates the Math teacher,

teacher 2 indicates the English teacher and teacher 3 indicates the Science teacher, Theory A indicates Piaget’s Cognitive developmental theory, and theory B represent Vygotsky’s sociocultural theory. After you figure out the composite score, you can start conducting a reliability analysis.

	Teacher 1	Teacher 2	Teacher 3
Theory A	3	2.3	2.8
Theory B	1.7	2.8	2.7

Table 3: The composite score for each teacher

As indicated in table (3), comparing the composite score of Teacher 1 (Math teacher) for theory A and theory B shows high score equal 3 with theory A than low score with theory B equal 1.7. Based on the composite score, the Math teacher tend to use the strategies of Piaget’s cognitive developmental theory. The Math teacher implemented effectively the Piaget cognitive theory in presenting the lesson inside the classroom. The Math teacher followed all the strategies to apply the Piaget developmental theory, such as focusing and highlighting the idea of developmentally appropriate education, an education that includes curriculum, tools, resources, guidelines and atmosphere that are appropriate for students from different fields, covering their social and emotional needs, as well as their cognitive and physical abilities. According to the composite score of Teacher 2 (English teacher), the table above shows high score equal 2.8 with theory B, and low score equal 2.3 with theory B. Regarding the composite score, the English teacher tended to use the strategies of Vygotsky’s sociocultural theory. She was able to apply Vygotsky’s Sociocultural theory in presenting the lesson inside the classroom, in fact not all the strategies done effectively, there were a lack of some important points, but so far it can be concluded that the English teacher hit the main points in implementing Vygotsky’s developmental theory. Lastly, Teacher 3 (Science teacher) gets almost similar composite scores for both theories A and B, equal 2.8 and 2.7 respectively. Comparing to the math and English teacher, the science teacher was capable to apply both of the theories, covering most of the strategies

In order to compare the students’ engagement and attainment with each teacher, a composite score has been calculated using the 2nd part of the classroom observation list. As shown in table 3, there is a clear difference in the composite score for each teacher.

Teachers	Teacher 1	Teacher 2	Teacher 3
Student's Attainment	2.2	2.2	2.5

Table 4: The composite score of the student attainment.

As indicated in table (4), Teacher 3 (Science teacher) achieved the highest composite score equal to 2.5 comparing to the scores of the Math teacher and the English teacher, where both of them got the same score equal to 2.2. To sum up, the Math teacher tends to Piaget's cognitive developmental theory. Although she applied effectively the Piaget's strategies in the classroom, there was a failure on some sides. According to Piaget's discoveries, the preoperational stage lacks the concept of conservation. Based on the classroom observation, the Math teacher forgot that the student in the preoperational stage is tending to consider that a sandwich cut into four parts is more sandwich. She misjudges that most of the students in the preoperational stage won't understand the principle of conversion. She should put in her consideration that students in the preoperational stage are egocentric in the way they are thinking. Students at this stage imagine that everybody sees the world exactly the way they do. Most of the students didn't figure out the concept of the conversion, but some high skilled students got the idea of conversion. In contrast, the English teacher tends to Vygotsky's sociocultural theory. The English teacher applied effectively the Vygotsky strategies during the lesson, but she missed a very important strategy that was not actually applied in the classroom. The English teacher didn't make any group activity. She neglected the importance of cooperative learning. The cooperative learning is very important as it makes student's internal speech accessible to others, students benefit when they hear their peers "thinking out loud", so they can add another vision and another point of view to their reasoning process. On the other hand, the Science teacher succeeded in using strategies of both theories (Piaget's cognitive development theory and Vygotsky's sociocultural), in conjunction with each other. Accordingly, the teacher can use a ceaseless scope of effective techniques to assist the students to get more engaged in the teaching and learning process.

By comparing the results of the two tables above (table 3 and table 4), teacher 3 showed the highest student attainment equal 2,5, as the findings of the two theories equal 2.8 and 2.7 respectively. In conclusion, both theories should be applied in conjunction with each other, to achieve more students' engagement and attainment.

4.4 Findings and Discussion of Semi-structure Interview

Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory serve in increasing the students' attainment. The Math, Science and English teachers used different strategies to conduct their lessons, where each one of them tends mostly to one of the cognitive-developmental theories. This is assumed so because the lesson plan and the activates are done by different teachers who adopt different points of view. This will allow evaluating the students' attainment and progress. The teachers used different strategies for the same grade stage, the current educational stage of the students is taken into consideration and it is expected that students' attainment and progress will differ from method to another. Which teacher's strategy is most likely to succeed? This greatly depends on the capability of each teacher to figure out the factors that form the character of her students and therefore to apply the most suitable theory. A qualified teacher should be aware of up to date researches on teaching strategies suitable for the grade level, and the subject that she is teaching. Educators should be eager to seek out skilled development training using the cognitive-developmental strategies to create a difference in the student's achievement. In this section we will discuss the findings of the semi-structure interview questions that had been answered by three different subject educators, the Math teacher, the Science teacher and the English teacher who applied two different developmental theories during the learning-teaching process inside their classrooms. A semi-structured interview contains 10 questions, which have been designed to discuss the implementation of strategies of different developmental theories. Below is the discussion about all the data that gained from the semi structured interview with the three teachers, the Math teacher, English teacher and science teacher.

For question 1: According to Thomas (1997), human development theories are models to explain how people behave and why do they behave the way they do. The human development theories represent different methods of thinking about child growth and development. These different development theories include, Freud's Psychosexual Developmental Theory, Erikson's

Psychosocial Developmental Theory, Piaget's Cognitive Developmental Theory, Bandura's Social Learning Theory, Vygotsky's Sociocultural Theory, do you know these theories? Would you briefly explain them?

The response of the teachers was mostly the same as the Math teacher answered yes, she added that she had a broad knowledge about the Human development theories, she defined the human development theories as the background that educators refer to in order to describe the changes a student pass by through their different stages of life. She added that some of these theories highlight a specific area of life, while other theories highlight particular stage of lifespan. On the other hand, It is found that the Science teacher answered yes also, she declared the significant role that all the human developmental theories play in presenting new ideas and approaches to student's capability to retain the knowledge gotten during the educational years. While, the English Teacher had not much knowledge about the theories, but the researcher summarized the theories to the teacher, highlighting the outlines of Piaget's Cognitive Developmental Theory and Vygotsky's Sociocultural Theory.

For question 2: Which theory, you most likely to apply in your classroom? And why?

The Math teacher declared that she used Piaget cognitive developmental theory during the learning- teaching process in her classroom. The teacher described the human developmental theories as the building blocks for a huge project, designed to explain the different ways people used to learn and the methods teachers used to facilitate that. The math teacher emphasized that Piaget cognitive developmental theory would have to be the giant cement foundation of this project. Piaget developmental cognitive theory deserved its reputation as the original basic idea as the researchers can continue constructing on it. She added that applying Piaget cognitive development theory in the teaching-learning process, allow her to deal with her students as little scientists where they can actively discover the world around them. On the other hand, the English teacher affirmed that she used Vygotsky developmental theory. The teacher stated that "Vygotsky's sociocultural theory" is the most theory she found it applicable to her lessons. The Science teacher affirmed that both theories should be used in combination with each other. She

added that, no theory is more accurate than the other, but both theories considered extremely significant in the teaching and learning process.

For question 3: What is the main concept of the chosen theory? would you elaborate?

The Math teacher clearly explained the main concept of Piaget cognitive developmental theory, where the way children think is totally different than the adults. His theory explains the progress of thinking process through the human life span, and describes the development of the mental states. It also determines how this thinking development through different life stages affect the way students understand the world and interact with different situations. While the English teacher, declared that the main concept of Vygotsky theory is the major role that the social interaction plays in the teaching-learning process. The teacher added that Vygotsky focused how gaining knowledge lies between the interactions of the students with one another, with their teachers, their classmates, their parents and definitely with the environment surrounding them. Similarly, the Science teacher added that Piaget's cognitive developmental theory highlights that child development occurs through a nonstop growth of thought processes as they get older across the lifespan. While Vygotsky's sociocultural theory stresses the active role teachers perform in cognitive child development.

For question 4: What are the major topics of the chosen theory?

From the interview, the Math teacher declared how Piaget cognitive developmental theory described the children cognitive improvement through a series of four fundamental stages. These stages affirmed that the cognitive development of children includes changes in children's capabilities and their cognitive process during different life stages. The four basic stages of Piaget developmental theory are: the sensorimotor stage (from birth to age 2), the preoperational stage (from age 2 to age 7), the concrete operational stage (from age 7 to age 11), and the formal operational stage (from adolescence to adulthood)

For question 5: What are the teaching strategies of the chosen theory?

The Math teacher and the science identified the three different teaching strategies used in Piaget's cognitive developmental theory. Preoperational thinkers; where students are capable to explain why and draw conclusion, to manipulate groups of objects and reduce egocentrism, Concrete operations; encourage students to discover concepts and principals, assign operational tasks., Formal operations, propose problems and encourage hypothesis formation, suggest alternative approaches to problems, develop projects and investigations, while the Science teacher added the fundamental topics of Vygotsky theory as follows: Learning occurs through social interaction , Students should work with the more knowledgeable other (MKO) to gain new knowledge, Learning comes first, then followed by development which driven by contribution from MKO, Learning occurs through the zone of proximal development (ZPD) and social speech become inner speech. Similarly, the English teacher affirmed the points the has been highlighted by the science teacher above.

For question 6: What kinds of teaching strategies do you use based on the developmental theory you chose to follow?

The Math teacher explained the teaching strategy used in her lesson based on Piaget's cognitive developmental theory. She used the "preoperational thinkers" strategy according to the age group she is teaching. The teacher applied this strategy by giving the students a hands-on activity to manipulate group of physical objects (clay, paper, and playdough) that change their shape, then she asked the students what they are experiencing with these objects during the hands-on activity. Student at the end were capable to explain why and draw conclusion. On the opposite, the English teacher described the teaching strategy she used based on Vygotsky's sociocultural theory. She started by displaying some flashcards and asked the students to read the new vocabulary (using scaffolding strategy). She asked the students to look at the meaning of each word. Then she asked them to work in pairs to memorize the spelling and the meaning of the new vocabularies. (using mediation strategy). She ended up the lesson with a worksheet and asked them to recall the spelling for each word. She asked the high skilled peers to help other students (using MKO strategy). On the other hand, the Science teacher declared that she used the strategies of Vygotsky's theory during the lesson, in conjunction with the strategies of Piaget's theory. She started the lesson with a warm-up question, and allow the students to explore the answer independently (using Piaget

theory). She explained the new scientific concept (using MKO strategy), then gave the instructions of a scientific experiment, she motivated the students by explaining the goal of a scientific experiment, (using scaffolding strategy). She divided the class into groups and then she assigned five high- skilled students in each group to help other learners to understand the new concept, (Using mediation and MKO strategy). Finally, she asked the students to complete the given task alone, to evaluate their individual ability to solve the problem, (using the ZPD strategy, and Piaget strategy). The science teacher believed in the importance of social learning in child development.

For question 7: Would you clarify how these strategies increase the students' attainment?

It is found the Math teacher answered yes. By using this strategy, students begin to improve their abilities to manipulate group of objects, to learn through playing, to develop their imagination, and to start use reasoning even if it is not logical. Using this strategy allow the students to explore the world around them, think critically, and even enjoy the learning process. Finally, all of these factors lead to increase the students' attainment. On the other side, the English teacher declared that Vygotsky theory can make students learn actively through social interaction with the atmosphere surrounding them and they can attain more with the help of their teachers, parents and their peers as well (MKO). The teacher highlighted the importance of the zone of proximal development (ZPD). Moreover, the Science teacher affirmed that using both theories in combination with each other results in great positive effect on the student's attainment. She highlighted that the zone of proximal development explains the new concepts that the students have not yet understand, but they are capable of learning these new concepts later at a given time with the help of their classmates or their teachers. She declared that there is a moment where the students are accurately at a point where they are willing to accept a new concept, she named this a "teachable moment", she added I achieve my lesson objectives when I reach to the "teachable moment". She added that using hands-on classroom activities allow the students to think critically, explore and give reasoning. Furthermore, she added that teachers should take their students industriously, as they have to esteem their suggestions to solve problems, their thoughts of previous knowledge and their views toward new concepts.

For question 8: Would you use another method in teaching-learning process to other class level? Explain why?

The Math teacher admitted that using the same strategies with different grade level cannot be applicable. According to Jean Piaget, the cognitive development of children occurs through four stages according to their age group: sensorimotor, preoperational, concrete operational, and formal operational. Each stage is characterized by the appearance of new intellectual capabilities and new cognitive skills that permit people to develop the way they understand the world around them. The teacher almost used the “preoperational thinkers” strategy as she is teaching the preoperational stage. But sometimes she moved to the “concrete operations” strategy, only at a specific point of transition to the next stage. Similarly, the Science teacher confirmed what the Math teacher declared above. According to Vygotsky’s theory, the English teacher admitted that using the same strategies with different grade level can be applicable. Vygotsky didn’t highlight the age range, instead, he focused more on the person’s level of teaching and learning rather than focusing on the age range.

For question 9: What kind of difficulties you face while applying the strategies? Would you explain?

The Math teacher admitted that there were some difficulties while applying the Piaget cognitive developmental theory. Jean Piaget doesn’t consider the interaction with peers or adults, and depend only on the child own abilities to explore and learn. She gave the students some physical objects that changed their shape to perform a hands-on activity to figure out how these objects change. The Math teacher declared that it was difficult for some students to figure out the concept alone depending only on their abilities. Students sometime need support from their teachers or their peers to support them to understand new concepts. With adult support, children can improve their thinking skills to higher levels. On the other side, the Science teacher admitted that there were some difficulties while applying the Vygotsky theory. As Vygotsky explained teaching and learning process is largely facilitated by the social communication between the students and “more knowledgeable others” such as the teachers, parents, or high skilled peers. The science teacher declared that using this concept while giving the students the instructions to perform a science experiment led to some negative points, as some students were able to perform the science experiment with the help of the teacher or their skilled classmates, but they became frustrated when they were not able to complete the science experiment alone. The English teacher declared that the

main difficulty that she faced is the student's engagement. Where students lose their spirit and motivation during the lesson, which will result in low engagement and definitely little attainment.

For question 10: In your opinion, what are the pros and cons of the chosen developmental theory?

From her point of view, the Math teacher summed up some pros and cons of Piaget's theory, using real evidence from running some activities during the lesson. She summarized the good and bad points as the following:

- Students can develop the ability to think critically.
- Children act like a “little scientist” as they explore, observe, make an experiment, and discuss the results.
- Students can always add new knowledge, build on an existing one.
- Students can adapt old ideas and accommodate new data.

She added that the theory is extremely effective as Piaget covered different sides in the learning and teaching process, however, he missed considering, the support of adults and peers which can definitely help in children's development. The English teacher stated some pros and cons from her point of view. One of the main advantages of Vygotsky's strategies is that Vygotsky focuses on the significant role of the language in the cognitive development of children, where language is a significant tool to connect with the outside world. From the teacher view, Vygotsky has a significant disadvantage, as he stated that students can learn only through social interaction, and he ignored learning through their own capabilities. Lastly, the science teacher compared both theories, highlighting some of their weakness and strength in her opinion. She stated that Vygotsky and Piaget proposed opposing views on the strategy of private speech. Where Vygotsky, believed that cognitive development depends on the internalization theory of language. In contrast, Piaget considered that language depends on the thought for its development in other words language come first then followed by thoughts. She declared in her view, is that Vygotsky's strategies let the educators to discover an important zone (ZPD; zone of proximal level) where the child can fruitfully achieve the main goals of the lesson with the help of more knowledgeable other (MKO), she added that students who works in groups produce better more advanced ideas than when they work alone. The science teacher added, Vygotsky himself, offered a good response concerning the disadvantages of his theory. He ignored the role of the student himself and the cognitive individual

capability and in contrast he stressed the learning through social interaction. In the opposite, Piaget focused on the children ability to explore, give reasoning and learn independently.

To sum up, according to Piaget, students learn Math, Science and English where the teacher has a facilitator role to engage the students in the learning process and encourage them to be active, explore, create, discuss, and make conclusions. On the other side, according to Vygotsky, students learn Math, Science and English using the scaffolding, high skilled peers' interaction and the concept of the zone of proximal development which can help students to gather more information, very quickly than they could learn using the traditional method. The teacher act as an instructor, where the teacher guide and direct the student's activity.

4.5 Triangulation

Triangulation defined as the combining of several research methods to develop an inclusive understanding of a phenomenon (Patton, 1999). Mixed-methods methodology is confirmed to be an effective approach of triangulating the findings and validating the data (Yin 2011; Creswell 2013). In this study, the data has been gathered using a mixed-methods methodology of both qualitative and quantitative instruments. Three instruments have been used, classroom observations, semi-structured interviews and calculating the composite scores.

The findings of the semi-structured interviews have reflected the answer to the research sub-questions about the strategies of Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory that have been applied in teaching Math, English, and Science. The results also reflected perspectives of Math, English and Science teachers in applying the strategies of the two cognitive theories in their teaching and learning process. It has been obvious that the Math teacher was convinced by Piaget's cognitive developmental theory more than the English teacher who was convinced by Vygotsky's Sociocultural theory. In parallel, the science teacher has convinced with both theories, confirming the significance of both of them. The findings of the classroom observations answered the main research question as it confirms that applying the cognitive-developmental theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory) in the teaching and learning process, has a great impact on increasing the student's engagement and attainment.

The findings of all the above research instruments have been triangulated, and a comparison between these findings has been done. Comparing the findings of the classroom observations and the interview together result in the following: teacher 3 showed the highest composite score of students' attainments as she applied the strategies of both theories during the teaching and learning process. This confirms the effectiveness of using the strategies of Piaget's cognitive developmental theory and Vygotsky's sociocultural theory in increasing the students' engagement and attainment.

CHAPTER V

CONCLUSION AND SUGGESTIONS

5.1 Summary of the Study

The main aim of the study is to figure out the effect of applying the cognitive-developmental theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory) in the teaching and learning process. Three educators teaching different subjects have been evaluated through classroom observation to check their ability to apply the strategies of Piaget's cognitive developmental theory or the strategies of Vygotsky's Sociocultural theory or both together in the teaching and learning process. The impact of applying these strategies on the students has been measured. It was hypothesized that if the educators apply the strategies of the two cognitive-developmental theories of Piaget and Vygotsky in the teaching and learning process, instead of the old-style traditional learning, it will result in enabling the children to use their minds more effectively, engage the students in the learning process and finally lead to increase the students' educational attainment. Semi-Structured interviews have been done to know more about each teacher's perspectives toward each strategy. The data have been collected, qualitatively and quantitatively, using mixed-method research design. The findings of the class observation (qualitative) have been used to calculate the composite score (quantitative) for each teacher. By measuring the composite score, a reliability analysis can be conducted. The collected data will be analysed separately, using different methods. Then, evaluations and comparisons between the findings have been done, which lead to the validity and reliability of the results. The findings bring us a step closer to create a framework to understand how children grow and develop, and therefore to use new learning methods to increase the students' attainment.

5.2 Key Findings

The main aim of the study is to figure out the effect of applying the cognitive-developmental theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural theory) in the teaching and learning process. The key findings of the study are as the following:

Both theories are very important as they play an essential role in understanding the way the children think and in explaining the child development from different sides. Applying the strategies of the two theories in conjunction with one another, lead to an unlimited scope to help children in the following aspects:

- Develop critical thinking skills and cognitive awareness
- Learn through exploring, observing, making an experiment, and give reasoning.
- Add new knowledge, build on a previous one. (Assimilation)
- Adapt old ideas and accept new concepts. (Accommodation)
- Learn through social interaction with more knowledgeable other (MKO)
- Learn through the zone of proximal development (ZPD)
- Convert the social speech to inner speech. (Inner speech)
- Learn to do more than to memorize and repeat.
- Understand the “why” overdue a new idea.
- Develop recall in the long run by deep understanding to a new concept.
- Learn how to reflect on what they are studying.
- Develop problem-solving skills.
- Learn to construct connections between different topics.

5.3 Implication of the Current Study

This research study is directly relevant to Piaget’s cognitive developmental theory and Vygotsky’s Sociocultural theory. Both theories are rich and varied subject where they focus on different aspects of child development including social interaction, emotional growth, child behavior, and cognitive progress. It is important to study those theories to gain a full understanding of how children think and change over the course of childhood. According to Piaget, children have real understanding of new concepts, only when they explore themselves, as he stated “to understand is to invent” (Piaget, 1974). On the other side, Vygotsky declared that children learn how to think through interaction with others, as he states “through others we become ourselves” (Vygotsky,1978).

5.4 Application

The application of this research study is positively beneficial for:

- Teachers to help them understand deeply the cognitive developmental theories, and how to apply them to become more qualified to understand how and why children grow, learn, and behave the way they do, and to change their traditional teaching strategies to the cognitive learning strategies which is a powerful alternative to the traditional classroom approach. Teacher become able to use active, constructive and long-lasting learning strategies to involve the students more in the learning process.
- Students to help them engaged more in the learning process, to construct on previous knowledge, to learn to make connections and how to reflect on subjects, to stop memorizing and start to use their brain more effectively to explore, analyse and give reasoning.

5.5 Limitations of the Study

Although the study got deep into Piaget's cognitive developmental theory and Vygotsky's sociocultural theory, the study neglected other cognitive theories which are significant as much as Piaget's cognitive theory and Vygotsky's sociocultural theory. Thus, the study considered limited regarding this point. Though the study can assist teachers, trainers, school leaders as well as parents to understand how children think and develop through different life stages. There is another issue should be taken into consideration, that the study has been conducted on a limited number of teachers. Although, the limited number of participants, the findings are valid and related to reality.

5.6 Scope for Future Studies

The study can be generalized and extended to compare the effect of all the cognitive theories on the learning and teaching process. Although, Piaget's cognitive developmental theory and Vygotsky's sociocultural theory are considered the most valid and effective theories, other cognitive theories should be taken into consideration. Studying all the cognitive theories together and comparing their effects on the learning process, will definitely lead to a more broad view, and more accurate decisions.

5.7 Concluding Notes

To conclude, studying Piaget's cognitive developmental theory and Vygotsky's sociocultural theory enable the educators to fully understand how children change, develop and grow through different life stages from childhood to adolescence. Neither theory is highly true, but both are as much important as other. Applying both theories in parallel with one another, there will be a wide variety of methods to help children improve their critical thinking skills and to promote their cognitive awareness. Educators will be able to replace the old traditional lessons with fruitful, hands-on classroom activities that let students experience, work and explore independently. Applying these theories allow teachers to take their students seriously and esteem their opinions, and suggestions. Therefore, students' engagement and educational attainment will definitely improve. The work of Piaget highlights that the development of a child happens through a continuous modification of thought processes as they age across the different life stages. While, the work of Lev Vygotsky, a Russian psychologist, focus on the significant role teachers play in the cognitive development of the child. Vygotsky's theory is becoming more powerful and effective in the field of child development. The researcher considered a comparison of their ideas, their strategies and the impact of their work on the teaching and learning process.

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PERMISSION LETTER
To Conduct a Classroom Observation

Dear Administration:

My name is Mona Abu Mady, I am currently enrolled in the Leadership and Management (M.ED) Master at the British University in Dubai (BUID), and I am in the process of writing my (Master's Thesis) under the supervision of professor Dr. Solomon Arulraj David, the Associate Professor & Head of Masters of Education Programme at the British University in Dubai. I am writing to request permission to conduct Classrooms' Observation in your school. The study is focusing on the impacts of the two cognitive-developmental theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural Theory) in the teaching and learning process. Due to the nature of the study, I request to make the classroom observations for three teachers of different subjects. A copy of the classroom observation form has been enclosed with the permission letter. The school name and other identifying information will be kept anonymous.

Your approval to conduct this study will be greatly appreciated. I will follow up with a telephone call next week and would be happy to answer any questions or concerns that you may have at that time. Please contact me at any time at the e-mail address or telephone number listed below.

If you agree, kindly sign below and return the signed form in the enclosed self-addressed envelope.

Sincerely,

Mona Abu Mady

By signing this Permission form, I certify that I _____ agree to

the terms of this agreement.

(Signature)

(Title)

(Date)

**CONSENT FORM
for Interview**

Thank you for agreeing to participate in this study, which will take place from July 2019 to October 2019. This form details the purpose of this study, a description of the involvement required and your rights as a participant.

The purpose of this study is:

- To understand the impacts of the two cognitive-developmental theories (Piaget's cognitive developmental theory and Vygotsky's Sociocultural Theory) in the teaching and learning process.

The methods that will be used to meet this purpose include:

- Semi-structure interview questions.

You are encouraged to ask questions or raise concerns at any time about the nature of the research. Please contact me at any time at the e-mail address or telephone number listed below.

Our discussion will be audiotaped to help me accurately capture your insights in your own words. The tapes will only be heard by me for the purpose of this study. If you feel uncomfortable with the recorder, you may ask that it be turned off at any time.

You also have the right to withdraw from the study at any time. In the event, you choose to withdraw from the study all the information you provide (including tapes) will be destroyed and omitted from the final paper.

Insights gathered by you and other participants will be used in writing a research report, which will be read by my professor and presented to the British University in Dubai (BUID). Though direct quotes from you may be used in the paper, your name and other identifying information will be kept anonymous.

By signing this consent form I certify that I _____ agree to

the terms of this agreement.

(Signature)

(Date)

APPENDIX 3

Classroom Observation

Teacher: _____

Course: _____

Observer: _____

Grade: _____

No	OBSERVED ITEM	RANGE		
		3	2	1
GENERAL TEACHER BEHAVIOUR		3	2	1
1-	Act as a facilitator and provide rules/routines that supported the students' needs.			
2-	Act as a director and provide clear directions for multiple tasks.			
3-	Focus on the process of thinking not only the results.			
4-	Arrange different classroom activities.			
5-	Engaged students in the exploration.			
6-	Encourage students to evaluate and solve problems.			
7-	Consider the students' age in the teaching process			
8-	Provides opportunities for students to practice under direct supervision of the teacher			
9-	Provides opportunities for students to practice independently			
10-	Provides opportunities for students to learn from each other			
11-	Informs students of objective of the lesson			
12-	Monitors student learning continuously			
STUDENTS RESPONSE TO TEACHER BEHAVIOUR		3	2	1
1-	Learn through working in pairs or groups.			
2-	Learn through working individually			
3-	Discovered central ideas through structured activities.			
4-	Work under direct instructions of the teacher			
5-	Gather evidence through research techniques.			
6-	Brainstorm ideas or alternative possibilities.			
7-	Identified and implemented solutions to problems			
8-	Explored diverse ways to think about a situation/object/event.			
9-	Need help from high-skilled peers			
10-	Learning through interaction with real world.			

Strengths observed:

The Theory that Used the most:

Overall impression of teaching effectiveness

Semi- structured interview questions

Question 1: According to Thomas (1997), human development theories are models to explain how people behave and why do they behave the way they do. The human development theories represent different methods of thinking about child growth and development. These different development theories include, Freud's Psychosexual Developmental Theory, Erikson's Psychosocial Developmental Theory, Piaget's Cognitive Developmental Theory, Bandura's Social Learning Theory, Vygotsky's Sociocultural Theory, do you know these theories? Would you briefly explain them?

Question 2: Which theory, you most likely to apply in your classroom? And why?

Question 3: What is the main concept of the chosen theory? would you elaborate?

Question 4: What are the major topics of the chosen theory?

Question 5: What are the teaching strategies of the chosen theory?

Question 6: What kinds of teaching strategies do you use based on the developmental theory you chose to follow?

Question 7: Would you clarify how these strategies increase the students' attainment?

Question 8: Would you use another method in teaching-learning process to other class level? Explain why?

Question 9: What kind of difficulties you face while applying the strategies? Would you explain?

Question 10: In your opinion, what are the pros and cons of the chosen developmental theory?

APPENDIX 5

Classroom Observation

Teacher : _____ Teacher1 _____

Course: _____ Math _____

Observer: _____ Mona Abu Mady _____

Grade: _____ three _____

No	OBSERVED ITEM	RANGE		
		3	2	1
GENERAL TEACHER BEHAVIOUR		3	2	1
1-	Act as a facilitator and provide rules/routines that supported the students' needs.	*		
2-	Act as a director and provide clear directions for multiple tasks.		*	
3-	Focus on the process of thinking not only the results.	*		
4-	Arrange different classroom activities.	*		
5-	Engaged students in the exploration.	*		
6-	Encourage students to evaluate and solve problems.		*	
7-	Consider the students' age in the teaching process	*		
8-	Provides opportunities for students to practice under direct supervision of the teacher			*
9-	Provides opportunities for students to practice independently	*		
10-	Provides opportunities for students to learn from each other			*
11-	Informs students of objective of the lesson		*	
12-	Monitors student learning continuously		*	
STUDENTS RESPONSE TO TEACHER BEHAVIOUR		3	2	1
1-	Learn through working in pairs or groups.			*
2-	Learn through working individually	*		
3-	Discovered central ideas through structured activities.	*		
4-	Work under direct instructions of the teacher			*
5-	Gather evidence through research techniques.	*		
6-	Brainstorm ideas or alternative possibilities.	*		
7-	Identified and implemented solutions to problems		*	
8-	Explored diverse ways to think about a situation/object/event.	*		
9-	Need help from high-skilled peers			*
10-	Learning through interaction with real world.	*		

Strengths observed: *learning through exploration*

The Theory that Used the most: *Piaget's theory*

Overall impression of teaching effectiveness: *effective learning process*

APPENDIX 6

Classroom Observation

Teacher: _____ Teacher 2 _____

Course: _____ English _____

Observer: _____ Mona Abu Mady _____

Grade: _____ Three _____

No	OBSERVED ITEM	RANGE		
		3	2	1
	GENERAL TEACHER BEHAVIOUR	3	2	1
1-	Act as a facilitator and provide rules/routines that supported the students' needs.			*
2-	Act as a director and provide clear directions for multiple tasks.	*		
3-	Focus on the process of thinking not only the results.		*	
4-	Arrange different classroom activities.			*
5-	Engaged students in the exploration.			*
6-	Encourage students to evaluate and solve problems.		*	
7-	Consider the students' age in the teaching process			*
8-	Provides opportunities for students to practice under direct supervision of the teacher	*		
9-	Provides opportunities for students to practice independently			*
10-	Provides opportunities for students to learn from each other	*		
11-	Informs students of objective of the lesson	*		
12-	Monitors student learning continuously	*		
	STUDENTS RESPONSE TO TEACHER BEHAVIOUR	3	2	1
1-	Learn through working in pairs or groups.	*		
2-	Learn through working individually			*
3-	Discovered central ideas through structured activities.		*	
4-	Work under direct instructions of the teacher	*		
5-	Gather evidence through research techniques.		*	
6-	Brainstorm ideas or alternative possibilities.			*
7-	Identified and implemented solutions to problems		*	
8-	Explored diverse ways to think about a situation/object/event.		*	
9-	Need help from high-skilled peers	*		
10-	Learning through interaction with real world.	*		

Strengths observed: *MKP*The Theory that Used the most: *Vygotsky's theory*Overall impression of teaching effectiveness: *clear instructions and explanations*

APPENDIX 7

Classroom Observation

Teacher: _____ Teacher 3 _____

Course: _____ Science _____

Observer: _____ Mona Abu Mady _____

Grade: _____ Three _____

No	OBSERVED ITEM	RANGE		
		3	2	1
	GENERAL TEACHER BEHAVIOUR	3	2	1
1-	Act as a facilitator and provide rules/routines that supported the students' needs.	*		
2-	Act as a director and provide clear directions for multiple tasks.	*		
3-	Focus on the process of thinking not only the results.	*		
4-	Arrange different classroom activities.		*	
5-	Engaged students in the exploration.	*		
6-	Encourage students to evaluate and solve problems.	*		
7-	Consider the students' age in the teaching process	*		
8-	Provides opportunities for students to practice under direct supervision of the teacher		*	
9-	Provides opportunities for students to practice independently	*		
10-	Provides opportunities for students to learn from each other	*		
11-	Informs students of objective of the lesson	*		
12-	Monitors student learning continuously		*	
	STUDENTS RESPONSE TO TEACHER BEHAVIOUR	3	2	1
1-	Learn through working in pairs or groups.	*		
2-	Learn through working individually		*	
3-	Discovered central ideas through structured activities.		*	
4-	Work under direct instructions of the teacher		*	
5-	Gather evidence through research techniques.		*	
6-	Brainstorm ideas or alternative possibilities.	*		
7-	Identified and implemented solutions to problems	*		
8-	Explored diverse ways to think about a situation/object/event.	*		
9-	Need help from high-skilled peers		*	
10-	Learning through interaction with real world.	*		

Strengths observed: *hands- on activity, critical thinking, ZPD*

The Theory that Used the most: *Both theory*

Overall impression of teaching effectiveness: *effective lesson, high student's engagement*