EFFECTS OF TEACHING USING INTERACTIVE WHITEBOARD ON MATHEMATICS ACHIEVEMENT AND ATTITUDE TOWARDS MATHEMATICS WORD PROBLEM OF GRADE TWO FEMALE PUPILS IN KUWAIT

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by

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Allah alone bestows knowledge and grants success.

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LIST OF ABBREVIATIONS

EDA:	Equilibrated Development Approach
GAISE:	Guidelines for Assessment and Instruction in Statistics Education
ICT:	Information Technology
ICT:	Information and Communication Technologies
IITE:	Institute for Information Technologies in Education
IWB:	Interactive Whiteboard
IWBs:	Interactive Whiteboards
ISTE:	International Society for Technology in Education
NCES:	National Center for Education Statistics
PBL:	Problem-Based Learning
PCs:	Personal Communications Services
SWB:	Super-wideband
TIMSS:	Trends in International Mathematics and Science Study
WPE:	Word Problem Enrichment

LIST OF APPENDICES

KESAN PENGAJARAN MENGGUNAKAN PAPAN PUTIH INTERAKTIF KE ATAS PENCAPAIAN MATEMATIK DAN SIKAP TERHADAP MASALAH BERAYAT MATEMATIK MURID PEREMPUAN GRED DUA DI KUWAIT

ABSTRAK

Tidak dapat disangkal lagi bahawa ramai murid yang berlainan tahap bergelut dengan matematik terutamanya MWP di peringkat sekolah rendah dan ini menunjukkan prestasi mereka yang rendah dalam peperiksaan mereka. Di Kuwait, terdapat tahap pencapaian pelajar yang rendah dalam program matematik, sama seperti yang berlaku di beberapa negara Arab kerana kekurangan teknologi interaktif dalam mengajar MWP dan kurangnya perhatian guru terhadap penglibatan pedagogi. Tujuan kajian ini adalah untuk mengkaji kesan pengajaran menggunakan papan putih interaktif ke atas pencapaian matematik dan sikap terhadap masalah berayat matematik murid perempuan gred dua di Kuwait. Kajian ini menggunakan pendekatan kuantitatif melalui reka bentuk penyelidikan kuasi eksperimen untuk mencapai objektif kajian. Kajian ini mengambil sampel 48 orang murid perempuan di Gred dua dengan 24 orang murid di kelas dengan papan putih interaktif (kumpulan eksperimen) dan 24 orang murid di kelas dengan papan putih konvensional (kumpulan kawalan). Sampel kajian ini dipilih menggunakan teknik persampelan bertujuan. Dua instrumen, iaitu ujian pencapaian dalam masalah berayat matematik dan sikap terhadap soal selidik masalah berayat matematik digunakan untuk mengumpulkan data. Data yang dikumpulkan dianalisis dengan menggunakan ujian-t sampel bebas. Hasil kajian menunjukkan bahawa tidak terdapat perbezaan yang signifikan dalam pencapaian (pretest) dan sikap terhadap (pra-tinjauan) masalah berayat matematik antara murid kelas dua yang belajar

melalui pengajaran menggunakan papan putih interaktif dan murid kelas dua yang belajar melalui pengajaran menggunakan papan putih konvensional. Hasil kajian menunjukkan bahawa terdapat perbezaan yang signifikan dalam pencapaian (ujian pasca) dan sikap terhadap (kata pasca tinjauan) masalah berayat matematik antara murid kelas dua yang belajar melalui pengajaran menggunakan papan putih interaktif dan murid kelas dua yang belajar melalui pengajaran menggunakan kaedah konvensional papan putih. Hasilnya juga menggambarkan bahawa terdapat perbezaan yang signifikan dalam pengekalan pencapaian dalam (ujian retensi) dan pengekalan sikap terhadap (tinjauan retensi) masalah berayat matematik antara murid kelas dua yang belajar melalui pengajaran menggunakan papan putih interaktif dan murid kelas dua yang belajar melalui pengajaran menggunakan papan putih konvensional. Secara teorinya, kajian ini mempunyai implikasi teori terhadap teori konstruktivisme yang mana ia membantu mengukuhkan mod pembelajaran dan pengajaran melalui teknologi. Ini membantu mencapai keseimbangan antara kemahiran pedagogi, pembelajaran kolaboratif dan pemahaman masalah berayat matematik. Kajian ini menyumbang kepada perdebatan yang sedang berlangsung mengenai teknologi pembelajaran dan dalam bidang pembuatan dasar pendidikan. Akhirnya, kajian ini menyimpulkan bahawa IWB mempunyai kesan yang signifikan terhadap murid dalam meningkatkan pencapaian mereka dalam MWP dan sikap terhadap MWP.

EFFECTS OF TEACHING USING INTERACTIVE WHITEBOARD ON MATHEMATICS ACHIEVEMENT AND ATTITUDE TOWARDS MATHEMATICS WORD PROBLEM OF GRADE TWO FEMALE PUPILS IN KUWAIT

ABSTRACT

It is irrefutable that many pupils in different stages struggle with mathematics especially MWP in the elementary stage and this appears in their low performance in their exams. In Kuwait, there is a low level of students' achievement in mathematics programs, just as it is common in some Arab countries because of lack of interactive technology in teaching MWP and teachers' lack of focus on pedagogical engagement. The purpose of this study is to examine the effects of teaching using interactive whiteboard on the mathematics achievement and attitude towards mathematics word problem of grade two female pupils in Kuwait. The study adopts the quantitative approach through a quasi-experimental research design to achieve the research objectives. The study samples 48 female pupils in Grade two with 24 pupils in the classroom with interactive whiteboard (experimental group) and 24 pupils in the classroom with conventional whiteboard (control group). The sample of this study was selected using the purposive sampling technique. Two instruments, namely achievement test in mathematics word problem and attitude towards mathematics word problem questionnaire were used to collect data. The data collected were analysed using independent samples t-test. The results reveal that there were no significant differences in achievement in (pretest) and attitude towards (pre-survey) mathematics word problem between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching

using a conventional whiteboard. The results show that there were significant differences in achievement in (post-test) and attitude towards (post-survey) mathematics word problem between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using a conventional whiteboard. The results also depict that there were significant differences in the retention of achievement in (retention test) and the retention of attitude towards (retention survey) mathematics word problem between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using a conventional whiteboard. Theoretically, this study has theoretical implication for the theory of constructivism as it helps to strengthen the mode of learning and teaching via technologies. It helps to strike a balance between pedagogical skills, collaborative learnings and understanding of mathematics word problem. This study contributes to the on-going debates about learning technologies and in the field of education policy making. Finally, this study concludes that IWBs have significant effects on pupils in improving their achievement in MWP and attitudes towards MWP.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Mathematics as a branch of science and knowledge is considered globally as one of the most important fields of knowledge because of its uniquity and its methodological methods. Rather, its impact as science extends to affect all aspects of life and it is being used in most of our life activities. In addition, other subjects and sciences rely on Mathematics. Mathematics involves in all knowledge branches in several ways. It is called the queen of science or the language of science (Abdul Qadir, 2006). Understanding mathematics is essential other branches of knowledge, as they all rely on mathematics in one way or another and it is the key to all sciences, arts, or specializations (Al-Amin, 2001).

The process of teaching mathematics requires the classification of mathematical knowledge and the analysis of mathematical content into its components, which are four mathematical categories: mathematical concepts and terminology, principles and circulars, algorithms and skills, applications, and problem-solving (Al-Balasi & Barham, 2010).

Mathematics Word Problems (MWP) is considered an essential component of mathematical content, that aims to develop students' abilities to solve problems, which is a basic objective of teaching mathematics to the primary stage.

Attitude towards MWP could play a vivid role to have a great influence on student’s achievement. The existence of the attitude variable is considered one of the essential factors that are related to achievement (Ma & Kishor, 1997). There are many factors such as attitudes, conceptions, and expectations of students and the teaching

techniques have been essential factors that affect their school achievement and experience (Borasi, 1990).

Learning how to solve problems could be a prime objective in learning mathematics, once these problems are mainly fact of life (Patton, Cronin, Bassett, & Koppel, 1997). Zakaria and Yusoff (2009) clarify that "the pupil needs to think and be capable of taking decisions by using appropriate strategies to solve mathematics problems and the success that the student reaches in achieving their goals give them great encouragement to develop positive attitudes towards mathematics, and also towards any other problem-solving activities" (p. 30). Thus, positive attitudes are supposed to have a close relationship with the student's achievement.

Teaching methods and strategies are important factors in expanding the learner role in the process of learning by involving him/her and making him/ her interact with them rather than being an information recipient only. Students have their mental models, so they must get the opportunity to learn and develop their skills (Thorley & Woods, 1997).

Moreover, we are living today in an age that evolves and changes very fast. This is reflected in the knowledge and technology revolution we are witnessing today. In addition, we are currently experiencing an age when the computer and the Internet are invading all the life fields making the world just like a small village. As a result, we need to be supplied with various scientific disciplines to go along with civilization and scientific and technological progress, in order to prepare individuals to understand the great cognitive development and keeping in line with the pace of the new civilization (Abdullah, 1992).

The Interactive whiteboard (IWB) is model of modern electronic and technological learning, which leads to the creation of a fertile environment that helps

in stimulating the student and encourages him/ her to interact actively with the scientific material in a realistic environment close to his/ her sensory perceptions, making him/ her attracted to it and seeks to be involved in it (Lazar, Panisoara, & Panisoara, 2020; Miranda, Marzano, & Lytras, 2017).

The results of many studies (Al-Salkhi, 2019; Chen, Gamble, Lee, & Fu, 2020; Smith, Hardman, & Higgins, 2006) indicated that using IWB within the educational process helps to enhance creativity, imagination, and thinking. It is recommended by many studies to use it in education after the results showed a positive impact on the educational process.

Many countries, including the State of Kuwait, are seeking to introduce modern technology and advanced technology such as IWB into their educational institutions, to improve the quality of education provided and achieve advanced results in the Educational attainment of its students. The Ministry of Education (2003) in the General Education Strategy in Kuwait 2005-2025 stressed the importance of "providing opportunities to benefit from a largest possible number of the learning resources and school activities through advanced ICT applications" (p. 30). The primary education has a great role because of being the basic building block of education and because of its special nature in terms of the age of pupils and the characteristics of their growth, which require the search for diverse ways to teach them.

The primary stage is the official start of the educational ascent in the State of Kuwait. The period of study is five years covering the age stage from 6 to 10 years, and it is an important, free, and compulsory stage for all Kuwaiti citizens. The primary school is the first stage in compulsory education (Aflalo, Zana, & Huri, 2018; Mohamed, Qoura, & El Hadidy, 2019), which extends in the countries of the region

until the end of the intermediary stage, and the basics of this stage can be defined as follows:

(A) Providing integrated development opportunities for the primary school child.

(B) Helping the child to acquire the basic skills of education.

(C) Providing the child with the necessary basic knowledge suitable to the characteristics of his /her growth.

(D) Preparing the child for living and citizenship in an Arab-Islamic society.

This stage aims to address the psychological and educational problems of the learners and to provide them with the basics of the appropriate cultural outcomes for the individual abilities by diagnosing the causes of these problems to address them in the appropriate ways with attention to the social and psychological problems and seek to solve them so that the learner can respond to the school community in the light of an educated curriculum that is capable of creating the appropriate educational (Findlow, 2008).

Considering these principles, the objectives of teaching mathematics in public education in Kuwait (Al-Shammari, Aqeel, Faulkner, & Ansari, 2012) can be defined as follows:

- Explaining natural phenomena and knowing the potentials of the environment and society.
- Using mathematical methods in the research and explanation and decision-making in the terms of mathematics and humanitarian aspects.
- Applying mathematics efficiently to develop an enlightened citizen in terms of productivity and consumption.
- Using mathematics language in self-expression and communication with others.

•Benefiting from mathematics by knowing its contribution to life as science, art, and culture.

•Understanding the role of mathematics in scientific progress and other subjects.

•Developing methods of thinking and problem-solving.

Through the experience of working in primary schools, the researcher has examined diminution in students' performance in solving a word problem. This is because many teachers don't utilize modern technology and devices in teaching students to solve mathematical problems. Students do not have problem-solving abilities and take the right steps when they are attempting to solve such problems.

Therefore, the researcher tries to employ technology in teaching mathematics by using the IWB to improve the ability of students in solving a MWP, in an attempt to fix the weakness of students in this regard. The IWB is an exciting and lively learning method which makes the student feels that he/she is learning outside the classroom, relieves the psychological stress he or she experiences as a result of the repeated educational practices, besides it helps to overcome the boredom, as well as providing opportunities to employ different learning styles (Shenton & Pagett, 2007).

1.2 Statement of the Problem

Mathematics word problem is a basic aspect in mathematics that is very important in daily life. Although pupils are obliged to be taught mathematics since it is viewed as basic educational subject (Chau, 2013), it is irrefutable that many pupils in different stages struggle with mathematics especially MWP in the elementary stage and this appears in their low performance in their exams (Boonen, de Koning, Jolles, & van der Schoot, 2016). Based on the findings of the Trend in International Mathematics and Science Study (TIMSS) in 2007, 2011 and 2015, the mean rankings

of Grade Four Kuwait students/participants are 39 out of 41 participated countries (in 2007), 48 out of 50 participated countries (in 2011), and 49 out of 49 participated countries (in 2015) fell below international average due to diminution in pupils' performance in the word problem and many teachers do not use modern technology and devices in teaching pupils to solve mathematical problems. This situation is also similar to Grade Eight Kuwait students with mean rankings of 39 out of 41 participated countries (in 2007) and 33 out of 39 participated countries (in 2015) while Kuwait did not participate in 2011. This indicates that the Grade Eight students in Kuwait have not mastered the concept of mathematics word problem.

In Kuwait, there is a low level of students' achievement in mathematics programs, just as it common in some Arab countries (Isman et al., 2012), which is due to lack of interactive technology in teaching MWP and teachers' lack of focus on pedagogical engagement because of the traditional use of conventional whiteboards. The current technologies (i.e. CWBs) in teaching mathematics in Kuwait have not been able to accelerate the learning of MWP among pupils, thus, why interactive whiteboards should be adopted. Pupils sometimes face some difficult words to spell or read. Consequently, this prevents them to understand the MWP themselves as they cannot understand how to make addition or subtraction according to their curriculum. It is undeniable that many pupils in different stages struggle with mathematics, especially mathematics word problems in the elementary stage and this appears in their low performance in their exams (Boonen et al., 2016).

The current conventional whiteboards illustrate the problems of grade two pupils while solving a MWPs as the conventional devices do not focus on pupil-teacher interaction and pedagogical engagement. The main limitations of the current technologies (i.e. CWBs) used in Kuwait primary schools are:

First, pupils sometimes face some difficult words to spell or read. Consequently, this prevents them to understand the MWP themselves as they cannot understand how to make addition or subtraction according to their curriculum. This is considered an overload on the teachers of mathematics as he/ she must read the MWP and clarifies them as a language at first then mathematically (Ríordáin & O'Donoghue, 2009; Vula, Avdyli, Berisha, Saqipi, & Elezi, 2017). The current study links the difficulties of reading the problem of mathematical words in the Arabic language faced by students in grade two in the State of Kuwait to lack of use of IWB and its effect on the achievement and attitudes of pupils.

Second, the use of conventional whiteboards consumes the period time of the class to explain to the students what the issue is about by paraphrasing the language to be easier for them, and then to be understood by trying to let them think and imagine about how to add or subtract numbers (Vula et al., 2017). Third, CWBs make some pupils lose their attention during the teacher's explanation for mathematics word problems as the teaching approach is traditional, conventional and that which is merely verbal, while others do so through balls or apples to add or subtract (Ding, 2007). This way also may not be beneficial for the back-sitting pupils in the class, as they may not see what the teacher is doing well which leads to abstraction (Claessens et al., 2017; National Research Council, 2015). These limitations in the use of Conventional whiteboards have resulted to (i) poor attitude towards mathematics word problem, (ii) low achievements in mathematics word problems, and (iii) low retention of attitude towards and achievements in mathematics word problems.

To address this issue, social constructivism theory should be validated with empirical data (Hall et al., 2008; Hall, 2010; Piaget, 1964; Weaver, 2001) within the realm of Interactive whiteboards. The philosophy of constructivism is built on the

concept that if the proper environment is provided, all children will learn (Bruner, 1996). The current study expects that using the IWB will pose a challenge for teaching in Kuwait at the initial stage of IWBs implementation. What makes the IWB such a convincing instrument for constructivist teaching and learning is the combination of a classroom-sized, student-manipulable, graphic medium powered by a computer. It is the most equivalent instructional equipment may have been independent computer workstations in a lab or laboratory prior to the implementation of IWBs. Although such workstations have their advantages, they do not provide a collective learning experience comparable to that of IWBs. Assuming teachers make good use of IWBs, this modern technology has tremendous potential to help create a more suitable constructivist classroom.

Several studies deal with the attitude towards mathematics to unravel the reasons behind the poor attitudes and performance in it (e.g., Chagwiza, Mutambara, Tatira, & Nyaumwe, 2013; Julius, Abdullah, & Suhairom, 2018; Mata, Monteiro, & Peixoto, 2012; Mensah, Okyere, & Kuranchie, 2013; Mubeen, Saeed, & Arif, 2013; Mutai, 2011). Noddings (1995) clarifies that the teachers' way of teaching (whether IWBs or CWBs) may facilitate the learning process by engaging the pupils and creating an appropriate atmosphere that supports pupils learning.

Currently, many technological solutions, including IWB, are used recently to make the challenges faced by teachers in the classroom easier, especially in developing countries such as Kuwait. Even though the academic achievement of pupils in Kuwait beings to accelerate gradually, there is no tool of instruction that has proven itself to be skilled in accelerating the learning of all pupils, especially as most children are currently living in a state of attraction towards smart technology in receiving information. Pupils are not capable of solving problems and make the right steps when

they are attempting to solve such problems when conventional technologies are adopted. High-level thinking, problem-solving skills, workforce readiness, analysis skills and the ability to adapt learning to real-world conditions, organisational skills and material interest will grow in the presence of enhanced technology (Cradler, McNabb, Freeman, & Burchett, 2002).

One of the most important smart educational technologies is IWBs. Many studies find that IWB training has beneficial effects on teaching and learning in the classroom. The IWB is an exciting and lively learning method that makes the pupils feels that he/ she is learning outside the classroom, relieves the psychological stress he/she experiences because of repeated educational practices (Hall, Chamblee, & Hughes, 2008). Moreover, it helps to overcome the boredom, as well as providing opportunities to employ different learning styles.

In light of the identified achievement problem within mathematics programs in Arab countries, the studies conducted by (Al-Dulaim, 2020; Al-Sharhan, 2018; Almansouri, 2011; Aytekin Isman, Abanmy, Hussein, & Al Saadany, 2012) tried to verify the effect of the IWB and its relation to pupils' achievement of mathematics. The results of these studies indicated that there is a high rate of academic achievement of mathematics during the use of an IWB compared to the traditional teaching method. Despite these few studies, there is a lack of studies that are based on data on the IWB's effect on pupils' achievement in MWP, attitude towards MWP, retention in achievement test and retention in attitude towards MWP. Therefore, this study seeks to investigate the existence of the effects of teaching using IWB on mathematics achievement and attitude towards MWP of grade two female pupils in Kuwait.

The use of new methods as attracting pupils' attention such as the visual aid which is represented by the IWB, will lead to addressing the low achievement of the

MWP, will adjust the attitudes of students towards the educational material and its retention. In addition, the current study expects that in the case of demonstrating the effectiveness of IWB will prepare a recommendation to the educational institutions in Kuwait will get benefit from it, which perhaps will add a whole new range of teaching techniques that have not been previously available in combination with the way teachers communicate with pupils and IWB. Therefore, the researcher tries to employ IWB technology in teaching mathematics to improve the ability of pupils in solving a MWP, in an attempt to fix pupils' weaknesses in mathematics word problems. Thus, the current study seeks to investigate whether pupils' attitudes towards MWPs were improved when pupils are exposed to IWB technology in their mathematics classes. Accordingly, the results of this study will provide a better understanding of influences on pupils' attitudes towards MWPs and thereby may enhance mathematics teaching and learning.

1.3 Research Objectives

The purpose of this study is to determine the effects of teaching using interactive whiteboard on mathematics achievement and attitude towards mathematics word problem of grade two female pupils in Kuwait. Specifically, the objectives of this study are:

1. To determine whether there is a significant difference in achievement in mathematics word problem (pretest) between grade two pupils who learned through teaching using an interactive whiteboard (experimental group) and grade two pupils who learned through teaching using conventional whiteboard (control group).

2. To determine whether there is a significant difference in attitude towards mathematics word problem (pre-survey) between grade two pupils who learned through teaching using an interactive whiteboard (experimental group) and grade two pupils who learned through teaching using conventional whiteboard (control group).
3. To determine whether there is a significant difference in achievement in mathematics word problem (posttest) between grade two pupils who learned through teaching using an interactive whiteboard (experimental group) and grade two pupils who learned through teaching using conventional whiteboard (control group).
4. To determine whether there is a significant difference in attitude towards mathematics word problem (post survey) between grade two pupils who learned through teaching using an interactive whiteboard (experimental group) and grade two pupils who learned through teaching using conventional whiteboard (control group).
5. To determine whether there is a significant difference in the retention of achievement in mathematics word problem (retention test) between grade two pupils who learned through teaching using an interactive whiteboard (experimental group) and grade two pupils who learned through teaching using conventional whiteboard (control group).
6. To determine whether there is a significant difference in the retention of attitude towards mathematics words problem (retention-survey) between grade two pupils who learned through teaching using an interactive whiteboard (experimental group) and grade two pupils who learned through teaching using conventional whiteboard (control group).

1.4 Research Questions

The research questions are raised based on the research objectives of the present study as follows:

1. Is there significant difference in achievement in mathematics word problem (pretest) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard?
2. Is there a significant difference in attitude towards mathematics word problem (pre-survey) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard?
3. Is there a significant difference in achievement in mathematics word problem (posttest) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard?
4. Is there a significant difference in attitude towards mathematics word problem (post survey) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard?
5. Is there a significant difference in the retention of achievement in mathematics word problem (retention test) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard?
6. Is there a significant difference in the retention of attitude towards mathematics words problem (retention-survey) between grade two pupils who learned

through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard?

1.5 Research Hypotheses

The null and alternative hypotheses for each of the related research questions are as follows:

i. **H0i.** There is no significant difference in achievement in mathematics word problem (pretest) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard.

   H1i. There is a significant difference in achievement in mathematics word problem (pretest) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard.

ii. **H0ii.** There is no significant difference in attitude towards mathematics word problem (pre-survey) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard.

   H1ii. There is a significant difference in attitude towards mathematics word problem (pre-survey) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard.

iii. **H0iii.** There is no significant difference in achievement in mathematics word problem (posttest) between grade two pupils who learned through teaching using

an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard.

H1iii. There is a significant difference in achievement in mathematics word problem (posttest) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard.

iv. **H0iv.** There is no significant difference in attitude towards mathematics word problem (post survey) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard.

H1iv. There is a significant difference in attitude towards mathematics word problem (post survey) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard.

v. **H0v.** There is no significant difference in the retention of achievement in mathematics word problem (retention test) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard.

H1v. There is a significant difference in the retention of achievement in mathematics word problem (retention test) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard.

vi. **H0vi.** There is no significant difference in the retention of attitude towards mathematics words problem (retention-survey) between grade two pupils who

learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard.

H1vi. There is a significant difference in the retention of attitude towards mathematics words problem (retention-survey) between grade two pupils who learned through teaching using an interactive whiteboard and grade two pupils who learned through teaching using conventional whiteboard.

1.6 Significance of the study

The modern curriculum all over the world is concerned with the development of the students' thinking, and the thinking is the attempt to overcome and solve difficulties and problems we face in order to understand the environment and adapt to it. The MWP is a means of arousing intellectual curiosity as it trains the individual to become able to solve his problems in his daily life and gives him experience.

One of the concerns that must be given great attention is the development of the ability of students and training them on how to solve mathematical problems or even life problems using modern mathematical methods that go along with the scientific and technological development, which is the feature of this modern age and to improve the student thinking mathematically in a way that allows obtaining any new information easily and through the way that suits the mind because this will lead to positive results.

The importance of this study is to determine whether the introduction of IWBs influenced student achievement in MWP and attitude towards MWP. As the number of IWBs in Kuwait 's classrooms rise, the effectiveness of these devices and their attitudes towards them in supporting the teaching and learning process will tend to be called into question. Furthermore, when teachers use IWBs, they will pay attention to

pedagogical concerns and their attitude toward certain boards. While several countries / schools have embraced IWBs with enthusiasm, only a few negative attitudes towards those boards have been found. Address the limited number of studies investigating the attitudes of students and teachers concerning IWB technology (Elaziz, 2008), this research can provide meaningful results for literature, particularly when demonstrating how IWB technology is viewed by teachers and students.

Before deciding whether to invest in new technology or available technologies to screen the current system, policymakers and educators need to know the views of education's shareholders such as teachers and students who use this technology in the first place.

Further research that will include the other shareholders of education like parents/guardians, administrators, and other facilitators are needed, especially in Kuwait. In addition, the current study recommends conducting research on the attitudes of teachers and students towards technology integration and the IWB technology and seeking to develop digital educational curricula.

This study aims at educating teachers to use this electronic tool as it attracts students' attention to be able to solve the MWPs. Because these generations are surrounded by visual means such as smartphones and other modern devices like "iPad". Therefore, the way of education should convoy the present age, which is quite different from the generations of past decades. The study may help teachers to recognize the importance of using modern means and multimedia such as IWB in teaching MWP among students of the second grade to increase their academic achievement.

Moreover, in a world of high technology, educational methods should be an essential part of this world to be effective and useful. Therefore, MOE should know

that their old teaching methods will not work effectively with this new generation. They must be trained in the most advanced teaching methods so that they can easily deliver information and reduce the gap between them and their students.

This study benefits educational supervisors and the authors of the mathematics curriculum in urging teachers to get out of the traditional style framework by using IWB in teaching and recognition the importance of using modern methods and multimedia such as IWB in the teaching of word problems.

This study is useful to the parents in determining skills in solving the MWP to be developed, understanding MWP, Emphasizing the need to pay attention to modern methods in teaching mathematics, and to recognize the importance of using modern means and multimedia such as IWB in teaching MWP.

1.7 Limitations of the Study

Similar to other studies, certain limitations occurred as follows: First, this study was focused on the MWP unit in addition and subtraction processes in the mathematics course for the second grade in the basic education stage. Thus, MWP problems relating to division and multiplication processes are missing in the study. Therefore, by focusing on only addition and subtraction processes in the mathematics course, we might not be assessed the effect of IWBs on MWP involving division and multiplication processes.

The second limitation of this study is the sampling of only female students of the second grade in primary education. The sampling of both male and females' students of other grade levels will provide a better overview of the effectiveness of IWBs on MWPs.

The third limitation is the use of cross-sectional quasi-experimental research design. The use of longitudinal quasi-experimental research design can provide more reliable and valid results for the effectiveness of IWBs on MWPs.

1.8 Definition of Terms

1.8.1 Teaching using IWB

Conceptual definition: IWBs are a system that incorporates the advantages of all teaching aids, such as chalkboard, whiteboard, Screen, camera, overhead projector, CD player and computer in one (Hall & Higgins, 2005). It is a tactile system used in combination with a digital projector and a screen to display any images usually displayed on a computer monitor with the added advantage of being able to manipulate the computer by manipulating the touch-sensitive surface of the electronic whiteboard.

Operational definition: This is a device comprising of a computer, a screen, data projector, personal communications services (PCs), a large tactile board, wireless input and peripheral devices like a visualizer or portable monitor, slates, or tablet. Several brand names such as the SMARTboard, Mimio, and Promethean also called the IWB (Winkler, 2011).

1.8.2 Teaching using Conventional whiteboard

Conceptual definition: Conventional whiteboard is a type of conventional board that is defined as a large shared space allowing all attendance to see everything in a clear way such as writing, drawing, graphics, photo, and PowerPoint. allows teachers and students to use it for writing and give the ability to erase any words and efficiently write another (Yas, Khalaf, Mohammed, & Abdelouahab, 2010).

Operational definition: It is the use of traditional writing board and notebook by the teacher and students in the classroom (Al-Mashaqba, 2017).

1.8.3 MWP

Conceptual definition: It is a mathematical exercise in which relevant context knowledge about the problem is provided as text instead of mathematical notation (Verschaffel, Greer, & de Corte, 2000). The MWP is a tough position that confuses confusing student, inexperienced with the wording in the form of words, and has no suitable response for him/her. In the school curriculum, word problems enable students to enhance their problem-solving skills in contextualised environments that do not need rotary protocols to be implemented (Bates & Wiest, 2004; Hart, 1996).

Operational definition: These are set of addition and subtraction word problems in which the solutions or sum are not more than 100 in total.

1.8.4 Achievement in MWP

Conceptual definition: Achievement in an MWP is defined as focusing on finding a mathematics language that is appropriate in word problem-solving. By studying word problems and abilities, students understand mathematical concepts and word problem solving better and it becomes easier for them when they are guided to use the language of mathematics (Kurshumlia & Vula, 2013). Students who are not familiar with the basics of using numbers do not solve mathematical word problems easily, which affects working and long-term memory and numerical using skill, all that lead to non-verbal problem-solving abilities (Kavkler, Magajna, & Košak Babuder, 2014).

Operational definition: The scores of 8 items/questions in the achievement test in MWP (achievement in MWP scale). Specifically, four questions each measures MWP

of the addition and subtraction of numbers up to 100. The items in the achievement test in MWP were built according to Year Two Mathematics Document Standard which is provided by the Ministry of Education, Kuwait.

1.8.5 Attitude towards MWP

Conceptual definition: Attitude towards mathematics word problem refers to the self-confidence of the students and the useful issues that gain from mathematics problems (Mohamed & Waheed, 2011). Marchiş (2013) determined the attitude toward mathematics as a positive or negative feeling when solve problems. It also refers to liking or disliking and avoids or engage with mathematical problem-solving. Moreover, attitudes may be the feeling of bad or good and useless or useful against mathematics.

Operational definition: The score of attitude towards MWP (Attitude towards MWP scale) is designed as a 10 items for evaluating attitude towards MWP (Sanchal & Sharma, 2017). Pupils rated the statement on a scale from 1 to 3, where 1 means ‘Disagree’, 2 means ‘Neutral’, and 3 means ‘Agree’. Smiley face icons (☹ means 'Disagree', 😐 'Neutral’ and 😊 means Agree) were used to represent the scale as the smiley face icons are easier to be understood by pupils.

1.8.6 Retention of achievement in MWP

Conceptual definition: Hornby, Wehmeier, and Ashby (2000) defined retention as the ability to recall experiences and learned things. Moreover, Kundu and Tutoo (2002) claimed that retention can be defined as mind preservation. This mean that what is stored is continuously expressed by the amount of information gained and held, skill preserved or problem-solving habits present. Thus, maintaining the accomplishment

of word problem information is the capacity of the learner to hold and remember as well as to retrieve or repeat the experience learned or part of it after a while. Increasing the level of achievement of students in an MWP thus means improving the level at which they remember the principles of the word dilemma they studied (Kurumeh, Onah, & Mohammed, 2012).

Operational definition: Retention of achievement in an MWP is measured through the retention of Achievement tests in MWPs. It is a reassessment of the achievement in MWP scale on the score of 8 items/questions.

1.8.7 Retention of attitude towards MWP

Conceptual Definition: Aitken (1999) defined retention of attitude as an individual's acquired predisposition or propensity to persist in reacting positively or negatively to any event, circumstance, idea or other entity. Whereas Neale (1969) discussed retention of attitude concerning MWP as "a persistence that likes or dislikes mathematics, a propensity to participate in or resist mathematical practise, a belief that one at MWP is good or bad and a perception that mathematics is useful or useless" (p. 632).

Operational definition: Retention of attitude towards MWP is measured through the retention of Attitude towards MWP questionnaire. It is a reassessment of the attitude towards MWP scale on the score of 10 items/questions.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter depicts a review of the extant literature concerning topics pertinent to the study of effects of teaching using IWB on mathematics achievement and attitude towards MWP of grade two female pupils in Kuwait. In addition, literature on constructivism philosophy, study based on innovations used to improve student mathematics achievement, and literature reviewing IWBs in the classroom are discussed, and their effects on student learning. Moreover, the study's conceptual framework was discussed.

2.2 Technology Technique in Education and the Classroom

Rapid technical advancements and improvements provide new possibilities for teaching and learning but many school districts fail to keep up with these improvements (Delorme, 2016; Gilksman, 2013). Any of today 's widely utilized education devices include smartphones, tablets (i.e. iPads), electronic projection boards (i.e., IWB, smart boards, and Promethean boards), digital and video cameras, paper cameras, the Internet, and so on (Schwartz & Pollishuke, 2013).

Present literature and empirical findings surrounding technology in education have a clear opinion that technology needs to be introduced into the classroom (B. Chen, Gallagher-Mackay, & Kidder, 2014; Pilgrim, Bledsoe, & Reily, 2012; Thiele, Mai, & Post, 2014).

Prensky (2012) identified the new generation of students as the "digital natives". Digital natives who were surrounded by and using the technological tools of

the digital age during their entire life, and as a result, their thinking and information processing skills are fundamentally different from their predecessors" (Prensky, 2012). Teachers who were not born into the digital world, referred to as "digital immigrants" by Prensky, must reconsider their methodology and content (Prensky, 2012).

As Collins and Halverson (2018) have suggested, student success that increases in schools that could become technology-rich is not simply a direct product of the technologies, but is dependent on a centred learning climate that is a function of the central educational goals of schools. The researcher claimed that technology not only improves specific tasks; such as, typing rather than writing or searching the Internet than using an encyclopaedia, but it can also improve the learning environment's communicative, meaningful, analytical, and logical capacities. Collins and Halverson (2018) agree that educational technology offers students and teachers with unique means of support for collaboration, interpretation, and speech. The researchers claimed that technology facilitates learning styles that are hard to attain otherwise, secondly, it facilitates all students ' educational experiences.

In an effort to improve student progress through differentiated learning, Morgan (2014) says, as students recently seem to be more engaged when using technology and can find conventional methods less inspiring, teaching successfully utilising digital platforms can help teachers teach in a way that suits their students ' learning styles" (p. 37). Students will learn from diverse configurations that correspond with sensory, kinesthetic, and visual learning types through devices such as the IWB, smartphones, and laptops (Morgan, 2014). Despite the documented beneficial effects of using technology in today's schools, the need to successfully incorporate technology to help and optimise the learning process of students is the biggest obstacle currently facing many teachers (Keengwe & Onchwari, 2011).

2.2.1 The Technology in Primary School Education

Screen technologies are widely used in the lives of young children. Consequently, it is crucial to consider the impact of such devices as tablets or e-books which are used for educational purposes and to figure out the optimal way of utilising this technology in the everyday routine of children, either at home, in childcare or in schools. This subject examines emerging behaviours and their consequences for parents, students, and policymakers (Courage & Troseth, 2016).

One of the new schools' duties is to train students for the life of a knowledge society. Teachers must strive to create an effective atmosphere for their students to cultivate the capacity to locate, coordinate and utilize information from various sources, along with learning how to make the most innovative and efficient use of information technology (IT). This can be done by training students to use computers and IT, and by leveraging practical classroom technologies in a range of subjects and even across all educational levels, recognising that the implementation of this assignment is considered a broad and long-term project (Korat, Shamir, & Segal-Drori, 2014).

In order to address the demands of multicultural society, UNESCO is at the center of activities to redefine educational paradigms. The UNESCO Institute for Information Technology in Education (IITE) has therefore launched a new initiative in 2011 exploring the role of information and communication technologies (ICTs) in primary education, designed to promote policy dialogue and developing the framework for successful primary education with the use of ICT (Lim et al., 2014).

Although the primary education is regarded as the largest part of any system of education. In addition to delivering a rare platform that influences the development of societies through young people's education. This young people need a variety of life