The Attitudes of Students and Teachers toward the Use of Interactive Whiteboard (IWB) in Education: Case of Computer Engineering Department at Eastern Mediterranean University

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ABSTRACT

The aim of this study was to examine teachers' and students' attitudes of interactive whiteboards (IWBs) as an instructional tool in computer engineering classrooms and to find out potential differences in attitudes according to some variables such as gender, age, hours of weekly IWB use, years of study and years of teaching experience of the participants. For data collection, both quantitative and qualitative methods were used. Two questionnaires distributed to 40 teachers and 150 students and also 10 teachers were interviewed to explore their opinions towards the use of IWB in the Department of Computer Engineering at Eastern Mediterranean University (EMU). The findings of this research indicated that the attitudes of teachers and students about using of IWBs technology in education were positive because they were mindful of the benefits of this technology in promoting meaningful teaching and learning. The result of the study has shown that there are statistically significant differences between the attitudes of students and teachers towards IWB use in their studies. It was also found that most teachers believe that IWB constitutes an effective and convenient way to deliver the learning content and that it increases the level of classroom interaction which in turn facilitates the learning experience, and also teachers expressed that they need training programs to acquire the essential competencies required to use this technology efficiently. Furthermore, the results showed that when students were involved in the IWB-base lessons their attitudes towards new technology have changed to more positive over time and this fluctuation in attitudes can be easily captured when dealing with and manipulating IWBs.

Keywords: Interactive whiteboard; Teachers' Attitudes; Students' attitudes; ICT

ÖZ

Bu çalışmanın amacı, bilgisayar mühendisliği sınıflarında bir ders anlatım aracı olarak kullanılan akıllı tahtaların (IWB); cinsiyet, yaş, akıllı tahtaların haftalık kullanım saatleri, öğrencilerin öğrenim gördükleri süre ve akademisyenlerin akademisyenlik yapmış oldukları süre gibi kriterlere göre, katılımcı akademisyen ve öğrencilerin tavırlarının gösterebileceği farklılıkları incelemektir. Bilgi toplarken, nicel ve nitel teknikler kullanılmıştır. Kullanılan iki anket, 40 akademisyen ve 150 öğrenci tarafından doldurulmuş ve Doğu Akdeniz Üniversitesi (DAÜ) Bilgisayar Mühendisliği bölümünden 10 akademisyen de akıllı tahtalara olan bakışları incelenebilsin diye bire bir görüşmeye tabi tutulmuştur. Bu çalışmada, eğitimde teknolojinin sağladığı faydaların farkında olan akademisyen ve öğrencilerin akıllı tahta kullanımına olan pozitif yaklaşımları gözlemlenmiştir. Çalışmanın bir diğer sonucu ise öğrenci ve akademisyenlerin akıllı tahtaların eğitimdeki kullanımına olan yaklaşımlarındaki istatiksel farklılıklardır. Birçok akademisyenin, akıllı tahtaların etkili ve uygun bir öğretim sunmaya olanak sağladığını, derse olan ilgiyi arttırdığını, öğretimi kolaylaştıran bir gereç olduğunu düşündüğü anlaşılmış ve aynı zamanda akademisyenler, bu teknolojiyi etkin bir şekilde kullanabilmek için eğitim alınması gerektiğini de vurgulamışlardır. Buna ek olarak, öğrenciler akıllı tahta kullanımının uygulandığı derslere katıldıkça, zaman içinde yeni teknolojiye olan tavırlarının pozitif yönde değiştiği sonucuna ulaşılmış ve aynı zamanda bu değişim, öğrenciler akıllı tahtaları kullanılırken de rahatça gözlemlenilmiştir.

Anahtar Kelimeler: İnteraktif beyaz tahta; Öğretmen Tutumları; Öğrencilerin tutumları; BİT

DEDICATION

Every challenging work needs self-efforts as well as the guidance of elders, especially who were very close to our heart.

I would like to dedicate my thesis work to sprit of my beloved brother Hamid Reza Ranjbar (1986-2012). This work is also dedicated to my lovely family whose affection, love, encouragement and prayers for day and night make me able to get such success and honor despite the challenges encountered along the way.

I really and will always appreciate all they've done in my life.

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Chapter 1

INTRODUCTION

Information and communication technology (ICT) as a form of modern technology can be employed as an instructional tool due to its versatility and multi-functionality. Integrating ICT into the educational system does not simply equal to the substitution of conventional educational resources such as books, posters, worksheets, video/audio materials, etc.; it rather creates a variety of teaching and learning opportunities which makes it worth of implementing (Kennewell, Tanner, Jones, & Beauchamp, 2008).

Over the past several years, the significance of ICT in regular education classroom contexts has been reported by several researchers. For instance, Venezky (2004) examined the effect of integrating ICT in the classroom and realized that for effective learning to occur, a balance should be made between traditional and modern approaches to teaching for effective learning.

Depending on the degree of familiarity with ICT, teachers have different views about the use of ICT technology in education. Wilson, Coles, Williams, Tuson and Richardson (2000) argue that if the virtues of ICT are perceived, teachers will be more inclined to bring technological resources to their teaching practices to improve their students' learning. Another study by Albirini (2006) investigated that teachers generally have a positive attitudes about ICT in education and believed that computers could enhance their living standards and earn them more respect. Moreover, computers

were considered as a practical educational tool with potential to improve student learning.

It is noteworthy that, students also advocate the use of ICT in the classroom. Hall and Higgins (2005) believe that the reason why students favor ICT is that it is flexible and provides access to multi-media. Another reason is that ICT appears appealing and fun for students specifically because of its visual presentation capability. Similarly, Tanner and Jones (2007) found that students favor ICT as a more modern technology with bright, colorful displays. These findings suggest that it is mostly the newness of the technology and its superficial features such as audio-visual presentations that motivate students to use ITC. Students also appreciate the immediate feedback given on their performance in the internet environment.

Despite the many benefits of ICT, its integration into the educational system and the classroom setting has some shortcomings. First of all, according to Ragsdale and Durell (2005), students' attitude of computers simply as a time-filler tool should be redirected to the fact that computers can also be used as an educational tool for learning objectives, and this responsibility is put on the teachers' shoulders. Moreover, it would not be easy for a single teacher to monitor the performance of students as they work individually or in small groups at different computers. Above all, there is no guarantee that assignments produced by computers enjoy a higher quality than those produced by conventional methods. They may even increase the workload of teachers.

Significant modifications have been made to today’s classroom over the past several years. While chalkboard still dominates many classrooms in some parts of the world, other teaching methods, including the technological ones are being increasingly

integrated and used in educational settings. This technology may come in different forms such as computers, high-tech tablets, smart phones, digital projectors, presentation software, teaching machines, podcasting equipment, World Wide Web, intelligent tutoring systems, and Interactive Whiteboard (IWB). However, the extensive use of technology does not necessarily lead to successful learning of those trained by them (Furr, Ragsdale, & Horton, 2005).

For living in twenty-first century which is known as the technological age educational institute must be equip with the latest technology in order to learn how to use effectively in learning. As a result, to integrate new technology and instructional methods into teaching, there has been an increasing call for teachers (Luterbach and Brown, 2011). The underpinning assumption is that technology-enhanced instruction is more appropriate and meaningful for students in the twenty-first century, and thus, modern technologies can be integrated into the classroom. Computers are regarded as old-timers that have been in schools for many years now and have promoted computer-based instruction (CBI) (Gast, Mechling, and Thompson, 2008). Both students and teachers can make the best of instruments and learning opportunities that technology offers. Using technology promotes the professional development of teachers, increases their positive contact with students on a regular basis, and offers innovative methods of instruction. Since technology is becoming an indispensable component of any classrooms which is persistently evolving, it is important as part of the education which prepares students for the future life.

According to Cuban (2005), teachers usually experience concern and anxiety despite their willingness to incorporate ICT into their classes due to their limited knowledge about new technology and the way it should be implemented in their classes. Some of

the concerns surrounding technology use, among the other things, include the ease of use, the integration of ICT into the curriculum, receiving technical support in case of need, its effect on teacher control, the nature of teacher-student relationships, and its effects on student learning.

IWB as a crucial aspect of ICT has been proved to be an appealing type of technology because it promotes learning in several ways; it raises the level of student engagement, enthusiasm and motivation for learning (Al-Saleem, 2012; Bacon, 2011; Barber et al., 2007). IWB also has pedagogical benefits. Through IWBs, students learn from experts, and the learning process is active and enriched (Smith, 2005; Lopez, 2010). Moreover, Kochavi (2010) believes that IWB is a fundamental part of the traditional classroom teaching contexts and this is a benefit because teachers are already familiar with instructional methods, such as writing on a board, the use of more innovative ICT teaching aids such as IWBs by which main points, students' answers, summaries, and so on can be projected onto the screen are facilitated. In other words, this learning assist tools is used in the classroom, and the previous knowledge of teachers with boards would facilitate the transition to more modern forms of IWB or the digital form of that. Using technology promotes the professional development of teachers, increases their positive contact with students on a regular basis, and offers innovative methods of teaching and learning. Since technology is becoming an indispensable component of any classrooms which is persistently evolving, it is important to integrate it into education to prepare students for their future life.

1.1 Interactive Whiteboard in Education

It has not always been easy for uptake technology by some universities because the transformations require them “to cope with the challenges and opportunities posed by information and communication technologies" (Jenkins & Smith, 2001, p. 95). However, during the last decade’s most of the educational institutions with the aim of integrating ICT in education are trying to provide a better learning environment for learners by equipping their classes with the latest educational technologies (Hsu, 2010).

Different forms of technology have been incorporated into the classrooms since the mid-1990s of which IWBs are one of the most recent ones adopted in modern classrooms (Beeland, 2002). These technologies-enhanced whiteboards are gradually being replaced by the traditional black and white boards which were once the essential components of any classes. Therefore, IWB relies on a touch screen smart board (Slay, Siebörger, & Hodgkinson-Williams, 2008) which is used by its users to manipulate and examine the elements on the board, write and erase applications such as animations and graphics, save notes from previous lessons for later use, use special capabilities such as a built-in spell checker, simulation, graphics, audio-recorded materials, etc. (Preston & Mowbray, 2008).

IWB not only enables teachers to design and organize assignments and use a wide range of multimodal resources available to them, but also to direct students’ cognitive and innovative capacities in the learning process (Littleton, Twiner, & Gillen, 2010). Somyurek, Atasoy & Ozdemir, 2009 argued that IWBs have the potential to convert an ordinary classroom environment into an interactive student-centered one because

they reduce the instructional burden which is on teachers and facilitate the learning process, and this, in turn, encourages student-initiated and student-centered instructional performances. IWB has changed many experienced teachers' attitudes towards technology (Huber, 2010).

Although there are many positive opinions and some problems affecting the use of this technology mostly have employed in Europe, including Turkey and England (Holmes, 2009) and the penetration rate (73%) of this technology has dramatically increased in the world to the extent that, for example, Denmark has increased the use of the IWB in classes by 50% since 2010, the rate is still average or low in developing countries in Asia. According to a recent research report by Brown (2011), the rate is still under 2% in Asia. Moreover, some teachers have pointed to the difficulty of getting technical support as well as the lack of time needed for examining and exploring the functions of interactive whiteboard technology (Lu & Overbaugh, 2009). Some teachers believe that the use of technology in classroom is distracting and ineffective because only few small groups of students can use the board simultaneously (Preston & Mowbray, 2008). Therefore, as explained above, uncertainty about the effectiveness of IWBs calls for a need for further investigation of this issue, particularly in contexts where integration of technology has been rare in the classrooms.

1.2 Purpose of the Study

The main objective of this study is to investigate students' and teachers' attitude of the using IWBs in education in the Department of Computer Engineering at Eastern Mediterranean University (EMU) in the Turkish Republic of Northern Cyprus (TRNC). The participants' attitude is assessed regarding some different variables such as gender, age, hours of weekly IWB use per week, and years of studying and teaching

experience. The goal of this research is to investigate the outlooks of teachers and students about the employment of IWBs at Computer Engineering Department by presenting beneficial insights on the use of IWBs to provide valuable data and more insights into effective use of this technology in the classroom, and also the results of this research could be helpful for school administrators, educational authorities and teachers and in-service trainers to assess their practices when utilizing IWB technology in their classes.

1.3 Problem Statement

In line with rapid technological developments as this technology is known as a combination of most of the traditional instructional aids such as blackboard, whiteboard, computer and video projector the reliance on ICT in educational settings and employing IWBs have increased in lessons (Yáñez and Coyle, 2011). Despite initially designed for commercial settings (DiGregorio and SobelLojeski, 2010), the IWB technology increasingly started to be incorporated in classrooms across the world. Coyle, Yanez, & Verdu (2010) argued that IWB gives teachers the opportunity to instruct in many innovative, stimulating methods than the potentials of traditional classroom equipment. IWBs is of the benefit because as students interact through them they promote 'interactivity' in the classroom (Allwright, 1984; Ellis, 1999). Since a considerable amount of time, energy, and money is invested in technology, the value, and the learning outcomes should worth the expense spent on it. However, as IWB is relatively a new phenomenon, it has not yet extensively been studied, and more empirical research evidence regarding its effectiveness in teaching and learning needs to be collected. Due to lack of sufficient evidence, gaining insights into the attitude of students and teachers at the university-level is of particular importance. In TRNC, the IWB is a relatively new technology in the classroom and its implementation for

teaching purposes is rising. However, the quick step to integrate innovative technologies into educational settings, sometimes results in neglecting the attitudeof their users; yet, the feedback provided by users of these technological tools contributes a lot to the effectiveness of them, the extent to which they should be integrated, and decisions on whether or not they should be integrated. Hence, this study aimed to assess the attitude of teachers and students due to the integration of IWB and its effect on learning in the Computer Engineering Department at EMU in TRNC.

1.4 Research Questions

The present research aims to examine the attitudes of teachers and students concerning the use IWB, and to determine the differences in attitudes of the participants regarding five variables, including gender, age, hours of weekly IWB use, years of study, and years of teaching experience. To achieve this aim is tried to answers the questions which are listed as follows.

1. What are the students' attitudes toward the use of IWBs according to perceived learning contribution, motivation, perceived efficiency, and perceived negative effects in computer engineering courses?

2. Is there any significance differences of the students' attitudes regarding to age, gender, years of study and hours of weekly IWB use?

3. What are the teachers' attitudes toward the use of IWBs according to instructional effects of IWBs, general attitudes, motivational effects of IWBs, and need for training in computer engineering courses?

4. Is there any significance differences of the teachers' attitudes regarding to gender, age, years of teaching experience and hours of weekly IWB use?

1.5 Significance of the Study

IWB technology is becoming more widespread across the world owing to the provision of a lot of opportunities to facilitate teaching and learning. The educational value of IWB for teachers and students should be proved to justify the expenditures spent on installation and utilization of this modern tool. The data obtained on this topic by asking teachers' and students' ideas about IWB would contribute to our understanding of the extent to which this technology promotes the teaching and learning the process, and subsequently plays a role in making a decision about investment in this modern technology.

Although IWBs have recently been used in higher education especially in university-level of TRNC. But to use this technology, there are a number of problems. First, many teachers had used ICT- based learning strategies neither as learners themselves, nor as teachers and subsequently, the lack of previous knowledges in teaching with IWB and employing them for teaching purposes has made it a challenge for them. The second could be the lack of extensive study as well as any formal evaluation regarding the attitudes of teachers and students in using IWB technology in university level. In order to boost the use of the IWB in the university classroom, it is crucial to understand the shortcomings and disadvantages that students experience and try to make the necessary improvements. This study is significant because it aims to provide empirical evidence for the concerns mentioned above, and in particular, the current state of technology uses in Computer Engineering Department at EMU. The results of this research hopefully provide useful information for teachers who use these technologies and also enable educational institutions to make informed decisions about investment in this technology. Apart from exploring the students’ and teachers’ opinions about the

benefits and drawbacks of the IWB, some pedagogical implications and suggestions for improvement are also made. This study draws both on qualitative and quantitative data to indicate how IWB technology is perceived by its users to assist all stakeholders involved, including educators, teachers, students, etc. maximizes the advantages of the IWB technology.

1.6 Limitation

Like all researches, a few limitations observed in this study. Firstly, the population of this research were 150 students and 40 Teachers in Department of Computer Engineering at EMU which is located in a small city in TRNC. This can limit the generalizability of the findings of the study to other higher education contexts in TRNC. Second, only a small proportion of teachers at Computer Engineering Department utilized the IWB and participated in this study as well as approximately one-third of the population of students participated in this study. Furthermore, no observation was made about how IWB is used for teaching and learning purposes in the classrooms.

Chapter 2

LITERATURE REVIEW

IWBs are one of the technological mediums of instruction which came to the fore in the 1990s. Use of technology has become a fundamental part of education in today's world (Wiebe & Kabata, 2010). According to Chambers (2005), a great deal of research has proved the positive influence of technology integration into educational settings. Technology comes in the form of diverse applications such as online assessment, speech synthesis, email groups, video conferencing, etc. (Ishtaiwa & Shana, 2011) with the goal of enhancing learning and teaching.

Along with their widespread usage in educational settings across the world, a group of researchers started evaluating this technological tool in order to see the value of it. Despite some negative evidence, previous literature has highlighted several positive outcomes of IWB in teaching contexts. Overall, the findings show that it fosters interaction among students in the classroom and increases their motivation, and also allows teachers to function more efficiently (Hardman & Higgins, 2006).

2.1 History of IWB Technology

IWBs first came to the fore in the 1990s. In their primary forms, IWBs were simple touch screen boards used to demonstrate schedules, tables, etc. and they had limited practicality and convenience. By the advent of digital technology, significant improvements were made to the structure of IWBs. Today, an IWB is a multi-functional equipment capable of performing several tasks with widespread usage in

different areas. IWBs are used extensively for instructional purposes in many schools across the world (Smith, Hardman, & Higgins, 2006).

It is argued that smart boards increase student's knowledge and motivation (Rakes et al., 2006; Siemens & Matheos, 2010). The term Smart Board is coined from Smart Technologies, one of the world's largest leading manufacturers of interactive whiteboards. Although Smart Board is a whiteboard designed by Smart Technologies, it is not synonymous with interactive whiteboards. Smart Board is, in fact, a product made by Smart Technologies manufacturer that is why it is known as Smart Boards. Other brands of interactive whiteboards of other brands perform the same functions, but use different software. Smart board has been an attempt to merge hardware and software programs in order to design an interactive type of whiteboard which allows its users to demonstrate and manipulate information on the board by touch or by pens for the audience who watch the information.

2.2 Interactive White Board as a Teaching Tool

As an educational technology IWBs have a number of pedagogical benefits. Through IWBs students can learn from experts, learning process is active, and enriched (Lopez, 2010; Smith, 2005). It is easy for teachers to access innovative ICT teaching aids that they can project onto the screen, and they are already familiar with conventional instructional methods. Teachers' familiarity with instructional methods such as writing on a board facilitates having access to innovative ICT teaching aids such as IWBs by which main points, students' answers, summaries, etc. that they can be projected onto the screen (Kochavi, 2010).

It is noteworthy that since IWBs can be used as a replacement for blackboards, they may encourage didactic teaching practices (Schuck & Kearney, 2007). To use the maximum potential of IWB, didactic pedagogies should be modified to the interactive ones (Miller, Glover, & Averis, 2004). According to Glover et al. (2007), IWB is nothing but a technological teaching aid if teachers do not know how to connect it to an interactive pedagogy. Despite the fact that IWBs introduces a fully new approach to pedagogy, its integration can simply be done with little training (Armstrong & Thompson, 2005).

There are many advantages of apps available for the IWBs. By using these apps, users are able to design different course materials and use them their in various file formats, the applications can simply be controlled by fingers running on the computer and this makes it possible for users to manipulate the course content on the computer reflected on the board using different functions, such as zooming, drag-and-drop, highlighting, connection to web-based applications, and screen sharing over the Internet (Türel & Demirli, 2010).

Nevertheless, there is a shortage of undertake research on the use of IWBs in different educational levels .In fact , the available research can be grouped into two distinct categories: studies examining how IWBs are used in classes, and studies investigating the geographical distribution IWBs use. The former group of studies has generally indicated that IWBs are majorly utilized to animate lessons using audio-visual equipment as well as the other interactive media resources (BECTA, 2003). The elimination of traditional materials also reduces the space required to keep those materials (for example, bookshelves) (Ertan et al., 2010). Instead, access to unlimited e-books that can be stored on computers are provided. On the other hand, from a

geographic standpoint, a steady rise in the use of IWBs in developed and developing countries has been also reported (Ertan et al., 2010). However, the body of existing research highlights the popularity of IWBs in America and England where considerable budgets are invested into the developing, utilization and empowering IWBs, and IWB-related teaching resources (Slay et al., 2008).

The findings of the more current studies compared to that of the previous ones reflect higher recognition and approval by educational institutes (Chuck & Kearney, 2007; Kennewell, 2006).Barry and Smith's (2005) study on understanding teachers' and students' attitudes about using an IWB indicated that the engagement levels of students , the frequency and efficiency of teacher-student and student-student interaction, provide opportunities for stimulating teaching experiences, and enable efficient lesson preparation processes could increase by using IWBs. As far as students are concerned, previous studies suggest that overall attitudes of students towards IWB lessons are positive because they believe that the use of this technology makes learning more fun and helps them understand difficult subjects, and perform better in IWB lessons (Chuck & Kearney, 2007).

2.3 The Relationship between IWBs and Learners Achievement

The findings of several studies about students' outlooks towards the use of the IWB have highlighted that students learning through IWBs are more interested and motivated because this technology is more engaging and directs their attention to the learning process more (López, 2009). It also facilitates the students' desire to remain on-task (Hall & Higgins, 2005 as cited by Manny-Aiken et al., 2011), and enables them to understand the lessons better as reflected in a deeper understanding of the subject matter and the long-term recall and retention of the acquired information.

There is also a great deal of interactive games that not only increase the students 'pleasure, but also typically lead to elicitation of a correct response. Indeed, substantial academic improvements have been detected due to direct effect of IWB use (Isman et al., 2012).

A strand of research has investigated the effect of IWBs on student achievement and learning outcomes. In United States, Zittle (2004) examined the influence of lessons presented by the IWB in a geometry course on 53 elementary school students' achievements in the test group compared to the control group. The comparison of pre- and post-test scores indicated significant statistical differences between the two groups with the test group achieving better grades. Likewise, Emran and Dhindsa (2006) investigated the achievement of college students in six chemistry lessons instructed either with or without an IWB. Similar to the first study, statistically significant differences were found between both groups with the test group who were instructed by the IWB outperforming the control group in the post-test. The constructive effect of IWBs in elementary schools has also been proved in other subject areas such as language in US (Swan et al., 2008), and in literacy, math, and science in England (Lewin, Somekh, & Stephen, 2008).

It is worth mentioning that some diversities also exist among experienced and less-experienced teachers in the use of the IWBs. Whereas experienced teachers believe that the IWB can function as a mediator if integrated into the pedagogy to facilitate teachers' interaction with the student, among the students themselves, and between the students and the IWB, less experienced teachers are tackling with its integration into their pedagogy and are yet uncertain about its positive effects. In a study carried out by (Lewin et al., 2008), it was observed that after a period of two years, skilled teachers

learned to employ the board for teaching students in pairs or small groups. The researchers concluded that students became more motivated to learn through these boards, so they decided to incorporate them in order to develop their teaching practices.

In a similar vein, Lewin (2008) studied elementary school students' achievements in two subject areas: math and language as well as the influence of the length of time learning with the IWBs. The findings showed that although at the beginning of IWB intervention only the average and stronger students achieved higher scores, after two years of intervention, all students regardless of their level had higher achievements on national tests. Lee and Boyle (2004) observed similar improvement on national tests in Australia.

On the contrary, a line of research have indicated that IWB does not have a unidirectional effect on achievement. For example, Higgins et al. (2005) who examined the implementation of the IWB in various subject areas of Australia found that although 5th and 6th grade students learning with the IWB had higher achievements in math and language national tests in 2003, the effect of this technology was not lasting and these positive results were not repeated in the next year. The justification of this finding was that application of IWB might contribute only to the achievement of weak students in the language area, specifically the writing skill, but the improvement might stop at later stages, that is why it is often argued that the newness of the technology may result in some improvements at the beginning but does not necessarily lead to the betterment of a given technology. In another study conducted by Christophy and Wattson (2007), a group of high school students who

used the IWB in the chemistry course received lower scores compared to the group that learned with traditional methods without the use of the IWB.

Many studies administered over the past decade have reported both social and academic value of using IWBs in the classroom context. Recently, Blue and Tirotta (2011) reported that to remain students on the task the IWBs generated an interactive environment and motivated learners as well as IWBs are also motivating for students with learning disabilities. Above all, interactive whiteboards that facilitate cooperation among peers, in fact, make them both more efficient learners and more responsive to different learning styles (Bell, 2002). The findings suggest that the IWB is suitable for elementary school students

2.4 Advantages and Disadvantages of Using IWBs in Education

Nowadays lot of studies have been done in order to assess the integration of technology into pedagogy. The use of interactive whiteboards in educational settings in some of these studies has shown several merits for both students and teachers. Syh-Jong and Meng-Fang (2012) conducted a comprehensive study by reflecting on prior research related to the advantages and disadvantages of using IWBs. The results of their study showed that the benefits of this technology for teachers are included the flexibility of integrating IWBs into a variety of pedagogical approaches, fast and efficient delivery of multimedia or multimodal material, and the supports offered to teachers for designing and developing lessons and other teaching materials. In addition, teachers are usually found to possess skills and ability enabling them to incorporate IWBs into teaching (Winzenried et al., 2010). And also by using IWBs the interaction between students and teachers can be facilitate (Glover et al., 2005). The many functions of IWBs assist teachers to store and reshape information and to make explanations.

Students can also observe the performance of their peers on the electronic whiteboard, assess their performance with those of the other classmates, reflect on their learning process, and thereby increase the exchange of knowledge.

A few reports like that of BECTA (2008) found no evidence of pedagogical change among teachers which were using IWBs; yet, some other studies concluded that the employment of IWBs improved teachers' confidence and their skills in using technological tools. The greatest contribution was made in settings where teachers had access to IWBs equipment, and a laptop, and are supported by training and guidance pertaining to the use of technology for pedagogical purposes (Underwood et al., 2004; BECTA, 2008; Miller et al., 2005; Betcher & Lee, 2009).

On the other hand, several drawbacks have also been attributed to IWB use. One of the major drawbacks is that teachers, specifically novice teachers, find it difficult to use IWBs in their classrooms. In fact, some teachers lack ICT-competence, and in particular, skills which enable them to use of IWBs (Miller & Glover, 2002; Slay et al., 2008). Furthermore, Smith et al.'s (2005) research indicated that the lack of sufficient knowledge's can be a limit for teachers, and teachers need more comprehensive training which is beyond the ones offered by suppliers and IWB companies. Installation and physically locating the IWB in a classroom in a way that can be observed by the whole class is not an easy task, either. Schmid (2008) argues that the problem occurs when teachers are required to incorporate IWBs as an innovative technology into their existing traditional teaching approaches and sometimes there is a discrepancy between the two environments. Teachers also express their concern about the considerable amount of time required for preparing IWB

lessons (Miller & Glover, 2010). Cost constraints are another reason why some schools with limited budgets cannot equip their classes with an IWB.

Syh-Jong and Meng-Fang (2012) presented the advantages and disadvantages of using IWBs (see Table 1), as perceived by elementary school teachers in mathematics and science. Table 1 shows the percentage of agreement with each item. The results highlighted that the lack of IWB equipment's in classrooms is the most important factor for those teachers which do not use the IWBs.

Table 1: Advantages and Disadvantages of using IWBs in Education

			Descriptors	**Percentage**
Advantages	1	Using IWBs can easily get students' attention and help them to concentrate on learning.	Attention	82.2
	2	Using IWBs can help teachers explain complex and abstract concepts.	Complex concepts	78.2
	3	Using IWBs can help make teachers' teaching process smoother and enhance teaching effectiveness.	Smooth teaching	76.4
	4	IWBs do not produce chalk dust, so they are good for the environment and human health.	Environmental benefit	86.8
	5	Using IWBs can increase interactions between teachers and students.	Interaction increase	82.2
	6	Integrating IWBs into teaching can help teachers become more flexible in using various classroom materials.	Flexible use	87.6
Disadvantages	1	School does not have enough funds to provide an IWB for each classroom.	Lack of budget	63.2
	2	There is an IWB in my classroom that is not used due to lack of time to design teaching materials.	Lack of time	12.6
	3	There is an IWB in my classroom that is not used due to limited sources of related teaching software.	Lack of sources	10.6
	4	There is an IWB in my classroom that is not used due to lack of professional training for the IWB's functions and operation.	Lack of training	14.6
	5	There is an IWB in the classroom that is not used due to frequent unsolved problems in using it.	Frequency of unsolved problems	12.9

2.5 Teachers' and Students' Attitudes towards Using IWBs

Teachers' and students' attitude of IWBs is another strand of research addressed by some scholars. Digregorio & Sobel-Lojeski's (2010) study revealed positive attitudes of teachers' and students' towards IWB is due to promote teachers-students interaction

and enhanced student engagement and motivation. One of the most important factors influencing the use of the IWB is teachers' attitude of the effect of IWB on their instructional methodology. If the attitude is positive, it would result in faster acceptance of this new technology and promotes the belief that it promotes students' learning (Essig, 2011).

According to Moss et al. (2007), working with advanced tools like IWBs makes teachers feel more up-to-date, and most teachers have reported that it is easy for them to work with IWBs (Miller, Glover & Avris, 2005). It is argued that although the preparation time for lessons is longer, the subsequent result is worthy and leads to greater student concentration, various visual and aural supports, flexible design for children with different abilities, the preparation of more effective lessons, and better presentation of learning material. Despite long hours spent on learning material development for the IWB, the use of this application allows teachers to prepare clear and coherent lesson plans which enjoy a variety of creative options that makes the teaching and learning process more enjoyable and meaningful compared to the traditional instructional methods (Bennet & Lockyer, 2008).

The results of a study by Nasrin & Saeed (2015) confirmed the positive attitude of teachers about IWB as well as the positive relationship between the frequency of IWB use and developing competency in using the IWB. In other words, most teachers reported that continued practice made their opinion about IWB more positive, so they tried to apply it more frequently.

Lee, Horng-Ji (2010) explored secondary school teachers' attitudes of the effect of training workshops for using an interactive whiteboard in Taiwan. Another goal of the

study was to identify potential problems related to the design of IWB training workshops in an attempt to improve their effectiveness. The results of the observations and interviews suggested that teachers were aware of the values and merits of using an IWB in classrooms. They pointed to the importance of attending training workshops and stressed that the knowledge of practical uses of interactive whiteboard would help them to integrate this promising educational tool into their pedagogy.

The results of Xu, Hui Ling & Moloney, Robyn's (2011) those who conducted a case study of both teachers' and students' attitudes of learning Chinese language through IWB-based pedagogy in a high school in Sydney were consistent with previous studies addressing this issue. Students in this study approved the use of modern technologies in education and believed that IWB facilitated learning various aspects of the Chinese language. Teachers, likewise, had a positive attitude towards integration of modern technology in teaching and believed that this technology made teaching and learning of Chinese more effective.

The findings of studies overall suggest that ; firstly, IWBs are effective tools for enhancing learners' abilities, motivations, awareness, attention, level of involvement, and learning and pedagogic approaches (Hennessy & Warwick, 2010); secondly, the teachers require effective training programs in using IWB to improve their teaching practices as well as for their professional development (Essig, 2011, Xu & Moloney, 2011) ; thirdly , students develop a positive opinion towards IWBs provided that teachers use it efficiently (Xu & Moloney, 2011). These findings shed light on the fact that in order to maintain innovation in teaching and learning contexts, school culture and classroom pedagogies should be changed (Lewin, Somekh, & Steadman, 2008). Termit Kaur Ranjit Singh and Mohamed (2012) argue that when technology is used

effectively, students' interaction in classrooms will increase. Technology that brings about more than what can be attained through conventional teaching methods, for example, more motivation or novel approaches that facilitate learning are worthwhile. According to these researchers, more interesting lessons, increased participation in and attention to the learning process, enhanced collaboration, and ease of whole group instruction in comparison with traditional teaching and learning processes are all the consequences of this form of technology-enhanced instruction.

Türel and Johnson (2012) founded that to acquire better insight into teachers' attitudes, it is vital to reflect on their background and competencies including the degree of familiarity and frequency of IWB use as well as sources of IWB skills. To illustrate, their study indicated that despite participants' satisfaction with IWB application and its recognition as a powerful and practical technology, teachers could not create a social constructivist atmosphere wherein students were able to learn through collaboration. More interesting point was that although most teachers believed that IWBs are time-efficient for instruction, they stated that they could not allow their students to use IWBs due to limited class time.

Concerning language studies, the review of teachers' and students' attitudes about the use of IWB in DiGregorio and Sobel-Lojeski (2010) showed satisfactory results. Although no reference was made to improvements in a given area such as linguistic outcomes, there was a consensus among scholars pertaining to the potential of IWBs for promoting teachers' and students' motivation and fondness in L2 lessons. The growing literature on the use of IWB for language teaching and learning purposes indicates that L2 teachers need to be skilled enough to successfully integrate this technology in their language classrooms.

This literature review shows that unlike areas such as math and science, studies addressing learners' perspectives about the technology of IWBs in L2 classrooms has been rare specifically FATIH project which was designed by Mone (2010) in Turkey in an attempt to create the chance of incorporating IWB technology in classrooms. Second, the available research reports and studies show that this topic has rarely been investigated in light of some issues for instance experience of teaching, gender, and the level of language proficiency, which the present study aims to investigate. Third, owing to their significant effects on the acceptance and use of IWBs technology in L2 education, studies have come to emerge on this area into teachers' and learners' standpoints. For instance, Matthews-Aydinli and Elaziz's (2010) administered in Turkey indicated that the attitudes of both teachers and students towards the IWB technology were positive and felt comfortable using the device. In the same way, the findings of a study by Duran and Cruz (2011) revealed that teaching was quicker and more exciting thanks to IWB technology. These findings can be true in relation to learning different languages such as the Chinese language (Xu & Moloney, 2012). Nevertheless, there are voices (Duran & Cruz, 2011) asserting that devices and technologies by themselves do not play any role in L2 teaching and learning; it is, in fact, the way in which these technological tools are utilized that determine their effectiveness.

2.6 Challenges and Opportunities of the IWB in Educational Setting

As a useful tool to utilize in education IWBs various educational opportunities and also at the same time some challenges. With regard to the benefits, through IWBs the learning process is more active and enriched (BECTA, 2004; Lopez, 2010; Smith, 2005). Also, accepting IWB as an indispensable component of the traditional classrooms teaching might be recognized as a merit (Kochavi, 2010). Needless to say

that the potentials of IWBs would satisfy both teachers and students' needs. On the one hand, it enables teachers to incorporate a good deal of web-based resources and materials during the lessons. On the other hand, it can increase student enjoyment and motivation, creativity, and cooperation as well as learning which develops their personal and social skills which facilitate presentations in front of their peers.

IWBs also have technical advantages. For instance, they are compatible with other tools that students frequently use such as computers, laptops or tablets that give learners, specifically the shy or reluctant ones, and the opportunity to directly engage with the course content and interact with it (Hennessy & London, 2012). Also, remote devices like online forums and video-conferencing offer more options for inclusion of whole class participation when designing activities.

In most studies (for example, Moss et al., 2007), both teachers and learners are positive about using the IWB technology in the classroom. The respondents frequently point to the high quality of display of the educational content as one of the major benefits of the IWB technology. According to Miller, Wall, Higgins and Smith (2005), determining factors in modifying attitudes concerning use of the IWB are its versatility and practicality. The participants of their study found working with IWB much easier than working with a computer keyboard and mouse.

Despite the advantages of IWBs in educational settings, there are some deficits related to the use of IWBs in education that make it challenging which are referred as technical problems like freezing and crashing (Hall & Higgins, 2005) to high expense of IWBs, lack of ICT skills and confidence to use IWBs (Smith, Higgins, Wall & Miller, 2005), IWBs break-down (Armstrong et al., 2005; Thomas & Schmid, 2010), time constraints

which limits planning and preparation of ICT materials (Pilkington & Tomkins, 2005) and special support needed for opting suitable software and applying it appropriately (Isman, Abanmy, Hussein, & AllSaadany, 2012). Of the challenges above, training programs aimed at help teachers making the most of the IWB appears very important. Effective teaching via IWB also requires teacher be well-organized, flexible, positive, willing to create educational plans and share their knowledge, and open-minded (Betcher & Lee, 2009). Moreover, to facilitate learning and instruction, teachers should use ICT technologies like IWB more frequently, collaborate and share their knowledge with colleagues, and get sufficient training for effective IWB use (Türel & Johnson, 2012).

Despite some of the challenges of using IWBs in education, it clearly shows that most findings and arguments are on the positive side using the IWBs. The majority of studies have confirmed that learners assuredly agree of using IWBs as a teaching aid (Hui Ling & Moloney, 2011; Matthews-Aydinli & Elaziz, 2010; Türel & Johnson, 2012) because of its potential to increase their interpersonal interaction and participation, and motivation (Hui Ling & Moloney, 2011). As awareness and familiarity with the IWB technology increases, students would develop more affirmative ideas towards this technology (Matthews-Aydinli & Elaziz, 2010).

Chapter 3

METHODOLOGY

This chapter describes the methodology employed to conduct the study, the research design, demographic information about the participants, instruments used to collect data, data collection, and data analysis procedures. According to Bailey (2004), most research addressing the effectiveness of technology in education has been qualitative in nature, and insufficient quantitative data has been accumulated on this topic. Nevertheless, it is argued that employing a quantifiable approach to measuring what is taking place in the classroom setting can also generate valuable data for studying the influence of IWB technology on students' learning.

3.1 Research Methodology

Quantitative approach used in this study aims to assess the problems under investigation by producing quantitative data. Following Robson (1993), the term survey is used in this study to refer to a methodology designed for collecting data from a certain population or a sample typically through a questionnaire or an interview. In order to achieve the objectives of this study a mixed-method comprised of both qualitative and quantitative data is utilized. The quantitative approach is the primary source of data collection through two separate questionnaires which were distributed among teachers and students in Department of Computer Engineering at Eastern Mediterranean University. In addition, the qualitative data were used through interviews administered by the researcher in order to obtain teachers ideas and offers by responding to a series of open-ended questions.

3.2 Research Group

The total population of this study consisted 500 teachers and students at the Department of Computer Engineering in EMU where classes equipped with IWBs and used by teachers in classrooms in spring semester 2016. For conducting this research project, a total of 150 undergraduate students who were volunteered to participate in the study. It was necessary to select participants with sufficient knowledge and experience of working with IWBs Thus, the sampling methods were availability or convenience sampling. Table 2 shows that 58% of students (N=87) were males, and 42% of students (N=63) were females in the sample group. 26.7% of the students (N=40) were between 18 and 20 years of age, 34.07% of the students were between 21-22 years of age, and the remaining 38.6% were 23 and older. In addition, according to their years of studies, 30% of the sample group were freshmen, 34% of the selected sample were a sophomore, 14 % of the group were junior, and the remaining 22% were senior students at the time of the study.

Table 2: Demographics of Students

Students		**Frequency**	**Percentage**
Gender	Male	87	58 %
	Female	63	42 %
Age	18 – 20	40	26.7 %
	21 – 22	52	34.7 %
	23 +	58	38.6%
Years of studies	1	45	30%
	2	51	34%
	3	21	14 %
	4 +	33	22%
	Total	**150**	**100**

Moreover, a total of 40 teachers who have actively used IWBs in their classes in Computer Engineering Department of EMU during the 2016-2017 academic year, spring semester decided to participate in the survey. 32.50% (N=13) of the teachers

were female, and 67.50% (N=27) of them were male. Table 3 shows the demographic information of the teachers.

Table 3: Demographics of Teachers

Teachers		Frequency	Percentage
Gender	Male	27	67.50%
	Female	13	32.50 %
Age	25 – 35	2	5%
	36 – 45	27	67.50%
	46 and older	11	27.50%
Years Of Teaching	1-5	2	5%
	6-10	8	20%
	11-15	20	50%
	16 and higher	10	25%
	Total	**40**	**100**

The age of 5% (N=2) of the teachers was between 25 and 35, 67.50% of them were between 36 -45, and the remaining 27.50% were 46 and older. In addition, in terms of the years of teaching experience, 5% of them were novice teachers, 20% of them had 6 to 10 years of experience, 50% had 11-15 years of experience, and finally, 25% of them had more than 16 years of teaching experience.

3.3 Data Collection Tools and Techniques

This section describes tools and techniques used to collect data in this study. In order to collect quantitative data two papers-based questionnaires were used in this study. Furthermore, in this study, the researcher used the questionnaires which were designed by Öz (2014). Thus, five demographic questions were used in the first section of students' questionnaire. Furthermore, the next section was comprised of 26 items to be answered on a five-point Likert-type scale measuring the attitudes of students concerning 4 aspects (See Appendix A). Similarly, five questions about the demographic information of teachers including were used in the first part of the questionnaire. As the same way, a five-point Likert-type scale consisting of 25 items

to measure the attitudes of teachers regard to 4 aspects were developed in the second section of the teacher questionnaire. Furthermore, in order to evaluate the attitudes of teachers about IWB technology, an interview was done. In total, five questions were used in English to investigate the advantages and disadvantages of using IWBs in education, the audio-recorded interviews between the researcher and the teachers were transcribed and analyzed according to the responses the participants gave to each of the six open-ended questions. All the responses were examined for cases, similarities and differences among the teachers' opinions (See Appendix C).

3.4 Data Collection

This study was directed during the 2016-2017 educational year in the Computer Engineering Department at EMU. After the university administrator's approval, a total of 150 students volunteered to participate in the study. The survey was carried out and during one week, students completed the questionnaire within 15 minutes of their lessons. Similarly, the survey of teachers were completed, and teachers decided to fill the questionnaire at home and return it to the researcher. However, questionnaires were used for data collection as primary tool as well as to support the results obtained from the quantitative method, data collected through Focus group interviews were administered with those teacher candidates who were frequently used IWBs in the classroom. For this purpose, the researcher administered semi-structured interviews with 10 participants who had integrated IWB into practicum sessions over eight weeks. The interviews took place at the participant's office. Interview with each participant lasted for 30-55 minutes and was administered in English. The interaction between all the participants and the interviewees were audio-recorded for future retrieval and analysis. The questionnaire designed by the researcher was given to participants, and it took approximately 15 minutes for the participant to compete them. After

completion, the questionnaires were submitted to the researcher and they were thanked for their participation in the study. All the participants of the study completed the consent form designed by the researcher to show their approval to participate in this study.

3.5 Data Analysis

Data analysis was conducted in relation to each research question in the present study. Data collected from the questionnaires were subjected to descriptive statistics by using statistical package for the social sciences (SPSS) software that enabled the researcher to perform quick and accurate statistical analysis. And also for obtaining a model in order to present the results the frequency and mean of responses to the items on the questionnaire were computed. In addition, to identify any significant differences between variables the other statistical analysis methods included one-way ANOVA and an independent-samples t-test.

3.6 Reliability and Validity

The Cronbach's alpha coefficient was used to assess the reliability of the instruments. The internal consistency for each theme was based on the following rules (<. 6 = unacceptable level, 6 = acceptable levels, .7 = low levels, .8 = moderate and. 9 = high level) (Davidshofer & Murphy, 1991). Finally, the results of the Cronbach's alpha of had the reliability of 0.86 for the student questionnaire while the corresponding value for the questionnaire of teachers was 0.88 which can be highly reliable for instruments.

Chapter 4

FINDINGS

In this research the students' and teachers' attitudes concerning the employment of IWBs in the classroom were discovered. To this end, students and teachers in Computer Engineering Department at EMU were surveyed. The study aimed to deepen the current understanding about the value of IWBs from the perspective of its users in an educational context. The interviews administered to the teachers also drew evidence on the way teachers view the use of interactive whiteboards, and the extent to which they adhere the use of this educational technology in their classes.

4.1 Data Analysis Procedure

All sections in the surveys were investigated analytically except interview section. In order to measure frequencies and percentages of each items inside the questionnaire the Statistical Packages for Social Sciences (SPSS) version 23 were considered. All items have a 5-point Likert-type format containing strongly disagree, disagree agree, no idea, agree and strongly agree answers. And also to observe gender differences, male and female students' and teachers' attitudes of using IWBs were compared by using independent-samples t-tests. Furthermore, one-way ANOVA was used to assess differences among the students regarding age, years of study as well as hours of weekly IWB use. In the same way, One-way ANOVA was also utilized to see whether significant differences can be found or not according to the relevant variables.

4.2 Descriptive statistics

To portray an inclusive picture of the participants' attitudes about the influence of IWBs on learning, an item-based analysis was administered in both groups to evaluate the considered categories. Put differently, the mean total scores were measured for each of four dimensions by adding the corresponding items within the four dimensions. The results of the descriptive statistics obtained from the questionnaires on necessity of IWBs which are presented in the same order that research questions are listed.

4.2.1 The Attitudes of Students' concerning the Use of IWBs

This section reviews the results of research and data analysis according to four categories: Learning Contribution, Motivation, Perceived Efficiency, and Perceived Negative Effects.

4.2.1.1 The Attitudes of Students Concerning Learning Contribution

The five questions inserted to find the attitude of student concerning their Perceived Learning Contribution in the first section of the Students' questionnaire (See table 4).

Table 4: Students' attitudes about perceived learning contribution

Items		SD	D	NI	A	SA	Mean	SD
Q1	Frequency	0	2	35	70	43	4.03	0.76
	Percent %	0	1.3	23.3	46.7	28.7		
Q2	Frequency	2	5	37	64	42	3.93	0.88
	Percent %	1.3	3.3	24.7	42.7	28.0		
Q3	Frequency	1	7	31	64	47	3.99	0.88
	Percent %	.7	4.7	20.7	42.7	31.3		
Q4	Frequency	1	10	53	62	24	3.65	0.85
	Percent %	.7	6.7	35.3	41.3	16.0		
Q5	Frequency	0	13	48	59	30	3.71	0.89
	Percent %	0	8.7	32	39.3	20		

Note: SD: Strongly disagree D: Disagree NI: No idea A: Agree SA: Strongly agree
SD: Standard Deviation Mean: Means calculated without the NI responses

Q1: I learn more when my teacher uses the IWB.
Q2: It is easier to understand the lesson when my teacher uses an IWB.
Q3: Using audio and visual materials with IWBs helps me understand the lesson better.
Q4: I find the opportunity to learn from different sources with the use of IWBs.
Q5: IWB use makes it easier for me to remember what I learned in class

According to the mean scores of this part, the students were agreed with all relevant questions. In terms of Q1 and Q2, the majority of students reported that when their teachers use the IWB they understand and learn better as well as less than one third of the students had no comments about this subject. Concerning Q3, 74% of the students believed for understanding the lessons better the use of audio and visual materials would help them by observing the materials on a big screen which is more interesting and engaging. Also, 75% of the students were agree or strongly agree that through IWB they could learn more. In terms of Q4, 57.3 % of the students were agree that IWBs make it possible to learn from a variety of sources such as students' work, software programs, and the Internet. However, a considerable number of participants (31%). were uncertain about this benefit.

4.2.1.2 Student's Attitudes Related to Motivational Issues

The series of questions inserted in section 2 of the questionnaire intended to inspect students' attitudes about motivational aspects (see Table 5).

Table 5: Student's attitudes related to motivational issues

Items		SD	D	NI	A	SA	Mean	SD
Q6	Frequency	7	25	31	38	49	3.25	1.03
	Percent %	4.7	16.7	20.7	25.3	32.6		
Q7	Frequency	20	52	50	23	5	2.61	1.01
	Percent %	13.3	34.7	33.3	15.3	3.3		
Q8	Frequency	0	9	33	79	29	3.85	0.80
	Percent %	0	2.0	22.0	52.6	19.3		
Q9	Frequency	28	44	36	28	14	2.71	1.23
	Percent %	18.7	29.3	24.0	18.7	9.3		
Q10	Frequency	0	13	41	65	30	3.75	0.88
	Percent %	0	8.7	27.5	43.6	20.1		
Q11	Frequency	3	11	53	55	28	3.63	0.94
	Percent %	2.0	7.3	35.3	36.7	18.7		
Q12	Frequency	3	11	27	75	34	3.57	0.84
	Percent %	2.0	7.3	18	50	22.6		
Q13	Frequency	2	22	42	57	27	3.57	0.99
	Percent %	1.3	14.7	28.0	38.0	18.0		
Q14	Frequency	1	7	51	60	31	3.65	0.82

	Percent %	0.7	4.7	34	40.0	20.7		
Q15	Frequency	1	11	47	67	24	3.68	0.85
	Percent %	0.7	7.3	31.3	44.7	16.0		
Q16	Frequency	2	6	44	64	34	3.81	0.88
	Percent %	1.3	4.0	29.3	42.7	22.7		

Note: f: Frequency SD: Strongly disagree D: Disagree NI: No idea A: Agree SA: Strongly agree
SD: Standard Deviation Mean: Means calculated without the NI responses

Q6: I like going to the front of the class to use the IWB.
Q7: It seems difficult for me to use IWBs.
Q8: I prefer lessons that are taught with an IWB.
Q9: It makes me uncomfortable when my work is shown to the whole class on the IWB.
Q10: I concentrate better when my teacher uses an IWB.
Q11: I get to join in lessons more when my teacher uses an IWB.
Q12: IWBs make learning more interesting and exciting.
Q13: It is easier to keep my attention when an IWB is used during the lesson.
Q14: Use of an IWB makes it easier for me to be motivated during the lesson.
Q15: IWB use increases my interest in the lesson.
Q16: If my teachers use IWB more often, I will enjoy lessons more.

Table 5 shows the mean scores to the items in this section. According to the results, students were agree with all the statements in this category with the exception of a minor difference found between the two negatively-stated questions (Q9,Q7) suggesting that the respondents rejected that using IWBs are difficult and also that they do not feel comfortable to show their work on the board during the lesson. On the contrary, the majority of participants (52.6 %) reported their agreement with the statements related to (Q6). However, 20.6 % of the students did not have any opinion which can be due to lack of sufficient experience with IWB-based classes. Similarly, despite the fact that more than half of the students reported their preference for their work being presented on IWBs, as well as 20% were uncertain about this statement signifying their lack of experience in using the IWBs. Concerning question 10, 63% of the participants felt that when IWB is incorporated into classrooms they could concentrate better. Similarly, 63% of the participants approved that use the IWB would increase student motivation (Q14). Additionally, regarding Q11, 55.4% of the participants were strongly agree and agree that they prefer to participate in IWB-based

lessons. Considering the responses of question Q13, the answers were diverse and mixed. Although more than half of the students (54%) reported that their attention have increased by attending to IWB-based lessons, More than a quarter of students (28%) were not certain it and 28% did not feel that IWBs would raise their attention. Finally, the responses to Q12 indicated high agreement (72.6%) with the idea that employment of IWB in classes they will be exciting and interesting.

4.2.1.3 The Attitudes of Students Regarding Perceived Efficiency

In the third part of the students' questionnaire, five questions were asked with respect two characteristics of IWBs including time management and organization of the lessons (see Table 6).

Table 6: Students' attitudes about traditional boards and IWBs

Items		SD	D	NI	A	SA	Mean	SD
Q17	Frequency	2	2	33	65	48	4.10	0.80
	Percent %	1.3	1.3	22.0	43.3	32.0		
Q18	Frequency	0	6	33	78	33	3.92	0.77
	Percent %	0	4.0	22.0	52.0	22.0		
Q19	Frequency	2	12	30	62	44	3.77	0.94
	Percent %	1.3	8.0	20.0	41.3	29.3		
Q20	Frequency	47	82	11	8	2	1.91	0.85
	Percent %	31.3	54.7	7.3	5.3	1.3		
Q21	Frequency	50	82	11	5	2	1.85	0.80
	Percent %	33.3	54.7	7.3	3.3	1.3		

Note: f: Frequency SD: Strongly disagree D: Disagree NI: No idea A: Agree SA: Strongly agree
SD: Standard Deviation Mean: Means calculated without the NI responses.

Q17: IWBs make the teachers' drawings and diagrams easier to see
Q18: The lessons become more organized when an IWB is used.
Q19: Using an IWB saves time and the lesson moves smoothly.
Q20: There is no difference between my teacher's use of a traditional board and an IWB in terms of teaching techniques and methods.
Q21: I think there is not much difference between an IWB and a normal whiteboard.

As Table 6 illustrates, two-thirds of the participants were agreeing 75.3 % that by the help of IWBs teachers will be able to draw pictures more skillfully and present the texts written manually by them in document format which is illegible (Q17); yet, 22%

of the participants were neither agree nor disagree on the subject. This can be interesting because of the fact, drawing diagrams are functions which are more applicable in science and math classes. As seen in Table 6, the mean scores of agreement with items 18 and 19 were high with 74 % of the students believed that utilization of the IWBs makes lessons more organized, and also save time (70.6 %). Moreover, less than a quarter of participants (20%) had no idea whether IWB has a time-saving effect. These uncertain responses to these questions can be examined from different viewpoints that one of the main reasons can be due to inefficient usage of IWBs by the teachers. More importantly, the effect of technology depends on how teachers employ that technology. When teachers are not skilled enough and lack ITC literacy, although they use modern technology, the resulting lessons might not be necessarily well-structured. The percentage of disagreement with item 20 is higher than that of the agreement, suggesting that students, in fact, believe that there are any differences between IWB and traditional board. The highest proportion of strongly disagree and disagree options went to Q21 by 88%, suggesting that IWBs do not offer extra functions and features over the conventional whiteboards.

4.2.1.4 The Attitudes of Students Regarding Perceived Negative Effects

In order to find out the students' attitudes towards the technical issues related to the use of IWBs five items (22-26) were used in section 4 of the Students' questionnaire (see Table 7). Concerning item 22, the results show that (54%) of students confirmed that the sunlight is a key problem because the problems associated with the screen of IWBs sometimes hindering their view from observing the texts and images. Students' responses to Q23 was rather mixed with one-third of students (38%) expressing their disagreement and 19.5 % of students still agreed with the idea. The largest proportion of responses (42.5 %) was related to having no idea about it. This indicated that nearly

half of the participants did not encounter to any technical problems such as break down and recalibration very often or these problems have been solved in a short time.

Table 7: The attitudes of students regarding negative effects

Items		SD	D	NI	A	SA	Mean	SD
Q22	Frequency	4	31	34	53	28	3.33	1.02
	Percent %	2.7	20.7	22.66	35.3	18.66		
Q23	Frequency	27	30	64	25	4	2.66	1.04
	Percent %	18.0	20.0	42.7	16.7	2.7		
Q24	Frequency	16	50	59	22	3	2.64	0.93
	Percent %	10.7	33.3	39.3	14.7	2.0		
Q25	Frequency	29	63	45	10	3	2.30	0.93
	Percent %	19.3	42.0	30.0	6.7	2.0		
Q26	Frequency	31	52	28	31	8	2.55	1.18
	Percent %	20.7	34.7	18.7	20.7	5.3		

Note: f: Frequency SD: Strongly disagree D: Disagree NI: No idea A: Agree SA: Strongly agree
STD: Standard Deviation Mean: Means calculated without the NI responses

Q22: Sometimes deficiencies of the IWB screen and sunlight in the classroom make it difficult to see the things on the IWB.
Q23: IWBs often break down and recalibration causes a waste of time.
Q24: When my teacher uses an IWB. I cannot keep up with the lesson because the pace of the lesson.
Q25: During IWB use there is a lot of noise in class.
Q26: IWB was exciting at the beginning but not anymore.

The results of Q24 revealed that 44 % of the students were able to follow lessons where the IWBs are used. It seems that they liked the pace of the lesson when working the IWB. Moreover, more than half of the students (61.3%) reported that there was not noise in class during use of the IWB (Q25). Students' responses to Q26, was mixed with 18% of students selecting the no idea option. With regard to the last statement in this section (Q28), the proportion of disagreement exceeded that of the agreement (55% vs. 27%) maintaining that IWB appears exciting at the beginning of its integration.

4.3 Differences of Students' Attitudes toward Using IWBs

The findings of data analysis concerning students' attitudes about IWBs are presented in this section with respect to the participant' age, gender, years of study, and hours of weekly IWB use.

4.3.1 The Attitudes of Students about Using IWB in Terms of Gender

As shown in Table 8, the overall attitude of IWB use was higher in males than females. In perceiving learning contribution and motivation dimensions, females' mean scores, and in perceived efficiency and perceived negative effects dimensions, males' mean scores were higher. However, the results of the independent-samples T-test showed that difference in student viewpoints was not observed between males (N=87) and females (N=63). Given these results, it can be concluded that students are normally aware of applying and benefits of this new technology for lessons which taught with the help of IWBs.

Table 8: T-test of Students' attitudes of IWB use based on gender

Variables.	**Group Statistics**				**T-test.**		
	Gender	**N**	**Mean**	**S.D**	**df**	**t**	**Sig. (two-tailed)**
Perceived learning contribution	Male	87	19.16	0.60	148	-0.75	0.45
	Female	63	19.51	0.50			
Motivation	Male	87	37.95	0.54	148	-0/27	0.73
	Female	63	38.17	0.40			
Perceived efficiency	Male	87	15.75	0.50	148	1.28	0.20
	Female	63	15.27	0.38			
Perceived negative effects	Male	87	13.91	0.62	148	2.05	0.06
	Female	63	12.90	0.55			
Overall attitudes	Male	87	86.77	0.36	148	0.66	0.54
	Female	63	85.86	0.27			

*Significant at 0.05 level, ** Significant at 0.01 level

4.3.2 Students' Attitudes of IWB According to Students' Age

Table 9 shows the results of the One-way ANOVA test. As can be seen, the overall attitude of the IWB use was significantly affected by the age of the students (p = 0.

008, p <.05). Age difference was also statistically significant in the dimension of motivation (p =. 026, p <.05) and overall attitude of IWB use, (p =. 008, p <.05). However, no significant difference was found among the students in three dimensions including: perceived negative effects dimensions (p =. 525, p >.05), Perceived efficiency of IWB use (p =. 259, p>.05), and perceived learning contribution (p =. 224, p >.05).

Table 9: The attitudes of Students concerning IWB according to ages

Variables	Group Statistics				AN.OVA		
	Ages	**N**	**Mean**	**SD**	**df**	**F**	**Sig.**
Perceived learning contribution	18-20	40	19.20	2.36	2; 147	1.513	0.224
	21-22	52	19.83	2.96			
	23 and older	58	18.91	2.89			
	Total	**150**	**19.31**	**2.79**	**149**		
Motivation	18-20	40	37.38	5.38	2; 147	3.725	0.026*
	21-22	52	37.10	5.50			
	23 and older	58	39.62	4.64			
	Total	**150**	**38.05**	**5.24**	**149**		
Perceived efficiency	18-20	40	15.38	2.37	2; 147	1.363	0.259
	21-22	52	15.96	2.30			
	23 and older	58	15.29	2.13			
	Total	**150**	**15.55**	**2.26**	**149**		
Perceived negative effects	18-20	40	13.23	2.73	2; 147	0.647	0.525
	21-22	52	13.87	3.19			
	23 and older	58	13.32	2.89			
	Total	**150**	**13.49**	**3.01**	**149**		
Overall attitudes	18-20	40	85.18	8.04	2; 147	5.033	0.008*
	21-22	52	84.64	8.32			
	23 and older	58	89.27	8.05			
	Total	**150**	**86.39**	**8.36**	**149**		

"*Significant at 0.05 level, ** Significant at 0.01 level"

4.3.3 Students' Attitudes of IWB According to Their Years of Studies

The relationship was also significant between students according to their years of study at their first, second, third, and fourth levels of their studies. As shown in Table 10, the findings of ANOVA test demonstrated differences of viewpoints regarding to years of study between male and female students in the dimension of perceived negative effects (p =. 003, p < .05). However, there was not a significant difference in participant's

viewpoints on IWBs concerning their years of study in the dimensions of motivation (p =. 988, p > .05), perceived learning contribution (p =. 823, p > .05), perceived efficiency (p =. 070, p > .05), and overall attitude of IWB use (p =. 267, p > .05). This suggests that the attitudes of students about new technology has changed to more positive during the time and this fluctuation in attitudes can be easily captured when dealing with and manipulating IWBs. In fact, early excitements of students about IWBs reduce and makes them feel efficient enough to deal with modern technologies.

Table 10: Students' attitudes of IWB concerning the years of studies

Variables	Group Statistics				ANOVA		
	Years of study	N	Mean	SD	df	F	Sig.
Perceived learning contribution	1	45	19.22	2.84	3; 146	0.30	0.823
	2	51	19.14	2.88			
	3	21	19.81	2.11			
	4 and higher	33	19.36	3.05			
	Total	**150**	**19.31**	**2.79**	**149**		
Motivation	1	45	37.91	4.80	3; 146	0.04	0.988
	2	51	38.10	5.45			
	3	21	38.38	5.89			
	4 and higher	33	37.94	5.30			
	Total	**150**	**38.05**	**5.24**	**149**		
Perceived efficiency	1	45	14.87	1.85	3; 146	2.40	0.070
	2	51	16.08	2.39			
	3	21	15.71	2.72			
	4 and higher	33	15.55	2.09			
	Total	**150**	**15.55**	**2.26**	**149**		
Perceived negative effects	1	45	13.40	3.01	3; 146	4.82	0.003**
	2	51	13.88	2.90			
	3	21	14.95	2.65			
	4 and higher	33	12.06	2.83			
	Total	**150**	**13.49**	**3.00**	**149**		
Overall attitudes	1	45	85.40	7.19	3; 146	1.33	0.267
	2	51	87.20	8.81			
	3	21	88.86	8.98			
	4 and higher	33	84.91	8.63			
	Total	**150**	**86.39**	**8.36**	**149**		

"*Significant at 0.05 level, ** Significant at 0.01 level"

4.3.4 Students' Attitudes According to Hours of Weekly IWB Use

Table 11 illustrations a one-way ANOVA comparing the means of students by the number of hours for using IWB during one week. As shown in Table 11, the results of the One-way ANOVA showed significant differences in three dimensions of

Perceived learning contribution (p = .000, P <.01), Motivation (p =. 078, p > .05) , and overall Attitude(p = .004, p <.05) between the students pertaining to the number of hours they use the IWBs per week . As seen on Table 11, no significant difference was found in students' attitudes based on hours of using IWB per week in Perceived negative effects (p = .053, p <.05), and Perceived Efficiency (p =. 053, p > .05) dimensions, in relation to use of IWBs in per week. Furthermore, in the dimensions of overall attitudes of using IWB the highest mean score belonged to the group of '11 and more' (M=90.00)

Table 11: Students' attitudes concerning the number of hours of IWB exposure

Variables	**Group Statistics**				**ANOVA**		
	Hours of weekly use	**N**	**Mean**	**SD**	**df**	**F**	**Sig.**
Perceived learning contribution	1-2	48	20.38	2.31	3; 146	6.45	0.005**
	3-5	69	19.16	2.63			
	6-10	26	17.58	3.06			
	11 and more	7	19.86	3.48			
	Total	**150**	**19.31**	**2.79**	**149**		
Motivation	1-2	48	12.75	2.94	3; 146	3.97	0.009**
	3-5	69	13.65	3.02			
	6-10	26	13.54	2.70			
	11 and more	7	16.71	2.06			
	Total	**150**	**13.49**	**3.00**	**149**		
Perceived efficiency	1-2	48	15.90	1.79	3; 146	2.62	0.053
	3-5	69	15.67	2.25			
	6-10	26	14.46	2.80			
	11 and more	7	16.00	2.24			
	Total	**150**	**15.55**	**2.26**	**149**		
Perceived negative effects	1-2	48	38.79	4.46	3; 146	2.32	0.078
	3-5	69	38.48	5.08			
	6-10	26	35.69	6.23			
	11 and more	7	37.43	6.48			
	Total	**150.**	**38.05**	**5.24**	**149**		
Overall attitudes	1-2	48	87.81	6.72	3; 146	4.55	0.004**
	3-5	69	86.96	7.70			
	6-10	26	81.27	10.15			
	11 and more	7	90.00	11.53			
	Total	**150**	**86.39**	**8.36**	**149**		

"*Significant at 0.05 level, ** Significant at 0.01 level"

This finding implies when the more students are involved in using IWBs, their perceptions changes positively during classrooms. That's why the greatest mean

differences exist between those who use more IWBs than those who are at their early stages of IWB exposure.

4.4 Differences of Teachers' Attitudes concerning to Use the IWBs

In this section the findings of data analysis are described to find differences in attitude between teachers' candidates about using IWBs according to the following categories: Instructional Effects of IWBs, General Attitudes, Motivational Effects of IWBs, and Need for Training.

4.4.1 Teachers' Attitudes Related to Instructional Effects of IWBs

The first section of the teacher's questionnaire was eleven questions which sought to discover the outlooks of teacher's viewpoints concerning the benefit of the use IWBs in learning environment as an education tools. Commonly, the most important advantages, including saving time, using different sources of teaching aid by teachers, printing and saving students' work or examples, simplify the process of review, and increasing face to face interaction between students in the class, and they are also identified in the literature review section. Another goal of the questions was to inspect how teachers are using IWBs for instruction and how they are making efficient, effective, and better managers of their classes. In other words, two subcategories are considered for these questions which the first one is the questions can be classified into two subcategories: regarding to the educational advantages of using IWBs and statements associated with opinions of teachers about the IWB. According to the mean scores presented in Table 12, except for the statement that using IWBs requires more preparation time, the opinion of teachers were positive with all statements.

Table 12: The attitudes of teachers regarding instructional effects of IWBs

Items		SD	D	NI	A	SA	Mean	SD
Q1	Frequency	4	5	15	10	6	3.23	1.17
	Percent %	10.0	12.5	37.5	25.0	15.0		
Q2	Frequency	0	0	9	10	21	3.03	0.70
	Percent %	0	0	22.5	25.0	52.5		
Q3	Frequency	4	4	4	17	11	3.68	1.27
	Percent %	10.0	10.0	10.0	42.5	27.5		
Q4	Frequency	0	1	6	20	13	4.13	0.76
	Percent %	0	2.5	15.0	50.0	32.5		
Q5	Frequency	4	2	10	17	7	3.53	1.15
	Percent %	10.0	5.0	25.0	42.5	17.5		
Q6	Frequency	5	5	10	8	12	3.35	1.20
	Percent %	12.5	12.5	25.0	20.0	30.0		
Q7	Frequency	0	1	5	22	12	4.13	0.72
	Percent %	0	2.5	12.5	55.0	30.0		
Q8	Frequency	1	1	12	17	9	3.80	0.91
	Percent %	2.5	2.5	30.0	42.5	22.5		
Q9	Frequency	0	0	4	20	16	4.30	0.65
	Percent %	0	0	10.0	50.0	40.0		
Q10	Frequency	0	0	2	20	18	4.40	0.59
	Percent %	0	0	5.0	50.0	45.0		
Q11	Frequency	0	0	2	28	10	4.20	0.52
	Percent %	0	0	5.0	70.0	25.0		

Note: f: Frequency SD: Strongly disagree D: Disagree NI: No idea A: Agree SA: Strongly agree
SD: Standard Deviation Mean: Means calculated without the NI responses

Q1: Using the IWB resources reduces the time I spend writing on the board.
Q2: When using IWBs in the classroom, I spend more time for the preparation of the lesson.
Q3: Using IWBs makes it easier to reach different sources and display them to the whole class immediately.
Q4: IWBs are beneficial for saving and printing the materials generate during the lesson.
Q5: I can give explanations more effectively with the use of IWBs.
Q6: With the help of using the IWB, I can easily control the whole class.
Q7: I think IWBs can be a good supplement to support teaching.
Q8: Using IWBs makes me a more efficient teacher.
Q9: Using IWBs makes it easier for a teacher to review, explain, and summarize the subject.
Q10: I believe IWB is a useful technology for teachers to learn.

Question 10 has the highest mean score, with almost all teachers (95%) perceiving the IWB as a worthwhile technology. Moreover, 70% of the teachers viewpoints were positive because they believed IWBs can provide a variety of educational resources in order to present them during the lesseons simultaneously (Q3), and believed that by using IWBs they are enable to explain, summarize and review the different topics (Q9), and also IWBs can be a useful tool to save handwrite note which is generated during the classroom by both student and teacher into different formats (Q4, 82.5%).

Furthermore, 60% of the teachers reported they can provide clearer explanations and examples by using IWBs (Q5). According to the results, 40% of the teachers agreed that for writing during the IWB-based lessons they spent less time on the board (Q1), and half of students (50%) reported that IWB is an effective tool for classroom management (Q6). However, the lowest mean score, yet comprising more than half of the responses (77.5%) belonged to Q2 maintaining that for preparing lessons which are designed based on the use of IWB usually take more time compared to prepare a traditional lesson. Contrary to the common belief, nearly half of the teachers do not find designing ICT-based lessons time-consuming, probably thanks to certain software programs which provide various activities for teachers that has facilitated the preparation of lesson. Furthermore, 25% of the teachers agree with the idea that the use of IWB requires them to prepare their materials. According to the results related to teachers' opinions (Q8), 65% of the teachers reported agreement with the idea that they can be more efficient in the lessons by using IWBs, and also 85% reported that IWBs could be a supplementary instrument in the lessons (Q7). Roughly two-third of the participants admit as a useful tool for learning IWB can be a useful technology for teachers, which it can make the highest mean score for almost all the questions. By considering the open-ended answers, it is shown that the majority of the interviewees agreed the new technology has an important role for the teachers to help them keep up with technological advances in this era of ICT. However, according to the statements of interviewees 3, technology should be integrated with clear educational purposes in mind. As he put it,

> Technology should be employed for educational purposes technology and should not be used only for entertainment, furthermore to recreational aspects of new technology it can be used for training purposes.

In other words, teachers can use this helpful aid technology by selecting opt appropriate software, and ensure that those technological aids are used in the most appropriate way to enhance teaching. When effective ICT tools are selected and implemented, students' attention and motivating can be maintained so their participation in the class activities is also enhanced. The interview results indicated eight teachers favored IWBs because it saves teacher's time. Two teachers also stated lessons that are based on the IWB make instruction more interesting and therefore more effective. As interviewee 7 pointed out:

> I think this technology gives both students and teachers the opportunity to enjoy from more interesting IWB-based lessons by the inclusion of a great variety of sources like instructional videos.

On the other hand, two of the participating teachers believed that despite the variety of IWB software's product which is related to support this technology for the course book, they do not have anything benefitted more than the textbook; yet, he believed that one of the major aims of the IWB is to provide supplementary materials to enhance teaching and learning. Interviewee 5 mentioned that this technology increases teacher-student interaction, appeals to different learning styles and also is a beneficial technology in order to class management:

> In fact, it can be a useful technology because it facilitates the communication between teachers and students. Students can interact with their teachers more frequently. Also, since materials become prepared through fast and efficient software and the traditional chalk or markers through which writing becomes so time-consuming and tiring are not utilized anymore… this leaves more room to manage the class. And also, by using IWBs learners can engage with different levels of intelligence.

From this expression, it is clear that the IWBs are cleaner to use in the classrooms because it prevents both teachers and students from getting dusty. Moreover, the employment of this technology can facilitate the incorporation of almost all types of

intelligences and the development of a variety of activities that are compatible with students' different intelligences and capabilities. Such materials would assist students to more easily understand the lessons.

4.4.2 The Attitudes of Teachers towards Using the IWBs

These eight questions inserted in section 2 of the teacher's questionnaire intended to investigate teachers' overall opinion about IWBs. Taking into account two positive and negative attitudes , Q12 and Q14 can be considered as positive attitudes because they directly question whether the teachers are positive about this technology and prefer to use it. Furhermore , as the negative attitudes , questions 13, 14, 15, and 18 can be regarded since they address teachers' negative states while using IWBs, their concerns about the students' willingness to accept this technology, and uncertainties about their preparation to use IWBs. Q17 is exactly associated with preference traditional methods for teaching over IWB-based approaches so that it that it can also be placed in the negative category.

Table 13: The attitudes of teachers in terms general attitudes of using the IWBs

Items		SD	D	NI	A	SA	Mean	SD
Q12	Frequency	0	1	6	23	10	4.05	0.71
	Percent %	0	2.5	15.0	57.5	25.0		
Q13	Frequency	10	16	3	5	6	1.55	0.64
	Percent %	25.0	40.0	7.5	12.5	15.0		
Q14	Frequency	0	0	2	22	16	4.35	0.58
	Percent %	0	0	5.0	55.0	40.0		
Q15	Frequency	14	18	7	1	0	1.88	0.79
	Percent %	35.5	45.5	17.5	2.5	0		
Q16	Frequency	9	5	9	14	3	2.93	1.14
	Percent %	22.5	12.5	22.5	35.5	7.5		
Q17	Frequency	4	7	4	9	16	3.05	1.11
	Percent %	10.0	17.5	10.0	22.5	40.0		
Q18	Frequency	2	0	7	11	20	2.00	0.82
	Percent %	5.0	0	17.5	27.5	50.0		
Q19	Frequency	12	18	7	3	0	2.03	0.89
	Percent %	30.0	45.0	17.5	7.5	0		

Note: f: Frequency SD: Strongly disagree D: Disagree NI: No idea A: Agree SA: Strongly agree
SD: Standard Deviation Mean*: Means calculated without the NI responses

Q12: I like using IWB technology in my lessons.
Q13: I feel uncomfortable using IWBs in front of my students

Q14: I have positive attitudes toward the use of IWBs in my teaching.
Q15: I have negative attitudes toward the use of IWBs in my teaching
Q16: I do not think my students are ready for this technology.
Q17: What I do in class with traditional methods is sufficient for teaching
Q18: I am not the type to do well with IWB-based applications
Q19: There is no difference between my use of a traditional board and an IWB in terms of teaching techniques and methods.

Table 13 indicates that the teachers' disagreement with these statements suggest an overall positive attitude about the IWB technology. Based on the results, the teachers strongly agreed with questions 12 and 14, but expressed their agreement with other questions involved in this category. On the basis of the majority of the teachers' perception, except 17.5% of them, IWSs can be used in lessons. When it comes to the question of the need for IWBs, the responses are more mixed. Although 42.5% realized the insufficiency of their traditional methods, 27.5% did not recognize the introduction of such new technologies into their teaching practices as a necessity. Disagreement with Q13 highlighted that IWBs does not make result in students' discomfort, and teachers themselves feel confident to employ them. Moreover, 75% of teachers perceived traditional boards different from IWBs (Q19) regarding techniques and methods, suggesting that they hold a positive attitude towards IWBs in comparison with the regular whiteboards. Finally, 62.5 % of the teachers confirmed their students' readiness to accept this type of technology (Q17).

4.4.3 The Attitudes of Teacher's Related to Motivational Issues

In order to investigate the attitudes of teachers in terms of motivational issues in section 3, the teacher's questionnaire consisted of four questions aiming to elicit information about teachers' opinions about the potential of using IWBs for making lessons more interesting and enjoyable, motivation, to keep students' attention for a longer time, to participation and increases interaction between students during the classes.

Table 14: The attitudes of teachers regarding motivational factors

Items		SD	D	NI	A	SA	Mean	SD
Q20	Frequency	0	4	6	23	7	3.83	0.84
	Percent %	0	10.0	15.0	57.5	17.5		
Q21	Frequency	2	6	6	22	4	3.57	1.02
	Percent %	5.0	15.0	15.0	55.0	10.0		
Q22	Frequency	0	0	7	27	6	3.98	0.58
	Percent %	0	0	17.5	67.5	15.0		
Q23	Frequency	1	6	6	19	8	3.68	1.05
	Percent %	2.5	15.0	15.0	47.5	20.0		

Note: f: Frequency SD: Strongly disagree D: Disagree NI: No idea A: Agree SA: Strongly agree
STD: Standard Deviation Mean*: Means calculated without the NI responses

Q20: I think IWBs make learning more enjoyable and more interesting.
Q21: I can keep my students' attention longer with the help of IWB technology.
Q22: I think IWBs increase the interaction and participation of the students.
Q23: I think my students are more motivated when I use an IWB in my lessons.

As indicated in Table 14, the mean scores and low standard deviations signify teachers' agreement with all the ideas put forward in this category. Question 22 has the highest Mean score (M=3. 98), indicating that the majority of teachers, that is, 82.5% of them approved that using of IWBs technology can increase the participation of the students and interaction between each other, and also make lessons more enjoyable and interesting (75%), hence, makes students more motivated (67.5 %). Regarding question 21, 65% of the teachers reported that students' attention could be maintained longer by using IWBs during the lessons. The interviews also confirmed the similar findings obtained through the questionnaire. Two of the interviewees stated that IWBs attract students' attention and increases their involvement in class activities. On the other hand, a few other teachers had contradictory ideas. As teacher 9 explained:

> For the IWB lessons to be projected on the board, the classroom should be dark, so students can see the content clearly. Paradoxically, a dark classroom puts some of the students to sleep and decreases their concentration level.

In other words, many factors such as dust, shadow, temperature, and sunlight might barricade the IWB works properly. The shadow, when a teacher/a learner steps into the light produced by projector, makes it impossible to see what s/he is actually writing

or doing. The board operation could be stopped by dust and hot weather. However, IWBs cool classroom. All these might cause problems. In this context, teachers need technical training to overcome the problems that happen inside the classes. In order to prevent students from losing their attention or feeling sleepy when the class is darkened for the use of IWBs, it is possible to open the curtains or turn on the lights that are at the back of the classroom and to reduce the negative effect of darkness on students.

4.4.4 The Atitudes of Techers' Relted to the Trining

And finally , for pertaining to the importance of training and feeling of comfort for appropriate use of the IWB two questions were considered in the last section (4) of the teacher's questionnaire (see Table 15).

Table 15: The attitudes of teachers regarding training factors

Items		SD	D	NI	A	SA	Mean	SD
Q24	Frequency	0	1	6	16	17	4.23	0.80
	Percent %	0	2.5	15.0	40.0	42.5		
Q25	Frequency	11	16	9	4	0	2.15	0.95
	Percent %	27.5	40.0	22.5	10.0	0		

Note: f: Frequency SD: Strongly disagree D: Disagree NI: No idea A: Agree SA: Strongly agree
STD: Standard Deviation Mean*: Means calculated without the NI responses

Q24: I believe that training is required to teach with IWB technology.
Q25: If I do not get sufficient training, I do not feel comfortable with using IWBs in the classroom.

By examining the responses which are given to Q24, one third of the teachers (82.5%) agreed that to be able to use this technology they need more training. However, responses to this item are more mixed. Although some teachers reported that it is easy for them to use IWB without any training, the majority of the teachers (67.5%) believed without such training they were worried to use IWB. Only 10% of the teachers agreed with this idea and this might be due to the experience they have acquired before. In general, the results highlighted that the teachers consider the need for training as an

important step to successful integration and use of IWB as well as the feeling of comfort experienced when using IWBs.

As far as the results of the overall responses to the four sections of the teacher's questionnaire are concerned, 67.33% of the teachers agreed with the dimension of Perceived learning contribution and only a small proportion of them (5.47%) were disagree with it. 52.04% of the teachers adhered the motivational effects dimensions while 16.85% of them disagreed. The Perceived efficiency dimension yielded more heterogeneous responses in the sense that and 46.29% and 16.28%, and 37.43% of responses were agreed, disagree, and neutral, respectively. Nevertheless, 23.60% of the students agreed with the Perceived negative effects dimension, and 44.40% of them disagreed and a smaller proportion that is, 23.60% agreed with the idea. Some additional remarks were also made by the teachers in the interview in this regard. As a case in point, teacher 6 mentioned that:

> I agree that teachers require training to make the best use of the IWBs, but I believe that teachers themselves are responsible for developing skills and ICT knowledge, in general, to enable them to use it effectively.

The above remark indicates that teachers have an important role in order to use the benefits of this technology in the lessons of learning how to use these technologies. The first step to this mission is undoubtedly developing a positive attitude towards the advantages of this technology over the traditional tools, and making an attempt to accustom to utilizing it. These findings are in line with those of Yang and Teng's (2014) study that revealed that using IWBs effective requires teachers to master IWB technical skills as well as a professional knowledge of attaining teaching goals and also supported by those of Schmid and Schimmack (2010) study who realized that teachers lack the despite having full access to the technology, do not have the necessary

skills and information about and the use of IWBs to boost their teaching approaches. In their study, they found that the use of IWB by trial and error is not effective in improving students' knowledge of the new technology and its potentials for increasing the excellence of instructions. As a result, teacher trainers and curriculum developers need to carry the weight of consolidating and designing effective pre-service training courses and workshops to help teachers foster the required competencies and abilities so they can use IWBs in a flexible manner.

4.5 Differences of Teachers' Attitudes toward Using IWBs

This section presents the results of teachers' attitudes of IWBs with respect to gender, age, years of teaching experience, and hours of weekly IWB use.

4.5.1 Teachers' Attitudes of IWB Use by Gender

In order to compare the mean differences between males and female's teachers by gender an independent T-test was employed. As illustrated in table 16, the results of the independent-samples T-test showed no difference in their attitudes concerning use of IWB between male (N = 27) and female (N = 13).

Table 16: Differences in attitudes of the teachers regarding IWB by gender

Variables	Group Statistics				T-Test		
	Gender	N	Mean	SD	t	df	Sig. (two-tailed)
Instructional effects of IWBs	Male	27	42.04	3.83	1.82	38	0.08
	Female	13	39.54	4.54			
General attitudes	Male	27	22.07	2.09	1.16	38	0.25
	Female	13	21.31	1.60			
Motivational effects of IWBs	Male	27	14.19	2.91	0.03	38	0.97
	Female	13	14.15	2.48			
Need for training	Male	27	6.33	1.21	-0.31	38	0.76
	Female	13	6.46	1.27			
Overall attitudes	Male	27	84.63	6.20	1.46	38	0.15
	Female	13	81.46	6.94			

"*Significant at 0.05 level, ** Significant at 0.01 level"

Although the examination of group statistics showed that male teachers had higher mean compared to the female teachers in three dimensions of instructional effects,

general attitude, motivational effects and overall attitude of IWB use (42.04, 22.07, 14.19, & 84.63), the difference was not statistically significant. In addition, female teachers had a higher mean score in the dimension of Need for training.

4.5.2 Teachers' Attitudes of IWB According to Their Ages

As indicated in Table 16, the results obtained from the One-way ANOVA test showed statistically significant differences in attitudes concerning use of the IWB based on ages between teachers in the two dimensions of motivation (p=. 008, p<0.05), and Need for training (p =. 012, p < .05) as far as age was concerned.

Table 17: The attitudes of teachers concerning IWB in terms of ages

Variables	Group Statistics				ANOVA		
	Ages	**N**	**Mean**	**SD**	**df**	**F**	**Sig.**
Instructional effects of IWBs	25 – 35	2	41.00	5.66	2; 37	1.01	0.374
	36 – 45	27	41.85	4.19			
	46 and older	11	39.73	3.98			
	Total	**40**	**41.2**	**4.18**	**39**		
General attitudes	25 – 35	2	21.00	1.41	2; 37	0.67	0.518
	36 – 45	27	21.67	1.69			
	46 and older	11	22.36	2.62			
	Total	**40**	**21.83**	**1.96**	**39**		
Motivational effects of IWBs	25 – 35	2	16.00	0.00	2; 37	5.59	0.008*
	36 – 45	27	14.89	2.26			
	46 and older	11	12.09	3.05			
	Total	**40**	**14.18**	**2.74**	**39**		
Need for training	25 – 35	2	8.00	0.00	2; 37	4.98	0.012*
	36 – 45	27	6.56	0.97			
	46 and older	11	5.64	1.43			
	Total	**40**	**6.38**	**1.21**	**39**		
Overall attitudes	25 – 35	2	86.00	7.07	2; 37	2.80	0.073
	36 – 45	27	84.96	5.49			
	46 and older	11	79.82	7.81			
	Total	**40**	**83.60**	**6.53**	**39**		

"*Significant at 0.05 level, ** Significant at 0.01 level"

However, there was no significant difference among the participants concerning the Instructional effects of IWBs, General attitudes and Overall attitudes dimension with all p-values (. 03, .05, & .07) being greater than the significance level (0.05). The

participants also appeared to have different perceptions concerning their age. The result can be interpreted that the teachers in 25-35 and 36-45 age groups were different from those in 46 and older group and as a result of this table it can be concluded the main concern frequently raised by many teachers was the need for adequate training in order to benefit from the full potential of IWBs because with an increase in their age they need to be update and develop their knowledge and skills of employing IWBs in their practical teaching as well as for IWB-assisted courses so that they will be able to transform their pedagogy into more student-centered, social and interactive learning.

4.5.3 Teachers' Attitudes of IWB According to Their Years of Experience

A one-way ANOVA test carried out to assess the teachers' attitudes about the influence of using IWB on teaching experience. Based on the results of Table 18, significant differences were observed among the teachers according to the length of their experience in the two dimensions of motivation ($p =. 000$, $p < .01$), and Overall attitudes ($p =. 025$, $p < .05$). However, no difference was found among teachers in relation to years of teaching experience in the need for training, general attitudes and Instructional effects of IWBs dimensions. The mean scores were higher for 1-5 years of experience group in general attitude (M=22. 45), for 6-10 years of experience group in the motivational effects (M=16. 22), and for 11-15 years of experience group in the need for training and in instructional effects dimensions (M= 43.0 & 7.50). Moreover, the highest mean score for the overall attitude belonged to 11-15 years of experience group. These results suggest an experienced teacher are more in favour of utilizing modern technologies compared to less experienced teachers.

Table 18: The attitudes of teachers regarding IWB according years of experience

Variables	Group Statistics					ANOVA	
	Years of teaching	**N**	**Mean**	**SD**	**df**	**F**	**Sig.**
Instructional effects of IWBs	1-5	2	6.15	0.71	3; 36	0.731	0.540
	6-10	9	7.11	0.78			
	11-15	20	7.50	1.14			
	16 and above	9	5.89	1.45			
	Total	**40**	**6.38**	**1.21**	**39**		
General attitudes	1-5	2	22.45	0.00	3; 36	1.75	0.175
	6-10	9	20.78	1.56			
	11-15	20	22.00	2.16			
	16 and above	9	21.44	1.67			
	Total	**40**	**21.83**	**1.96**	**39**		
Motivational effects of IWBs	1-5	2	14.50	1.41	3; 36	8.25	0.000**
	6-10	9	16.22	1.92			
	11-15	20	15.00	2.14			
	16 and above	9	11.22	2.64			
	Total	**40**	**14.18**	**2.74**	**39**		
Need for training	1-5	2	41.25	2.83	3; 36	2.70	0.60
	6-10	9	42.33	4.56			
	11-15	20	43.00	4.10			
	16 and above	9	39.67	4.33			
	Total	**40**	**41.23**	**4.18**	**39**		
Overall attitudes	1-5	2	84.35	4.95	3; 36	3.49	0.025*
	6-10	9	86.44	5.03			
	11-15	20	87.50	5.53			
	16 and above	9	78.22	7.76			
	Total	**40**	**83.60**	**6.53**	**39**		

"*Significant at 0.05 level, ** Significant at 0.01 level"

4.5.4 Teachers' Attitudes of IWB According to Hours of Weekly their Use

This section presents the results of the one-way ANOVA test run to explore teachers' viewpoints of IWB with regard to the number of hours of IWB exposure. The results demonstrated that statistically significant differences found among the participants regarding the number of hours of using IWB in dimensions of Instructional effects of IWBs, $F = 3.97$, $p < .05$), and Overall perception ($p = .004$, $p < .05$). However, the difference was not significant in three dimensions of the need for training, general attitudes and motivational effects of IWBs.

Table 19: The attitudes of teachers about IWB by the number of hour's exposure

Variables	Group Statistics				ANOVA		
	Hours of weekly use	**N**	**Mean**	**SD**	**df**	**F**	**Sig.**
Instructional effects of IWBs	1-2	6	38.00	4.29	3; 36	3.97	0.015*
	3-5	12	41.58	3.73			
	6-10	15	43.33	3.74			
	11 and more	7	38.86	3.48			
	Total	**40**	**41.23**	**4.18**	**39**		
General attitudes	1-2	6	22.10	1.72	3; 36	0.46	0.715
	3-5	12	22.17	2.62			
	6-10	15	21.73	1.58			
	11 and more	7	21.14	1.77			
	Total	**40**	**21.83**	**1.96**	**39**		
Motivational effects of IWBs	1-2	6	13.83	2.40	3; 36	2.80	0.054
	3-5	12	13.75	1.48			
	6-10	15	15.53	2.10			
	11 and more	7	12.29	4.54			
	Total	**40**	**14.18**	**2.74**	**39**		
Need for training	1-2	6	6.33	1.37	3; 36	1.53	0.224
	3-5	12	6.42	1.68			
	6-10	15	6.73	0.70			
	11 and more	7	5.57	0.79			
	Total	**40**	**6.38**	**1.21**	**39**		
Overall attitudes	1-2	6	80.33	6.28	3; 36	5.23	0.004**
	3-5	12	83.92	5.07			
	6-10	15	87.33	4.95			
	11 and more	7	77.86	7.47			
	Total	**40**	**83.60**	**6.53**	**39**		

"*Significant at 0.05 level, ** Significant at 0.01 level"

However, as shown in Table 19, group statistics results showed for 3-5-hour group in the dimension of the general attitude (M =22. 17) as well as for 6-10 hours concerning two aspects of motivational effects (M =15. 53) and instructional effects of IWB use (M =43. 33) were seen high mean scores. The highest mean score belonged to 6-10 hours' group in overall attitudes of IWB use dimension (M=87. 33). The results of the one-way ANOVA tests showed that the more hour's IWB-based lessons are used in class, the difference will become clearer between the IWBs and regular whiteboards. The examination showed that teachers with 6-10 hours of IWB use differ significantly in their perception from 11 and more hour's groups. Furthermore, teachers with 1-2 hours of IWB use differed from the 6 -10 hours' group, and teachers with 6-10 years

of experience differed from 11- 15 hours, and 16 or above hour's groups. In this study, teachers in 25-35 and 36-45 age groups were different from those in 46 and older group. The participants also appeared to have different perceptions concerning their age. In general, this suggests the number of hours of IWBs usage increases, and the teacher's enthusiasm to work with technology increases as well.

Overall, the findings suggest that teachers' willingness to use this technology increases with an increase in the number of hours of using IWBs. The importance of this finding lies in the fact that more exposure to this technology result in discovering more potential and capabilities compared to traditional whiteboards. It can be related to the student's feedback during the lessons because feedback has an important role to play in the acceptance of this technology in the sense that when teachers receive positive feedback, they become more inclined to incorporate this technology into their current conventional practices.

Chapter 5

CONCLUSION

This study explored the students' and teachers' attitude of the use of IWBs in the Computer Engineering Department at Eastern Mediterranean University in Turkish Republic of Northern Cyprus (TRNC) by using a mixed-method approach which included both qualitative and quantitative data for analysis. To attain the objectives of this study two different questionnaires were distributed among participants including 150 students and 40 teachers with the experience of using IWB technology in computer classes. Moreover, interviews also conducted with 10 volunteer teachers to provide further data regarding teachers' attitude of the use of IWBs.

The findings of this research indicated the attitudes of teachers and students about the constructive use of IWB in their classes were positive and they acknowledged IWBs are a prevailing, encouraging and practical technology which have the potential to enhance teachers' instructions as well as to facilitate students' learning and to maintain their motivation. Moreover, IWBs were perceived as innovative and powerful supporting tool which has a supplementary function in promoting both learning and teaching. This The findings are in strong agreement with previous result which were found by Öz (2014) who conducted a study about the attitude of students and teachers in EFL lessons in Turkey, the results of his study showed that students and teachers who were using IWBs more often, had more affirmative perceptions about the IWB technology. The results of this study also highlighted a positive relationship between

the frequency of IWB use and improvement in IWB competency in addition to developing a positive attitude about IWB. In other words, the majority of teachers believed as they used IWBs more frequently, they develop more mastery of IWB skills and gradually developed positive attitudes towards IWBs. This finding is consistent with those of the study administered by Chris C. & Peter K. (2010) on using IWBs in pre-service teacher education programs in two Australian universities which indicated that teachers were optimistic about IWBs. In addition, similar to the findings of the present study, participants in Duran and Cruz (2011), Matthews-Aydinli and Elaziz (2010) and Öz (2014) studies reported that teachers and students were comfortable with using IWBs, and application of this technology enabled them to draw on a wider variety of information and learning resources which could be used in a flexible way and also impulsively in response to different pedagogical needs.

Moreover, based on the findings of this research any significant difference was not observed among teachers in terms of gender, this result indicates that teachers are chiefly aware of the benefits of this new educational technology. In addition, female teachers had less positive attitudes concerning the use of IWB than Male teachers. However, in terms of age, years of teaching experience and number of hours of weekly use significant differences were observed among teachers. In the other hand, the results of the student's attitude demonstrated that no significance difference found between females and males based on gender and also results showed the attitude of males were more positive than females. Furthermore, the participants differed in their attitudes based on ages, he the number of hours of IWB exposure and years of study. It implies that with continue using the IWBs by students their attitudes towards new technology have been changed to more positive gradually, and this fluctuation in attitudes can be easily captured when dealing with and manipulating IWBs. In fact, using technology

makes students feel that are efficient enough to deal with modern technologies, these results are supported by the findings of ELAZDZ (2008) who explored a research about the attitudes of teachers and students about using IWBs technology in EFL Classrooms. In addition, most of the students and teachers expressed their willingness to use an IWB in their classes because they believe that IWB makes it easier for them to concentrate during the lessons. This indicates that in order to increase motivation and increase concentration on the materials being taught among students and meaningful participation of students in classroom activities IWBs useful educational tools are playing the important role. Moreover, the findings suggest that utilizing IWB as a part of teaching and learning in higher education, especially at the university level (such as in Eastern Mediterranean University) makes students and teachers familiar and rasies their motivations to find the potentials of the new technology, and also for sharing knowledge with each other via individual and group presentations by using teaching methods which are designed based on the new technologies.

Last but not least, using IWBs will certainly become an essential ICT tool in educational settings all over the world. In TRNC, IWBs are comparatively new. Therefore, more research of both quantitative and qualitative nature are needed to shed light on all aspects of their use. Moreover, future research should attempt to identify possible differences in novice and experienced teachers' attitude about integration and benefits of this technology into their classes. IWBs are new to most teachers and students as well. So, it would be beneficial to do research in universities that have embedded the IWBs in their classroom practice in order to assess the impact of IWBs after they are no longer felt a novelty.

Thus, technology decision makers and curriculum developers are responsible for designing and offering more effective in-service and pre-service preparation workshops and courses to develop teachers' skills and to enable them to manipulate IWBs for effective learning as well as to improve IWB knowledge and skills.to continuously use of IWBs in lessons teachers should be reinforced by interact with peers and also participating in a professional development program aimed at effective use of IWBs and it would be reasonable teachers should be provided with the opportunity to get familiar with the IWB technology, its pedagogical aspects along with instructional potentials and advantages through training workshops as a medium to help them gaining the required skills.

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APPENDIXES

Appendix A: Student Questionnaire

Students' Attitudes of the IWB Use in the Classroom

Dear Respondent,

My name is Mohammad Mehdi Ranjbar, I am a master's student in the Computer Education and Instructional Technologies Department at Eastern Mediterranean University, Famagusta. In the delimitation of my thesis, the purpose is to evaluate The Attitudes of Students and Teachers towards Interactive Whiteboard (IWB) Use in Education. The information and data gotten from the questionnaire will build a basis of the scientific work and will never be adopted for any other purpose.

Thank you for your participation

Demographics

Gender: Male ☐ Female ☐

Age: 18 – 20 ☐ 21 – 22 ☐ 23 and older ☐

Year of studies: 1 ☐ 2 ☐ 3 ☐ 4 and higher ☐

Hours of weekly IWB usage: 1 - 2 ☐ 3 – 5 ☐ 6 – 10 ☐ 11 – more ☐

s/n	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I.	**Perceived learning contribution**					
1	I learn more when my teacher uses the whiteboard					
2	It is easier to understand the lesson when my teacher uses an IWB.					
3	Using audio and visual materials with IWBs helps me understand the lesson better.					
4	I find the opportunity to learn from different sources with the use of IWBs.					
5	IWB use makes it easier for me to remember what I learned in class					
II.	**Motivation**					
6	I like going to the front of the class to use the IWB.					
7	It seems difficult for me to use IWBs.					

8	I prefer lessons that are taught with an IWB.					
9	It makes me uncomfortable when my work is shown to the whole class on the IWB.					
10	I concentrate better when my teacher uses an IWB.					
11	I get to join in lessons more when my teacher uses an IWB.					
12	IWBs make learning more interesting and exciting.					
13	It is easier to keep my attention when an IWB is used during the lesson.					
14	Use of an IWB makes it easier for me to be motivated during the lesson.					
15	IWB use increases my interest in the lesson.					
16	If my teachers use IWB more often, I will enjoy lessons more.					
III.	**Perceived efficiency**					
17	IWBs make the teachers' drawings and diagrams easier to see					
18	The lessons become more organized when an IWB is used.					
19	Using an IWB saves time and the lesson moves smoothly.					
20	There is no difference between my teacher's use of a traditional board and an IWB in terms of teaching techniques and methods.					
21	I think there is not much difference between an IWB and a normal whiteboard.					
IV.	**Perceived negative effects**					
22	Sometimes deficiencies of the IWB screen and sunlight in the classroom make it difficult to see the things on the IWB.					
23	IWBs often break down and recalibration causes a waste of time.					
24	When my teacher uses an IWB, I cannot keep up with the lesson because the pace of the lesson.					
25	During IWB use, there is a lot of noise in class.					
26	IWB was exciting at the beginning but not anymore.					

Appendix B: Teacher Questionnaire

Teachers' Attitudes of the IWB Use in the Classroom

Dear Respondent,

My name is Mohammad Mehdi Ranjbar, I am a master's student in the Computer Education and Instructional Technologies Department at Eastern Mediterranean University, Famagusta. In the delimitation of my thesis, the purpose is to evaluate The Attitudes of Students and Teachers towards Interactive Whiteboard (IWB) Use in Education. The information and data gotten from the questionnaire will build a basis of the scientific work and will never be adopted for any other purpose.

Thank you for your participation

Demographics

Gender: Male ☐ Female ☐

Age: 25 – 35 ☐ 36 – 45 ☐ 46 and older ☐

Year of teaching: 1 - 5 ☐ 6 - 10 ☐ 11 - 15 ☐ 16 and higher ☐

Hours of weekly IWB usage: 1 - 2 ☐ 3 – 5 ☐ 6 – 10 ☐ 11 – more ☐

s/n	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I.	**Instructional effects of IWBs**					
1	Using the IWB resources reduces the time I spend writing on the board.					
2	When using IWBs in the classroom, I spend more time for the preparation of the lesson.					
3	Using IWBs makes it easier to reach different sources and display them to the whole class immediately.					
4	IWBs are beneficial for saving and printing the materials generate during the lesson.					
5	I can give explanations more effectively with the use of IWBs.					
6	With the help of using the IWB, I can easily control the whole class.					
7	I think IWBs can be a good supplement to support teaching.					

8	Using IWBs makes me a more efficient teacher.					
9	Using IWBs makes it easier for a teacher to review, explain, and summarize the subject.					
10	I believe IWB is a useful technology for teachers to learn.					
11	Using IWB makes the lessons more interactive					
II.	**General attitudes**					
12	I like using IWB technology in my lessons.					
13	I feel uncomfortable using IWBs in front of my students					
14	I have positive attitudes toward the use of IWBs in my teaching.					
15	I have negative attitudes toward the use of IWBs in my teaching					
16	I do not think my students are ready for this technology.					
17	What I do in class with traditional methods is sufficient for teaching					
18	I am not the type to do well with IWB-based applications					
19	There is no difference between my use of a traditional board and an IWB in terms of teaching techniques and methods.					
III.	**Motivational effects of IWBs**					
20	I think IWBs make learning more enjoyable and more interesting.					
21	I can keep my students' attention longer with the help of IWB technology.					
22	I think IWBs increase the interaction and participation of the students.					
23	I think my students are more motivated when I use an IWB in my lessons.					
IV.	**Need for training**					
24	I believe that training is required to teach with IWB technology.					
25	If I do not get sufficient training, I do not feel comfortable with using IWBs in the classroom.					

Appendix C: The Questions of Interview

1. Do you think that the use of technology is necessary for teachers?

2. Do you think that teachers benefit from technology sufficiently?

3. In what ways do you support the use of IWBs in instruction?

5. What are the most common problems teachers face when using IWBs?

6. In your opinion, what could be the benefits of IWB s in teaching settings?