THE IMPACT OF INTERACTIVE WHITEBOARDS ON CLASSROOM INTERACTION IN TERTIARY LEVEL ENGLISH AS A FOREIGN LANGUAGE CLASSES

A MASTER'S THESIS

BY

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THE PROGRAM OF
TEACHING ENGLISH AS A FOREIGN LANGUAGE
BİLKENT UNIVERSITY
ANKARA

APRIL 2013

The Impact of Interactive Whiteboards on Classroom Interaction in Tertiary Level English as a Foreign Language Classes

The Graduate School of Education
of
Bilkent University

by

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In Partial Fulfillment of the Requirements for the Degree of
Master of Arts

in

The Program of
Teaching English as a Foreign Language
Bilkent University
Ankara

April 2013

BİLKENT UNIVERSITY

THE GRADUATE SCHOOL OF EDUCATION

MA THESIS EXAMINATION RESULT FORM

April 1, 2013

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ABSTRACT

THE IMPACT OF INTERACTIVE WHITEBOARDS ON CLASSROOM INTERACTON IN TERTIARY LEVEL ENGLISH AS A FOREIGN LANGUAGE CLASSES

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This study aimed to investigate the relationship between classroom interaction and Interactive Whiteboard use in tertiary level English as a Foreign Language classes, and to compare the types of interaction patterns occurring in classes equipped with either an IWB or a regular whiteboard. In the study, one control group and one experimental group were employed, both of which were taught by the same EFL teacher. In the control group, classroom instruction was supplemented with a regular whiteboard while in the experimental group an IWB was used. Data collection was carried out through observations and video recordings of classes, and analyzed using the categories and checklists of the Communicative Oriented Language Teaching (COLT) observation schemes (Spada & Fröhlich, 1995). Findings revealed only slight differences between the interaction patterns in the IWB and the non-IWB groups, indicating that the IWB did not impact interaction in the classroom negatively; nor did it greatly contribute to classroom interaction. Therefore, the study showed that an IWB alone is not pivotal to foster classroom interaction. Based on the results of negligible direct effects of IWB use on classroom interaction, the study draws teachers', administrators' and material developers'

attention to specific ways of using an IWB to increase the interaction in EFL classes at the tertiary level.

Key words: Interactive Whiteboards, EFL, COLT observation schemes, classroom interaction

ÖZET

ÜNİVERSİTE DÜZEYİNDE İNGİLİZCENİN YABACI DİL OLARAK ÖĞRETİLDİĞİ SINIFLARDAKİ ETKİLEŞİME AKILLI TAHTA KULLANIMININ ETKİSİ

Saliha Toscu

Yüksek Lisans, Yabancı Dil Olarak İngilizce Öğretimi Bölümü
Tez Yöneticisi: Yrd. Doç. Dr. Julie Mathews-Aydınlı

1 Nisan, 2013

Bu çalışma, üniversite seviyesinde yabancı dil olarak İngilizce öğretimi yapılan sınıflarda akıllı tahta kullanımı ve sınıf etkileşimi arasındaki ilişkiyi incelemeyi ve akıllı tahta veya normal beyaz tahta kullanımı sonucu oluşabilecek etkileşim türlerini karşılaştırmayı amaçlamıştır. Çalışmada bir kontrol grubu ve bir deney grubu kullanılmıştır. Kontrol grubunda ders öğretimi normal tahta ile desteklenirken, deney grubunda akıllı tahta ile desteklenmiştir. Veri toplama süreci gözlem ve gözlenen derslerin video kaydını içermektedir. Bu sayede toplanan veri Spada ve Fröhlich (1995) tarafından geliştirilen Communicative Oriented Language Teaching (COLT) gözlem listesinde bulunan kategorilere göre analiz edilmiştir. Bulgular, akıllı tahta kullanımının sınıf etkileşimine önemli derecede etkisinin (olumlu veya olumsuz) olmadığını göstermiştir. Bu çalışma, akıllı tahta kullanımının üniversite seviyesinde İngilizce' nin yabancı dil olarak öğretildiği sınıflardaki etkileşimi inceleyip bu alandaki literatüre katkı sağlamıştır. Bu çalışmanın sonuçları, öğretmenlerin, okul yöneticilerin ve materyal hazırlayanların dikkatlerini akıllı tahtanın üniversite seviyesinde İngilizce derslerinde sınıf içi etkileşimi artırmak için ne zaman ve ne şekilde kullanılması gerektiğine çekmektedir.

Anahtar sözcükler: Akıllı tahta, yabancı dil olarak İngilizce, COLT gözlem listeleri, sınıf içi etkileşim, üniversite eğitimi

ACKNOWLEDGEMENTS

Writing a thesis is admittedly a challenging process. I would like to express my thanks to those who guided and supported me contributing to the preparation and completion of this thesis in this process.

First of all, I would like to express my thanks and deepest gratitude to my advisor, Asst. Prof. Dr. Julie Mathews-Aydınlı for her continuing support and expert guidance in supervising this thesis. Without her assistance and useful contributions, it would not be possible to bring this thesis to conclusion. It was a real privilege for me to be one of her advisees.

I would also like to express my sincere gratitude to Dr. Deniz Ortaçtepe for her invaluable guidance, support and enthusiastic encouragement in preparation and completion of this thesis.

I also owe special thanks to one of the most creative and energetic teachers I have ever met, Robin Turner for his invaluable assistance to carry out this study. Without his assistance, carrying out this thesis would be impossible.

I would also like to thank my friends Ayfer Sülü, Seda Güven, Zeynep Aysan and Naime Doğan for their unforgettable friendship and never-ending support in writing this thesis.

Last but not least, I owe my deepest and genuine gratitude to my family for their endless encouragement, support and for their everlasting belief in me throughout my life.

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CHAPTER I: INTRODUCTION

Introduction

The use of technology has become an important part of teaching and learning a great number of subjects, including languages (Ishtaiwa & Shana, 2011). According to Mishra and Koehler (2006), digital computers, computer software, artifacts and mechanisms have increasingly become widely used components in educational settings. Thus, the rapid developments in technology have led to a number of opportunities to be used in language classrooms by changing the traditional nature of the classroom. Multimedia CD ROMs, video conferencing, speech recognition, speech synthesis, email groups, learner monitoring, electronic libraries and on-line testing are just some examples of the applications that could be used in order to teach and learn languages (Ishtaiwa & Shana, 2011). There are a number of studies which have been conducted in different settings and which indicate the impact of technology integration into language teaching and learning (Armstrong, 1994; Brouse, Basch & Chow, 2011; Chambers, 2005; Garrett, 2009; Kern, 1995; O'Dowd, 2007; Warschauer & Meskill, 2000; Wiebe & Kabata, 2010). One of the recent technologies offering teachers and learners opportunities to teach and learn in new ways is the Interactive Whiteboard (IWB).

The literature supports the idea that IWB technology may benefit educational settings by enabling paper and energy to be saved with its feature of reusing class materials previously produced, and it has been shown to have a motivational effect for students thanks to its visual and audio richness (BECTA, 2003). The various benefits that IWBs provide may contribute to improving language learning in the classroom; however, scholars in English as a Second Language (ESL) and English as a Foreign Language (EFL) have long argued that interaction has a fundamental

importance for language leaning and acquisition (Allwright, 1984; Brown, 1991; Ellis, 1999; Hall & Verplaetse, 2000; Kumaravadivelu, 2003; Lightbown & Spada, 2006; Long, 1980; Nunan, 1991; Vygotsky, 1978). IWBs provide some clear technical advantages to teachers and students, but little is known about their impact on classroom interaction in language classes. This empirical study aims to explore whether IWB use affects the amount and nature of interaction in EFL classes.

Background of the Study

In recent years, Interactive Whiteboards (IWBs) have been used increasingly in language teaching and learning settings as a technological tool. They are considered to have the potential to improve teaching and learning experiences by offering useful ways for students to interact with electronic content (BECTA, 2004). Miller and Glover (2009) define IWBs as an educational tool used in conjunction with a computer and data projector to incorporate software, internet links and data equipment allowing whole class use. They state that schools are increasingly equipping their classrooms with IWBs to supplement or replace traditional white or blackboards. Hall and Higgins (2005) emphasize that as long as information technology continues to have an impact on education, there will be a great interest in the use of IWBs because this technology combines all the previous teaching aids like chalkboard, whiteboard, television, video, overhead projector, CD player, and computer in one.

IWBs are relatively new tools for teaching and learning settings; however, a number of studies have been undertaken by researchers in order to find out their implications in education, and researchers have come out with results indicating their challenges and benefits (Coyle, Yalez & Verdü, 2010; Elaziz, 2008; Glover & Miller, 2001; Ishtaiwa & Shana, 2011; Lewis, 2009; Shmid, 2006; Swan, Shenker &

Kratkoski, 2008). There are many studies in which the drawbacks of these technological boards are pointed out by the researchers. For example, Campbell (2010) argues that the effective use of IWBs requires an investment of time, appropriate technical and pedagogical training, and independent exploration by teachers; otherwise the use of this technology can be frustrating and ineffective. In the study conducted by Glover and Miller (2001), it is clear that the lack of competency to use the technology might cause inefficient use, so when teachers are not trained properly for the use of IWBs, these boards are not different from the traditional blackboards. In addition, Harris (2005) mentions the financial problems related to IWBs. Since these electronic boards are not cheap, affording this technology is often not possible without a government policy or some kind of external funding.

Despite the challenges regarding the use of IWBs, there is also much research indicating the positive results of the use of these boards (Schuck & Kearney, 2007, as cited in Ishtaiwa & Shana, 2011). According to these researchers, IWBs replicate the functions of older presentation technologies such as flipcharts, overheads, slide projectors and videos while facilitating the manipulation of text and images for the class. Also, Swan, Schenker and Kratcoski (2008) express that IWBs allow the dynamic integration of web-based materials and digital lesson activities with patterns, images and multimedia; writing notes over educational video clips; and using presentation tools included in the software in order to enhance learning materials. Swan et al. (2008) add that IWBs provide quick retrieval of materials and immediate feedback by means of their infinite storage space. Also, they enable everything that could be done virtually on computers to be done on IWBs.

According to Elaziz (2008), IWBs have benefits both for teachers and learners in English as a Foreign Language (EFL) contexts. His study indicates that teachers who use IWBs in the classroom have the opportunity to give clearer and more dynamic presentations, to accommodate different learning styles according to students' needs, to save and print notes made during class time, and to benefit from web-based resources, which in turn can facilitate teachers' own professional development. In general, the previous studies suggest that students who are educated in classrooms with IWBs not only improve their practices through experimental learning but also are motivated to learn and encouraged to interact with their teachers and the other students in the classroom.

The positive effect of IWBs on classroom interaction may be one of their major benefits based on more general claims about the opportunities from technology integration into education (BECTA, 2003). The impact of IWBs on classroom interaction in different content classes (e.g., math, science, and history) has been discussed and, based on attitude studies, a positive impact on classroom interaction has been indicated (Burden, 2002; Coyle, Yalez & Verdü, 2010; Levy, 2002; Schmid, 2006; Smith, Hardman & Higgins, 2006; Tanner, Jones, Kennewell & Beauchamp, 2005). For instance, Levy (2002) states that teachers who use IWBs in their classes think that IWBs enhance teacher-learner interaction in the classroom. According to Burden (2002), the use of IWBs is a new way to foster students' active participation into the social construction of knowledge and understanding in education.

Statement of the Problem

Interactive Whiteboards' (IWB) impact in education has attracted considerable interest in recent years. Many studies have investigated the effects of this new technology as a pedagogical tool in different disciplines such as science and

math, English language arts, and English as a Second Language, and generally their conclusions are positive about the impact and the potential of the technology (Coyle et al, 2010; Elaziz, 2008; Levy, 2002; Gray et al., 2005; Hall & Higgins, 2005; Walker, 2003; Schmid, 2006; Schroeder, 2007; Smith, Hardman & Higgins, 2006; Soares, 2010). Several of these studies suggest that IWBs can be considered as a tool for enhancing 'interactivity' in the classroom. Despite the recognized importance of interaction in second language acquisition (Allwright, 1984; Ellis, 1999; Vygotsky, 1978), only two studies investigating the impact of IWBs on foreign language instruction note particularly the issue of classroom interaction, and both of these studies were conducted in K-12 classrooms (Orr, 2008; Soares, 2010). Therefore, there is a need to explore the contribution of IWBs in terms of interaction in foreign language classrooms at the higher education level.

IWB use is not yet widespread in Turkey; however, this technology has started to have an increasing presence in Turkish classrooms with the support of the government. The Ministry of National Education has launched a multi-billion dollar project, called the Fatih Project, managed by the Scientific and Technological Research Council of Turkey (TUBITAK), in order to integrate information technologies into schools. The project coordinators aspire to integrate IWBs into every elementary, middle, and high school classroom within the next three years. The project is justified by numerous studies showing the benefits of this new technology in a variety of disciplines conducted in primary and secondary schools (Coyle et al., 2010; Hall & Higgins, 2005; Lewis, 2002; Walker, 2003). While IWBs have increasingly become widespread for learning and teaching, actual information on how IWBs are being used in tertiary level EFL contexts as a pedagogical tool, in particular to enhance the interactivity necessary for foreign language learning,

remains unclear, and may be leading to less effective practices. These electronic boards may be used, for example, just for presentation purposes in the institutions equipped with IWBs, and thus, there is the risk that use of IWBs may even be causing teachers to move from a more active pedagogy to one that leads students to become more passive learners.

Research Question

This research addresses the following research question:

1. To what extent does the use of Interactive Whiteboards (IWBs) contribute to classroom interaction (teacher-student(s)/ student-student(s)/ teacher-board/ student-board) in tertiary level English as a Foreign Language (EFL) classes?

Significance of the Study

The literature lacks any study indicating the amount and quality of the interaction that takes place in tertiary level EFL classrooms when IWBs are being used. Therefore, this study aims to contribute to the literature by showing the outputs of language instruction with IWBs regarding classroom interaction.

This study intends to reveal the extent and quality of classroom interaction with the effect of technology--specifically, when IWBs are being used. Therefore, at the local level, the findings of this study may help teachers who work with tertiary level students to understand the potential for increasing or improving the amount and type of classroom interaction when using IWBs, and may contribute to their language instruction practices and ultimately to the students' language learning. The study may also have beneficial implications for curriculum designers and material developers as it may provide them with information on the potential benefits or drawbacks of IWB use for classroom interaction at the tertiary level. It may also

provide information for administrators trying to decide whether to invest in IWB technology for their classrooms.

Conclusion

This chapter has covered the background of the study, statement of the problem, research question and significance of the study. The following chapters will present detailed information about the relevant literature, describe the methodology used in the study and the procedure of data analysis followed by the discussion of the findings.

CHAPTER II: LITERATURE REVIEW

Introduction

The use of technology has become an integral part of language teaching. A great deal of research indicating positive effects of the integration of technology into educational settings has been carried out (Brouse, Basch & Chow, 2011; Chambers, 2005; Garrett, 2009; Kern, 1995; O'Dowd, 2007; Wiebe & Kabata, 2010). Technology presents a diversity of applications to enhance learning and teaching such as video conferencing, speech synthesis, online testing, email groups, etc. (Ishtaiwa & Shana, 2011). Interactive whiteboards (IWBs) are one of the technological mediums which came into existence in the 1990s. Concurrent with its use becoming widespread over the world in educational settings, a number of studies have been carried out to evaluate, discuss or see the value of this technology (Burden, 2002; Coyle, Yalez & Verdü, 2010; Elaziz, 2008; Glover & Miller, 2001; Gray, Hagger-Vaughan, Pilkington & Tomkins, 2005; Hall & Higgins, 2005; Ishtaiwa & Shana, 2011; Levy, 2002¸Lewis, 2009; Orr, 2008; Schroeder, 2007; Swan, Shenker & Kratkoski, 2008; Schmid, 2006; Smith, Hardman & Higgins, 2006; Tanner, Jones, Kennewell & Beauchamp, 2005; Walker, 2003; Soares, 2010). Despite some reported drawbacks of IWBs, the literature has a number of studies that have indicated its positive outcomes in teaching settings. General attitudes towards this technology show that it fosters interaction in the classroom by enhancing learner participation and motivation, and that it enables teachers to teach more effectively (Gray et al., 2005; Kennewell, 2001; Levy, 2002; Smith, Hardman & Higgins, 2006).

This chapter firstly reviews the literature on the use of technology in language teaching. Next, the definition of IWBs, the technology's history and studies showing its benefits and drawbacks for teachers and students are explained. Finally, the

importance of interaction in language classes is discussed and the studies and reports looking at the effect of IWBs specifically on classroom interaction in different content classes are presented.

The Use of Technology in Education

The use of technology to learn through the creation and communication of information can be said to date back more than 500 years–to the invention of printing, which enabled mass amounts of printed words to be distributed. With the invention of computers more than 60 years ago, a new revolution started by allowing raw data to be turned into structured information, that information into knowledge; then knowledge into action using advanced software agents (Reddy & Goodman, 2002).

In the 1960s, the potential of technology in the classroom began to be realized by educators and the first mainframes and minicomputers started being used. After that, in the 1970s and 1980s, personal computers (PCs) came into existence, followed by the internet and multimedia technologies including CD-ROM and computer-based audio and video in the 1990s (Wenglinsky, 2005; Chin, 2004). Since then, the use of technology in educational settings has been increasing enormously. Recently, there have been such great developments in technology that more electronic tools have been started to be used to support learning and teaching.

The Use of Technology in Language Education

Technology implementation into language classes has been affecting the language teaching profession for years. It started with the language labs of the 1960s and went on with microcomputers of the 1970s and 1980s, which was followed by language labs equipped with digital technology (Bush, 1997). In recent years, the importance of technology has increased in language learning settings as in all aspects of life. With all developments in technology, opportunities such as authentic learning

and interaction between learners and teachers and with the native speakers of the target language by means of Web 2 tools such as instant messaging, social networking, video conferencing are now possible for nearly all language learners (Brouse, Basch & Chow, 2011). While the developments in technology bring new, motivational experiences for users in educational settings, the adaptation of new technologies is not easy and flawless (Bush, 1997; The Office of Technology Assessment (OTA), 1995; Wenglinsky, 2005). In the following section, the drawbacks and benefits that technology brings for teachers and students in language classrooms will be explained respectively.

The Drawbacks of Technology in Language Classes

Although the current developments in technology are improving day by day, the integration of technology into classes continues to bring challenges for educators and learners. According to Chin (2004), the lack of training to use particular technologies in the classroom affects teaching negatively. Even though many teachers are good at using technology for personal aims, they may struggle in integrating it into their instructional practices (Chin, 2004). In a study conducted on behalf of the US government on teachers and technology by the Office of Technology Assessment (OTA) (1995) it was shown that teachers' preferences can block the use of technology in the classroom. Due to overloaded schedules and/or insufficient knowledge about how to use a particular technology, teachers often fail to adequately or effectively integrate technology into their instruction. In addition, the use of technology may not inspire all students since not all students in a class will share the same level of familiarity of technology.

The OTA study indicates other drawbacks, such as the financial aspect of technology. Special, quality hardware and software tend to cost a lot and require

frequent maintenance, which also costs money for the institutions. Therefore, even computers in labs may be considered as a waste of time and money by some educational institutions (OTA, 1995; Wenglinsky, 2005).

The Benefits of Technology in Language Classes

Despite these very broad limitations and challenges, the overall benefits of technology in education are generally seen as outnumbering its disadvantages -- providing of course it is used effectively by educators and learners (BECTA, 2003, 2004; Betcher & Lee, 2009; Campbell & Martin, 2010). The use of technology allows teachers to access a variety of audio and visual materials, helps them enhance their teaching, as well as to simplify the tasks. In the book, *Technology Enhanced Language Learning*, Bush (1997) states that the unique opportunity of using technology in language classes is that it provides teachers with access to authentic audio and visual materials. These materials help teachers teach the target language in a more realistic and in-depth way. According to Davies (2007), technology brings benefits to education since it promotes teachers' professional growth. It is functional, fast and responsive; and also, it allows its users to share information with anyone anywhere. Moreover, Davies (2007) states that the use of technology-based tasks helps enhance interaction between the teacher and learners. Finally, Chin (2004) states that the use of technology is effective in developing rapport in the classroom. He adds that when a teacher uses a particular technology in the classroom, the students will pay more attention to what the teacher is explaining.

In addition to the advantages the technology brings for teachers, its use accounts for some benefits to students in language classes, as well. Technologies such as e-mail, threaded discussion boards, and chat allow language instruction to be more communicative and collaborative and enable the instruction to continue even

outside of the classroom (Warschauer, Shetzer & Meloni, 2001). Technology is also reported to have a positive impact on students' motivation and engagement (Beauvois, 1998; Warschauer, 1996). In addition, it has the potential to increase cultural awareness and interaction among students by providing them with the facility to use the language as meaning and form in a virtual social context (Lee, 2002; O'Dowd, 2007). The findings of the study by O'Dowd (2007) indicate that online communication via internet communication technologies increases students' intercultural knowledge and enables students to be responsible for their own learning process. O'Dowd (2007) also adds that technology provides learners with authentic classroom practice. In addition, Davies (2007) investigates the impact of technology on language learners and concludes that technology increases learners' cognitive development.

Interactive Whiteboards

The use of technology brings many opportunities for users. There are many technological applications a teacher can use in the classroom. However, Betcher and Lee (2009) report that the most commonly used tools in schools are still the pen, paper and teaching board. This finding suggests that the teaching board is a preeminent piece of equipment used by teachers to enable them to teach in classrooms, which is important because it offers insights into how Interactive Whiteboards (IWBs) may differ from other classroom technologies. IWBs are a technology which combines the benefits of all teaching aids like the chalkboard, whiteboard, television, video, overhead projector, CD player and computer in one (Hall & Higgins, 2005). Hennessy, Deaney, Ruthven and Winterbottom (2007) give the definition of IWBs as follows:

> IWB systems comprise a computer linked to a data projector and a large touch-sensitive board displaying the projected image; they allow direct input via finger or stylus so that objects can be easily moved around the board or transformed by the teacher or students. They offer the significant advantage of one being able to annotate directly onto a projected display and to save the annotations for re-use or printing. The software can also instantly convert handwriting to more legible typed text and it allows users to hide and later reveal objects. Like the computer and data projector alone, it can be used with remote input and peripheral devices, including a visualiser or flexible camera, slates or tablet PCs (p.2).

The potential applications of the IWB include its use for web-based resources in whole-class teaching, creation of digital flipcharts, video clips to explain concepts, saving of notes written on the board, and quick and unlimited revision of materials (BECTA, 2003).Walker (2005) states that it is possible to use resources such as CD-ROMs, presentation packages, spread sheets, internet pages, websites, and audio visual materials on a computer from the board.

The Integration of IWBs into Education

The first IWBs were developed at Xerox Parc in Palo Alto in the 1990s for use in office settings in order to overcome the limitations of blackboards or whiteboards (Greiffenhagen, 2002). The potential benefits of this technology on education was recognized early on, but the cost of IWBs caused them not to enter educational settings until the mid-1990s, when they became cheap enough to afford to be used in schools (Walker, 2005). Today, the use of IWBs is increasing in teaching and learning settings especially in the UK, Denmark and the USA. The

argument behind this increase is that they help educators to create more interactive, motivating and attractive classes (McIntyre-Brown, 2011).

Studies on IWBs

Although IWBs are a relatively new technology in classrooms, the impacts of this technology on education have already been highly investigated by many researchers in the countries where IWBs are used across the curriculum. The findings of these studies indicate both drawbacks and benefits of this technology in educational settings.

The Drawbacks of IWBs in the Classroom

Although the use of IWB technology is growing rapidly, similar to all other new technological tools, it has become the target of criticism by some researchers. According to Walker (2005), IWB technology, like any kind of technology, has the potential to have technical problems. These glitches may result from problems with the computer, the network connection, the projector or even a problem with the board itself. Wall, Higgins and Smith (2005) argue that such kinds of technical problems may cause learner frustration. In addition, Campbell and Martin (2010) point out that when the educators lack training on how to overcome the technical problems related to the use of IWBs, the use of the technology becomes both inefficient and time consuming.

Another potential disadvantage of the board is that the preparation of the materials to be used on the IWB can take a long time, especially when teachers lack basic training on computer skills such as word processing, file navigation, databases or how to use the particular tools relevant to IWBs (Walker, 2005). This situation may cause teachers to use the IWBs inefficiently. Furthermore, lack of knowledge on how to use this technology may cause the instruction through the use of IWBs to turn

into a struggle for teachers, as they may not feel competent and confident while using the board (Schmid, 2009; Walker, 2005).

IWBs also have a disadvantage in terms of their cost. They are expensive to purchase when compared with other presentation technologies such as overhead and slide projectors (Higgins, Beauchamp &Miller, 2007). Although their cost has decreased since they first emerged in educational settings, they still require a huge budget to purchase for many schools (Walker, 2005). Therefore, government support is often required to integrate IWBs into schools.

The Benefits of IWBs in the Classroom

Despite the potential disadvantages of IWB technology in educational settings, Schmid (2009) states that the literature is rich in studies indicating the benefits of IWBs in educational settings for both teachers and learners.

The benefits of IWBs for teachers. The use of IWBs offers many opportunities for teachers. Walker (2005) states that IWBs work in conjunction with other technologies, so their use allows teachers to reach a number of resources in the shortest time possible. Levy (2002) also points out that IWBs provide teachers with the means to integrate multimedia resources such as written text, video clips, soundtracks and diagrams into their classes. Thus, IWBs bring variety into the class, thereby helping teachers to arrange the classes in ways that address the needs of students with different learning styles such as visual, auditory and kinesthetic (Miller & Glover, 2010).

Secondly, IWBs enable teachers to save whatever notes they have written on the board during class time. Thus, the use of IWBs allows the materials to be re-used, and thus can be seen as a time-saver for teachers (Walker, 2005). Furthermore, the saved materials enable teachers to quicken the pace of the class by removing the

need for teachers to write the same information many times on the board (Miller & Glover, 2010). Rather than preparing the same materials over and over, teachers, based on their own reflection or students' feedback, can simply revise or add new things to already saved notes. This increases the efficiency of classes (Levy, 2002), and in turn allows teachers more time to develop their pedagogy in the classroom.

Finally, the physical properties of the IWB are often seen as an advantage. Firstly, the size of the IWB provides teachers and students with a large display area (Walker, 2005), which, in turn, provides teachers with the opportunity for more effective whole-class teaching (Miller & Glover, 2010). Secondly, the physical set up of the board allows teachers to manipulate the documents from the board itself instead of using the computer keyboard or mouse (Gerard, Widener & Greene, 1999). Thus, the board helps enhance the conversation in the classroom since teachers face the class and interact with the students (Gerard et al., 1999). Thirdly, the touch sensitive screen of the board enables teachers and students to interact with the board physically in more ways than they can with a simple whiteboard.

The benefits of IWBs for students. The previous literature indicates that education supplemented by IWBs generally has a positive impact on students' learning. Students have been found to be more motivated in classes with IWBs because the integration of the technology into the classes creates more diversity in the class activities (Walker, 2005). As a result, students' engagement and participation are enhanced (Miller & Glover, 2010). Since the use of IWBs increases the shared experience among the students, their roles in the class have been said to shift from those of "spectator" to full participant (Bettsworth, 2010, p. 223).

It has also been argued that IWBs help enhance motivation in the classroom (BECTA 2003). BECTA (2003) explains that the use of IWBs increases motivation

because “students enjoy interacting physically with the board, manipulating text and images; thereby providing more opportunities for interaction and discussion” (p.3). Parallel to the increase in motivation, Beeland (2002) states that student engagement increases as well. In his study, Beeland (2002) aimed to find out students’ and teachers’ perceptions about IWB use. His survey-based research concluded that when the technology is integrated into a classroom, teaching and learning are enhanced because the physical interactivity with the board increases students’ motivation to manipulate the visuals and texts on the board. That means students’ engagement is increased in the classes with IWBs. Likewise, Levy (2002) drew the same conclusions about the contributions of the IWB to student engagement in the classroom. In her study, the participant students indicated that the IWB had a motivational effect on them. Similarly, the teachers interviewed after the study particularly noted that the IWB helped students participate in classes more.

In addition to the contribution of IWBs to student participation and engagement, Soares (2010) explains that the IWB has a potential to help enhance student autonomy in the classroom. Soares (2010) states that while the board itself does not foster learner autonomy, when the integration of the board in the class is provided purposefully, and when the activity is arranged effectively, the classes with the IWB have a potential to be more learner centered.

Finally, in Bettsworth’s (2010) study exploring the effectiveness of IWBs in enhancing understanding of grammar points in modern language classes, she found out that there was a big difference between students’ understanding of the grammar points after they were taught by the IWB. Thus, the use of the board encouraged collaboration among students and interaction since the students interacted with each other and the teacher to talk about the tasks assigned them.

The Importance of Interaction in Language Learning

The role of interaction in second language acquisition has been greatly investigated in the literature. Although there has long been an awareness of the importance of communication for language development, it was in the 1970s that Wagner-Gough and Hatch proposed that conversational interaction could be used to learn the syntax of a language rather than only practicing the form of the language. As a result of their analysis of conversational interactions between learners and interlocutors, they proposed that the syntax of the second language could develop out of conversation.

Wagner-Gough and Hatch's (1975) research was followed by Long's (1980) interaction hypothesis, in which he stated that through interaction, modified input is provided. For Long, this input was the basis for language acquisition since the learners will notice the input. Later on, Long (1996) explained his interaction hypothesis as language acquisition occurring when there is a negotiation between a learner and an interlocutor. According to Long (1996), while a learner and an interlocutor are interacting, there may occur communication breakdowns and then, the learner gets negative feedback from the interlocutor, signaling that there is something wrong with the learner's message. At the end of the negotiation about the meaning between the learner and the interlocutor, the learner gets enough input from the interlocutor and learns the correct form of the message. The difference between the earliest and latest versions of Long's (1980, 1996) interaction hypothesis is that in the latter one the learner process the information she or he gets through negotiation.

Vygotsky's work (1978) is also credited for its importance in highlighting the role of interaction in language development. As a result of his studies on interactions

between children and adults, he concluded that social interaction is primarily important in language development. He argued that a child has two mental development levels. The first one is *the actual development level*, which is the result of the child's thinking processes, such as reasoning. The second one is *the potential development level*, to which a child can reach with assistance of others. Vygotsky named the distance between those two levels as the Zone of Proximal Development (ZPD). He argued that since a child can develop more skills with the help of others or in collaboration with others rather than the things she or he can develop alone, a child should be given opportunities to communicate, work or spend time with others for language development. Likewise, many other researchers (e.g. Cullen, 1998; Gass & Mackey, 2006; Gass, 2004; Krashen & Terrell, 1983; Pica, 1987) drew attention to how crucial interaction is for both first and second language development. Interaction provides the learners of the target language with the chance of practicing the language, discussing the meaning of what they and others say, interpreting the message conveyed by other speaker(s) and exploring the use and usage of the target language.

Classroom Interaction

Brown (2001) defines interaction as a situation in which two or more people exchange their opinions, feelings and information collaboratively in a way that affects the participants mutually. Ideally, classrooms are environments where ideas, feelings and information are exchanged between the teacher and students, or the student and students. In his theory of social constructivism, Vygotsky (1978) discusses the importance of interaction for effective learning, which occurs only when there is interaction between the teacher and students. Therefore, interaction is an important part of the instruction in the classroom because it helps the teacher to

convey the intended meaning while helping the students to share their ideas, to think about the problem at hand, and to determine solutions for the problem collaboratively (Kaya, 2007). According to Verplaetse (2000), interaction in the classroom enables students to develop academically, socially and communicatively. Also, interaction provides students the opportunity to share the knowledge they have with others. Through interaction, the teacher and students form a mutual body of knowledge. In addition, they develop a mutual understanding of their roles and relationships. Thus, they know what they are expected to perform as a group member in the classroom (Hall & Walsh, 2002). According to Allwright (1984), interaction enables learners to take responsibility for their own learning. Thus, they have an active role in their learning by working collaboratively with their teachers and other students in the classroom.

As with any kind of learning, interaction is also very important in language classrooms. Interaction has a particularly crucial role to play in language classes because it helps students to enhance their language development and communicative competence providing students with practice of the target language in the classroom (Yu, 2008). Meaningful interaction leading students to communicate in the classroom presents students more opportunities to learn and practice the target language (Yu, 2008). Creating a class with more learning opportunities increasing students' motivation and potential to interact with other students and the teacher contributes students' language learning process in classrooms.

Rivers (1987) explains the significance of interaction for language learning saying that interaction helps students to increase their language knowledge since, through interaction in class activities such as discussions, group work and problem solving tasks, they are exposed to authentic linguistic input and to the output of their

peers. Additionally, Rivers (1987) underlines that through interaction, students use all they know about the language. In the classroom, Kaya (2007) states that students listen to their teachers and other students in the classroom, ask questions, interpret the events and give feedback to each other. Therefore, students whose aim is to use and produce the language can learn language effectively through interaction in the classroom.

The findings of the study conducted by Dobinson (2001) indicate that classroom interaction can facilitate vocabulary learning, while Takashima and Ellis' work (1999) revealed the impact of interaction on learning grammar. The findings of the latter study showed that when students interact with the teacher through questions/answers and focused feedback, there is an increase in students' awareness of items which they have been taught.

IWBs and Interaction

The previous literature indicates that IWBs have a positive impact on classroom interaction. Morgan (2008) defines interactive learning as instruction that engages students in the learning process by using a number of mental and physical activities. Interactive learning provides dynamic class activities which enable students to engage in the class more actively. It involves the combination of a number of educational strategies such as the use of visuals, reading, writing, problem solving, and discussion. IWBs, she argues, are educational tools that can be used effectively to implement those strategies (Morgan, 2008).

Betcher and Lee (2009) state that interactive whiteboards are called interactive because they encourage students to be more engaged in the class by providing them with physical interaction with the board. The students actively participate in the class, touch the board, drag and drop the items on the board.

However, Kent (2004) suggests that relying only on the physical interaction that an IWB can provide does not in and of itself bring about an effective learning and teaching environment. Rather, an effective learning and teaching environment needs to enable students to explain their ideas and defend them to the other students in the classroom.

The physical interaction which the IWB provides the teacher and students with is very important. However, it does not constitute the full extent of what constitutes interaction in the classroom. Smith, Higgins, Wall and Miller (2005) state that "the uniqueness and the boon of the technology lies in the possibility for an intersection between technical and pedagogic interactivity" (p.99). In other words interactivity with the board alone does not foster classroom interaction. Enhancing interaction in an IWB classroom depends on teachers' ability to organize the class content intentionally to increase the overall interaction in the classroom and, in particular, their ability to use the IWB for that purpose (Tanner et. al, 2005).

Studies on IWBs and Interaction

Studies in Content Classes

The impact of IWBs on classroom interaction has been investigated in different disciplines such as science, history and math. The findings of the studies conducted in those areas suggest that IWBs have a positive impact on classroom interaction. In their study, Smith, Hardman and Higgins (2006) investigated the effects of IWBs on teacher-student interaction in the teaching of literacy and numeracy. The researchers observed literacy and numeracy classes—both with and without IWBs --using a computerized observation schedule. They focused on exploring whether IWB use helps to turn the traditional form of whole class teaching into a more interactive one. The data gathered from both classes –IWB and non-IWB

were compared and the findings of their study revealed that in the IWB classes, opportunities for reciprocal dialogue between teacher and students were increased. Even though the effect of IWBs on classroom interaction was not significant, more "open questions, repeat questions, follow up questions, evaluation, answers from pupils and general talk" were found (p. 450), which indicates IWB use in the study showed a more interactive style of classroom talk.

Mercer, Hennessy and Warwick (2010) also investigated the potential contribution of IWBs as a tool to enhance classroom dialogue. The study was conducted in the UK with primary and secondary school students, mainly in history classes. Through video analysis of the classes with the IWB, the researchers concluded that the interactive features of the IWB are good for promoting dialogic interaction in the classroom. The participating teachers used interactive features of the IWBs such as hide and reveal. In the study, instead of showing the whole text, the teacher firstly asked students to focus on a few lines in the text on the board via the board's hide and reveal feature. After the students had elicited the meaning conveyed through those lines as a result of the discussions in groups with their fellow students and the teacher, the whole text was studied in the classroom. Thus, using this feature, the teacher could decrease the difficulty and complexity of the task and also increase the dialogic interaction in the classroom through the questions asked about the text (Mercer et al., 2010). The researchers noted that the teachers could have created the same dialogic interaction without the IWB; however, the IWB presented easier ways of finding, adapting and saving of the resources.

Studies in Language Learning Classes

In addition to the apparent impact of IWBs on interaction in content classes such as math, science and history, their effects on classroom interaction have also

been investigated in language classes, and researchers have again generally concluded with positive results. IWBs provide users with a wide variety of computer functions such as CD ROMs, presentation packages, audio files, videos, and unlimited access to internet resources, with their own facilities such as highlighting, dragging/ dropping, concealing the items (Walker, 2005). Through all those functions, Schmid (2009) states that a more real life-like learning setting can be created in language classrooms. As a result of the study she conducted in an English for Academic Purposes (EAP) class, Schmid (2009) concluded that the use of an IWB increased interaction between students and improved students' engagement with the class. In her study, she explains that via the IWB, she could provide students with authentic materials in the target language. The IWB use enhanced students' motivation since the classes with IWBs were not limited to paper handouts, and since the IWB enabled students to have a class with visual and authentic material and to engage with the class material through the interactive facilities of the board such as drawing on the texts, dragging or dropping the items on the slides (Schmid, 2009).

In another study, which aimed to shed light on the potential of IWBs for the language learning process, Schmid (2007) discusses the contributions of the IWB's Activote tool to classroom interaction. Activote is a system which is similar to the technology used in television programmes to measure the replies given by audiences to questions electronically (Chin, 2004). In the context of Schmid's research, the voting tool was used to arrange a classroom activity based on competition among students. Each student was given a separate voting keypad, through which they could give answers to the questions shown on the board. Through the voting tool of an IWB, the answers given by students are instantly shown on the IWB in graphics. In the research, Schmid (2007) states that via the voting tool, students' active

participation in the learning process was accomplished and interaction between the students was enhanced. Using the voting tool, students firstly gave their answers individually, and later on, when the results were shown in graphics, the students analyzed and discussed the questions in groups with their peers or with their teacher and gave explanations for the answers. Thus, the students could both compare their knowledge with others' and check their performance and learn from their peers since they interacted with each other while discussing the given answers.

Bettsworth (2010) conducted a study on secondary school students to investigate the impact of IWBs on enhancing comprehension of a particular grammar point in Modern Foreign Languages (MFL) classrooms. Her research indicated a positive effect of IWB use on grammar teaching and revealed that IWB use contributed to classroom interaction as well. In the study, the teacher and students made the most of the features such as dragging and dropping, highlighting the important points, and coloring the text. All these helped students to be engaged in the class and to interact with each other more. Doing the tasks assigned them, students were observed being more concentrated on the task and discussing about the image or text on the board in the target language in small groups or in a whole class discussion. Each student in the small groups or in the whole class discussion engaged in the learning process by debating the given answers, making guesses for the correct answers, or correcting their friends' answers. In the light of her findings, Bettsworth (2010) expresses that the use of IWBs changed the role of students from being passive listeners or receivers of knowledge to being active participants, comprehending the information through interaction with others.

There are also a couple of studies indicating the implications of IWB technology in English as a foreign language (EFL) contexts. Both of these studies

were conducted in K-12 classes, and both resulted in positive findings in terms of interaction in the classroom. Soares (2010) conducted a project in a K-12 classroom with 10-12 year old EFL students and participant teachers to assess participants' opinions on newly introduced IWB technology. The data in the study were collected through questionnaires given to the students, interviews with the teachers, and self-reflections by the researcher on IWB use in the classroom. The results showed participants' agreement on the idea that the IWB was motivating for them. The participant teachers also agreed on the idea that collaboration and dialogue between the students was enhanced and ultimately, therefore, interaction was increased. The researcher underscored the importance of the teacher and his/her particular beliefs in making the most of IWBs' interactive potential.

The other study was based on EFL students' perceptions on the use of IWBs. The participants of the study were chosen from different classes taught with IWBs in Lebanon and Tunisia. The researcher, Orr (2008), interviewed the students and recorded their comments on the classes that had been supplemented by the IWB. The findings of the study indicated that students responded positively to the IWBs because their use sped up the pace of the lessons, and enabled the students to understand the content better since they provided the students with high quality visuals and with internet connection. In this study, the researcher does not examine classroom interaction particularly; however, he gives reference to the subject by stating the lack of empirical studies directly supporting the interaction aspect of the IWB technology in the classroom.

Both of these studies (Orr, 2008; Soares, 2010) looked at the use of IWBs in K-12 classes, and either directly or indirectly indicated the impact of IWBs on classroom interaction in English as a foreign language classes. However, the

literature still lacks studies investigating the possible impact of IWBs on interaction in language learning classes, particularly at the higher education level. Therefore, there is a need to explore whether IWB use has the same potential impact on interaction among students at older ages and with different learning needs. This study is aimed at exploring the impact of IWBs on classroom interaction in tertiary level EFL classes.

Conclusion

This literature review provides an overview of the literature regarding the use of technology in education in general and in particular the use of interactive whiteboards and classroom interaction. The literature indicates that as a technological tool, IWBs generally bring benefits for both students and teachers. One of the benefits which IWB technology provides is its contribution to classroom interaction. While there have been studies carried out in different disciplines to reveal how IWB technology impacts classroom interaction, the research indicating the interaction aspect of IWBs in English as a Foreign Language classes is limited to only two studies conducted in K-12 classes (Orr, 2008; Soares, 2010). Both of these studies indicate the positive perceptions of students and teachers on the use of IWBs with respect to its impact on classroom interaction. However, the literature lacks any empirical studies indicating the contribution of IWBs to classroom interaction in higher education. Because of the lack of empirical evidence to support the benefit of IWBs for classroom interaction in EFL classes in higher education level, this study intends to investigate the contribution of IWBs to classroom interaction in higher education. The next chapter will cover the methodology used in this study including participants and setting, instruments, data collection and data analysis procedure.

CHAPTER III: METHODOLOGY

Introduction

The primary aim of this study was to reveal the contribution of IWBs to classroom interaction in higher education English as a Foreign Language contexts. The study specifically explored the extent and the quality of the classroom interaction in classes supplemented by IWBs and compared it with the interaction taking place in classes which were not supplemented with IWBs. In the study, the researcher attempted to find answers to the following research question:

1. To what extent does the use of Interactive Whiteboards (IWBs) contribute to classroom interaction in tertiary level English as a Foreign Language (EFL) classes?

This chapter provides information regarding the setting and the participants of the study, the instruments used to obtain the data, the data collection procedures and the analysis of the collected data.

Setting and Participants

The study was conducted in the Faculty Academic English Program at Bilkent University School of English Language (BUSEL) in April, 2012. This program provides academic English support to the freshmen students. The courses in the program include content-based or academic skills courses. The aim of the program is to promote students' academic thinking, writing, reading and language usage. The participants in the study were EFL students from different departments who were studying in their freshman year. The students were taking the English & Composition 102 course, an academic skills course. The participant teacher was an EFL teacher working in BUSEL. The teacher was chosen on a volunteer basis. He is

a native speaker of English with more than 10 years of experience in teaching English for academic purposes.

To conduct this quasi-experimental study, two classes of the participant teacher were chosen. The classes were chosen on the basis that they both would be taught by the same teacher and would follow the same program so that the content of the classes were the same. As mentioned earlier, in both of the classes, the students were taking English & Composition 102 course, but one was taught using an IWB, and the other was taught using a traditional whiteboard.

The number of the students in the classes ranged from 15 to 18. The course content was based on the psychology and philosophy of games. The courses were given based on a textbook and class notes prepared and compiled by the instructor. For the experimental group, the course content was adapted by the teacher and the researcher to be able to be used on the IWB.

In the experimental group, the Promethean IWB was used. The board provides the users with features such as dual pen use, access to other multimedia resources with a large highly sensitive screen, and tools such as four different pens, activwand and activeslate. The flipcharts used in the study were prepared using Activinspire software 1.6. The software enables users to create colorful, interesting flipcharts for class use. Users can create limitless flipcharts using the software. The software has a tool bar for class use with different color choice, figures and shapes. Also, the software provides users with different template choices.

Before the study began, the teacher received training on how to use the Promethean IWB. During the training, the teacher was informed about the basic tools such as pens and a wand – a tool ensuring a mouse control to the users, which is wireless and battery free. In addition, the basic features of the IWB were introduced

to the teacher. Also, technical information about the calibration of the board was given in case an unexpected situation might happen. After that, the teacher was given information on how to create and save interactive flipcharts using Active Inspire software 1.6.

Instruments & Materials

This study was based on classroom observations to explore the effect of IWBs on the extent and nature of classroom interaction. The observation required the researcher's individual participation in every class, and recordings of the classes for a detailed evaluation. For the evaluation of interaction in the control and experimental groups, the researcher used an adapted version of the Communicative Orientation of Language Teaching (COLT) observation scheme (Spada & Fröhlich, 1995), and benefited from the transcripts taken from the audio recordings.

Communicative Orientation of Language Teaching (COLT) Observation Scheme

The COLT observation scheme is a classroom observation instrument introduced for the first time by Nina Spada, Maria Fröhlich and Patrick Allen in 1984 for language classrooms. The COLT observation scheme includes two parts, the first of which is used to describe the events during the instruction at the level of episode and activities. This part was used to explore the extent of the interaction in the study. The second part is used to analyze the verbal interaction between teachers and student(s) or student and student(s). This part was used to explore the quality of the interaction in the groups observed.

COLT Observation Scheme Part A. Spada and Fröhlich (1995) express that the COLT observation scheme allows for adaptations in categories. Therefore, an adapted version of the COLT observation scheme was used in this study. Part A

gives the initial "macro-level" analysis of the classroom behaviors (Spada, 1995, p. 128). Thus, the information about the overall description of the instruction in the classrooms observed is aimed to be obtained. The Categories on Part A of the scheme are coded while the observer is in the class. Of the *time*, activities & episodes, *participant organization, content, content control, student modality and materials* categories included in the original part A of the COLT, the following five main categories were used in this study: *time, activities and episodes, participant organization, and materials* (See a copy of the adapted version of COLT observation scheme Part A in Appendix 1). The categories of *content, content control and student modality* were not included into the observation scheme since those categories were not directly related to the research question in this study. They gave more detailed description of class events or behaviors than the one which was aimed to be explored in this study.

In order to complete the COLT observation scheme Part A, the classes are observed in real class time. The first category, *time* indicates the starting time of each episode or activity. Thus, the percentage of time spent on different COLT features can be calculated. In the column indicating *activities and episodes*, the description of the main activities and specific events (episodes) in them are written down next to the time they start and finish. In the following column, there is *participant organization,* which alludes to the way in which the students are organized. Three main organization patterns are given as subcategories under *participant organization*. Those are *class, group* and *individual participant organization patterns*.

In *class organization pattern,* there are three primary options: teacher to student interaction, in which the teacher interacts with a particular student asking a question, responds to his/her question, comments on his or her utterance or vice

versa; teacher to whole class interaction when the teacher addresses the whole class especially when giving a presentation about the topic; and student to student interaction in which the activity is led by a group of students or they interact with each other. Under *group organization pattern,* whether the students work in groups or pairs and whether they do the same task or different tasks are also investigated. Under *individual organization pattern*, whether students work on their own on the same task or on different tasks is aimed to be explored in the classroom.

In the next column, the use of the IWB or regular board is investigated through the feature of *materials*. Different from the version of the COLT developed by Spada and Fröhlich (1995), in this adapted version of the scheme, the feature of *materials* is divided into two categories with two subdivisions each. The first category shows whether the interactive whiteboard (IWB) is used or not in the activity and by whom the IWB is used –by the teacher or the student(s) -- the second category is to explore whether the regular board is used or not during the activities, and by whom the board is used.

COLT Observation Scheme Part B. Part B coding of the COLT is different from Part A coding since it analyses the particular verbal interaction types that occur between the teacher and students (Spada & Fröhlich, 1995). Part B of the scheme includes more detailed categories than Part A coding; therefore, the coding is done after the class with the aid of transcripts from audio or video recordings. Spada and Fröhlich (1995) provide a number of categories in the COLT observation scheme Part B, however, in this study, not all of the categories were used since they were not related to the aims of this study and the content of the classes observed (See Appendices 2 and 3 for COLT Part B categories used in the study).

Part B is divided into two main columns: teacher verbal interaction and student verbal interaction. Both of these main parts are then divided into categories and subcategories for a detailed analysis. The categories of teacher verbal interaction analyzed in this study are *information gap, sustained speech* and *incorporation of student utterances*.

The first category is *information gap* which has two subcategories: *giving information* and *requesting information.* In the *giving information* part, whether the information given is predictable or not is investigated. In the *requesting information* part, whether the information requested by the teacher is pseudo or genuine is investigated.

The next category is *sustained speech* which is aimed to be used to analyze whether the discourse speakers engage in is extended or limited to one word, sentence or clause. The subcategories to analyze *sustained speech* are *minimal* and *sustained*. The teacher's responses of more than one or two words and one or two main clauses are coded as *minimal* while teacher turns with at least three main clauses are coded as *sustained*. While coding *sustained speech*, whether the speech is *minimal* or *sustained* is decided according to the turns not utterances (Spada & Fröhlich, 1995).

The *incorporation of student utterances* is the last category in the *teacher verbal interaction* feature of the Part B, which analyzes how the teacher reacts to students' utterances. This category is divided into subcategories such as *correction, repetition, paraphrase, comment, expansion* and *clarification request.* All these subcategories are used to analyze the teacher's verbal interaction in the classroom while reacting to student(s)' utterances.

The other feature, *student verbal interaction* is categorized as *discourse initiation, target language use, information gap, sustained speech* and *incorporation of student/ teacher utterances.* The first category, *discourse initiation,* is used to analyze the proportion of students' self initiation of discourse in a conversational turn taking in classroom class time. Spada and Fröhlich (1995) state that this category is not included in the scheme for teacher's verbal interaction because the discourse in the classroom is almost always initiated by the teacher.

The next category, the *use of language*, is used to analyze whether the native language or foreign language is used in class time and to calculate their proportions. The following category is *information gap*. This category has the same subcategories with the ones in teacher verbal interaction, but at this time the student talk is analyzed. Similarly, the *sustained speech* category in students' verbal interaction has the same subcategories with the ones in teacher's verbal interaction. However, since the students may also restrict their utterances to only one or two words, the *ultra minimal* subcategory is added to the subcategories under *sustained speech* in student talk (In teacher's verbal interaction, the *ultra minimal subcategory* was not included because the participant teacher's utterances in this study in each turn involved more than two words).

The final category analyzed under student verbal interaction is the *incorporation of student/ teacher utterances* category, which has the same subcategories with the teacher verbal interaction-incorporation of student utterances. This category is intended to explore how students react to the teacher's or other students' utterances and which subcategories are mostly used.

Transcripts

Basically, Spada and Fröhlich (1995) suggest using audio and/or video recordings in order to complete the Part B coding of the COLT observation scheme because Part B is more detailed than Part A and it is not possible to analyze the categories of Part B while observing the events in the class. In addition, Spada and Fröhlich (1995) highlight the importance of recordings for the verification of the data in Part A, even though the actual part A coding is done in real class time. Therefore, the audio and video recordings of the classes were transcribed in order to analyze the verbal interaction between the teacher and students. In addition, the data coded in Part A of the COLT Observation Scheme were verified through the audio and video recordings.

Data Collection Procedures

Data collection was carried out in the spring semester of 2012 and took one month. First, permission was obtained from the participant teacher for his volunteer participation into the study using a consent form informing him about the purpose of the study (see Appendix 4 for the consent form). Also, the students were informed that participation would have no effect whatsoever on their final grade. Before the observation started, the class materials were adapted to be used on the IWB by using Activinspire Software 1.6 and the schedule was arranged to observe three control and three experimental classes. The researcher attended all six classes as a non-participant observer in order to do Part A coding during the class time. For the Part B coding, each class was also audio and video recorded. Two recorders were used in the observation in order to avoid any technical problems which could be experienced because of any failure. The researcher completed the Part A coding as much as possible during the class and then checked them again and filled in details by using

the video recordings. Later on, the Part B coding was completed with the help of the recordings.

The Reliability of Coding

Spada and Fröhlich (1995) suggest doing the coding with two coders to ensure the inter-rater reliability of the data. Therefore; two coders (one of whom was the researcher and the other one was an MA student) participated in the coding process of the data on the observation schemes in this study. Part A was completed by the researcher herself in the classroom while the activities and episodes were going on in the classes. The second coder focused on the first 20 minutes of each class and completed coding after the class by using the video recordings. To determine the agreement on the reliability of the data on Part A data coded by both of the coders, the data were compared using SPSS. In this process, firstly, each coder separately filled in their checklists by taking the activities and the episodes into account. Later on, the data were entered in SPSS, and finally, the similarities in the coding done separately by both coders were compared using *Cohen's Kappa*. The results showed that there was 81.3% agreement on the categories. Based on the high agreement for the first 20 minutes of the class time between two coders' coding, the rest of the class time was coded by the researcher only. Later on, the results were analyzed with respect to the formula given by Spada and Fröhlich (1995).

Likewise, the data taken from the transcripts in order to complete the second part of the COLT observation scheme were coded by two coders. For agreement on the categories in Part B, two coders looked through the tapes together and came to an agreement for all the coding. Thus, the data from the verbal interaction was coded under the aforementioned categories.

Data Analysis Procedures

The analysis of the data coded on the COLT observation scheme was done as suggested by Spada and Fröhlich (1995). The two parts of the COLT were analyzed differently. The COLT observation scheme part A was used to measure the time spent by participants interacting with each other, using the IWB or regular board; or by students working in groups or individually. While doing this analysis, the activities and the episodes in each class were taken as the basis. They were timed and numbered in order to calculate the percentage of the time spent for each category. In each activity or episode, check marks were put under relevant categories. Then those check marks were counted and the number of check marks under one particular subcategory was divided by the total number of the check marks under the main category or feature.

Later on, Part B was used for the content analysis of the verbal interaction in the classes. Firstly, each student or teacher turn in the transcriptions was coded according to the categories given in Part B. After that, a check mark was put under the appropriate category on part B of the scheme. All checkmarks in one category or subcategory were counted and the proportion of the time spent on that particular category or subcategory was found by dividing the number of the checkmarks into the total number of the checkmarks under the main category or feature. The data gathered from the observations in and from the transcripts of classes supplemented with and without the IWB were then compared in order to identify if there were any differences between the IWB and non-IWB classes in terms of the classroom interaction amounts and types.

Conclusion

This chapter on methodology gives general information regarding the aim of the study, the research settings, participants, instruments, data collection procedures and data analysis methods. The following chapter will present the results of the research and the data analysis method used to interpret the results in detail.

CHAPTER IV: DATA ANALYSIS

Introduction

The purpose of this study was to identify whether the use of IWBs has an impact on classroom interaction by comparing an EFL class supplemented by the use of an IWB with an EFL class which was not supplemented by an IWB. Thus, the study aimed to explore the differences in the extent and the quality of the classroom interaction as a result of IWB use in an EFL context at the tertiary level.

The research question addressed in the study was:

1. To what extent does the use of Interactive Whiteboards (IWBs) contribute to classroom interaction (teacher-student(s)/ student-student(s)) in tertiary level English as a Foreign Language (EFL) classes?

The data in this study were collected through the observations of six EFL classes in total. Two groups of students participated in the study: one experimental group and one control group. Three classes of each group were observed. The instruction was supplemented by the IWB in the experimental group while the instruction was supplemented by a regular whiteboard in the control group. Both of the classes were taught by the same teacher. The content of the class materials used in both of the groups were the same except that the class materials the teacher was using on the regular board were adapted to be used on the IWB.

The basic instrument used to code the data in the study was an adapted version of the COLT Observation Scheme developed by Spada and Fröhlich (1995). The instrument was used in coordination with other instruments such as video/ audio recordings and transcripts from the recordings. Both qualitative and quantitative methods were used in the analysis of the data collected in this study. This chapter

presents a detailed explanation for the data analysis process in the study and the results found as a result of the analysis.

Data Analysis Procedures

In an attempt to explore the impact of IWB use on classroom interaction, the data as coded on the COLT observation scheme were analyzed according to the method described by Spada and Fröhlich (1995). The analyses of Part A and Part B were done separately.

The Analysis of the Data on the COLT Observation Scheme Part A

The data coded on Part A of the scheme were used to gain a general description of the class in terms of the participant organization and the use of materials. The data were coded on the scheme according to the activities and the episodes in the classes. While calculating the duration of each activity and episode, the starting time of an activity and episode was subtracted from the next activity or episode. Later on, each category under the main features –participant organization and materials- was computed in order to calculate the time spent on each. In the calculation, the categories were determined as "exclusive focus," "primary focus" and "equal focus" (Spada & Fröhlich, 1995, p.114). When only one category was checked off during an activity or episode, the focus was named as "exclusive"; if more than one category was checked off during an activity or episode, the case was named as "combinations" which were detailed in focus as "primary" and "equal." "Primary focus" means that more time was spent on a particular category than the other one while "equal focus" means that roughly the same amount of time was spent on each category (Spada & Fröhlich, 1995, pp. 114-115).

In this study, the categories checked off as exclusive focus and primary focus were taken into account since exclusive and primary focuses indicate the most

prominent categories. The calculations of the categories were done separately. Each category was calculated by taking the duration of the activities and episodes, and the check marks on the categories into account. Later on, the data were grouped according to the main features and the results were presented according to the classes with or without IWB instruction.

The Analysis of the Data on the COLT Observation Scheme Part B

The communicative features to which the data were coded accordingly in Part B include subcategories of more than two. For instance, under the category of *incorporation of student utterances*, there are subcategories of *correction, repetition, paraphrase, comment, clarification request and expansion*. In the analysis of the data in Part B, each of the categories is figured as a proportion of the category which contains that particular subcategory (Spada & Fröhlich, 1995). In an attempt to calculate a proportion, the check marks in a subcategory are counted and then divided by the number of total check marks under the main category. All the categories in Part B have more than one subcategory, except for the *discourse initiation* category, which has no subcategories (Spada & Fröhlich, 1995). Therefore, the proportion of *student discourse initiation* was calculated by dividing the number of the check marks put for student-initiated conversation exchanges by the total number of the student turns in a class time. Subsequently, an average for the classes with or without the IWB was calculated and the results were showed in bar graphs in order to reveal the differences and the similarities between the two groups –IWB and non-IWB.

Results

In this section, the data gathered through the COLT observation scheme Part A and Part B are analyzed respectively and the results are presented comparing and contrasting the data gathered from the classes with and without the IWB.

The COLT Observation Scheme Part A

The real time events at the level of episodes and activities in the three IWB and three non-IWB classes were observed during class time and analyzed through the instrument of the COLT Observation Scheme Part A. In this study, the main features analyzed in Part A of the scheme were *participant organization* and *materials*. The percentages of the time spent on the categories under these features were calculated and the differences and similarities in the categories that may be related to IWB use were identified.

The first feature analyzed was *participant organization*, which was used to analyze the interaction between *the teacher and the whole class, student and student* and the *teacher and individual student* or vice versa. In addition, this feature included the category of *group* in order to distinguish whether the students were working in groups or individually and whether they were working on the same task or different tasks.

Table 1 indicates the percentages spent on the interaction between *the teacher and whole class, student and student* and *the teacher and an individual student*.

Table 1

Participant Organization (class) by Visit

	IWBGroup			Non-IWB Group		
	T-W	S-S	T-S	T-W	S-S	T-S
Visit 1	53%	23%	24%	40%	42%	18%
Visit 2	30%	43%	27%	26%	47%	28%
Visit 3	25%	29%	46%	27%	32%	41%
Average Totals	36.00%	31.66%	32.33%	31.00%	40.33%	29.00%

T-W: Teacher <=> Whole Class Interaction
S-S : Student <=> Student Interaction
T-S : Teacher <=> Student Interaction

Table 1 represents the participant organization by visit. In this table, the percentages computed separately for the interaction types in the IWB and non-IWB classes per visit are shown. The results indicate that all of the interaction types were recorded in both of the groups. It is seen that the percentages of each category have changed in every visit, which results from the fact that different activities have been planned for each visit; thus, the categories have changed depending on the kind of the activities. Table 1 indicates that there are not any striking differences between the IWB and non-IWB classes with one exception that during the first visit, the IWB class had a lot more teacher-whole class interaction and a lot less student-student interaction than the non-IWB class, despite the fact that the content of the classes in the two groups was the same. Teacher and whole class interaction occurred generally at the beginning of the activities while the teacher was explaining how to do the activity; at the end of each activity, in order to give more detailed information about the taught items and during the activity when the teacher was responding to student questions.

The reason why the percentage of the teacher-whole class interaction was longer in the IWB group seemed to be that teacher was more likely to present the

material using the visual aids the IWB provided, as compared with the non-IWB class. The class material in the first visit was based on game photos and the IWB enabled a better visual aid for the presentation. Also, the student group might have affected the result because it was observed that the students in the IWB group asked more questions about and explanation for how to do the activity. These questions asked by various students seemed to have led the teacher to give more explanation for the unclear parts by addressing the whole class.

The findings indicate that the student-student interaction in the IWB group was considerably less than that in the non-IWB group in the first visit. This situation might have resulted from the IWB class students being quite focused on using the IWB, that is, they carefully dragged the items, and sometimes had difficulty in handling the tool used to drag and drop the items since the IWB is new in the classroom. Thus, the students were focused on coming to the board individually and doing the activity and when they had difficulty in understanding the questions in the activity, they mainly asked their teacher for clarification rather than their friends. The physical interaction with the board might have reduced the student-student interaction. However, in the non-IWB class, since the way they did the activities was based on showing them on the traditional whiteboard, to which they were all accustomed, the students kept up their dialogue with each other. They asked for help from their friends when there were questions or when they were not so sure about their answers.

Table 2
Participant Organization(Group)by Visit

	Group (Same Task)			Group (Different Task)		
	Visit 1	Visit 2	Visit 3	Visit 1	Visit 2	Visit 3
IWB	35.55%	70.21%	72.91%	00.00%	00.00%	00.00%
Non-IWB	42.50%	74.41%	70.58%	00.00%	00.00%	00.00%

Table 2 indicates the percentages of the activities done in the classes within each visit. It is clear from the table that in the IWB and non-IWB classes the kind of activities did not differ dramatically, although the total percentage of group activities used varied between sessions from around one third to nearly three quarters of the class. When working in groups, the students in both the IWB and non-IWB classes were always working on the same task rather than on different tasks.

The other feature analyzed through Part A of the scheme was *materials*. By means of this feature, the percentages of the use of the IWB by the teacher or student and the use of the regular board by the teacher or students were intended to be calculated.

Table 3 indicates the total percentage of time spent using the IWB or regular board, by both the teacher and the students, in the IWB and non-IWB classes.

Table 3
Material by Group

		IWB Group	Non-IWB Group
IWB	Teacher-use	02.00 %	--
	Student-use	48.00 %	--
Regular Board	Teacher-use	1.00 %	03.00 %
	Student-use	--	53.00 %

Table 3 represents the percentages of the total class time spent by the teacher or the students using the IWB or regular board. The results indicate that in both of the groups, students used the IWB or the regular board more than the teacher. While overall board use in both classes was quite similar, the percentages of the time spent by the teacher and students using the regular board are slightly higher than the percentages of the time spent by the teacher and students using the IWB board in the experimental class (56% and 50% respectively). In addition, the results indicate that the teacher spent just 1% of class time using the regular board in the IWB classes.

The COLT Observation Scheme Part B

The verbal interaction types in the three observed IWB and three observed non-IWB classes were coded in and analyzed through the COLT Observation Scheme Part B. The categories in Part B were analyzed under two main features: teacher verbal interaction and student verbal interaction. Each feature has subcategories with subdivisions (binary or multiple) (See the COLT Observation Scheme Part B in Appendices 2 and 3). All categories were calculated as proportions of their main features. Thus, the differences in interaction patterns and their proportions in the IWB and non-IWB classes were aimed to be explored.

Teacher Verbal Interaction

The categories analyzed in *Teacher Verbal Interaction* feature are *information gap, sustained speech* and *incorporation of student utterances*. By means of these categories, the communicative features of teacher talk in the IWB and non-IWB classes were analyzed; thus, the differences and similarities in terms of the teacher talk between IWB and non-IWB classes were explored.

Figure 1 indicates the average proportions of *information gap* and *sustained speech* categories calculated through the analysis of the verbal interaction features of the teacher talk in six visits to the IWB and non-IWB classes. The subcategories under *information gap* are *giving information* and *requesting information*, which themselves each have binary subdivisions. The subdivisions of *giving information* are *predictable information* and *unpredictable information* while the subdivisions of *requesting information* are *pseudo request* and *genuine request*. In the next category, *sustained speech* has two subcategories*: minimal* and *sustained*. Each subdivision was calculated as a part of the percentage of the main category. Thus, for instance,

Figure 1 shows how the teacher's speech in the IWB group included 86% of what can be considered *unpredictable information* and 14 % *predictable information.*

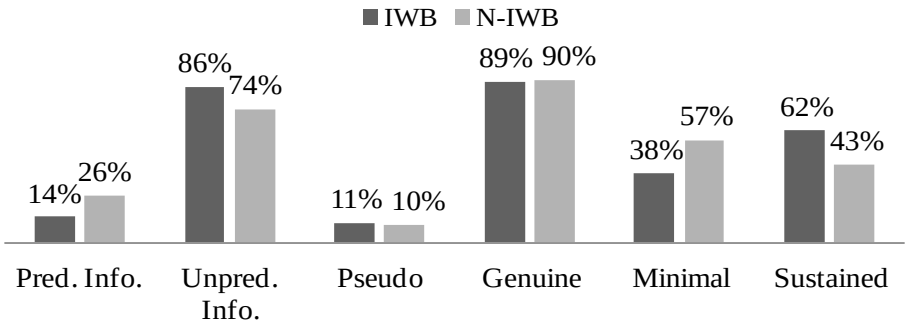

Figure 1.The average proportions of information gap/ sustained speech by group in teacher verbal interaction.

Spada and Fröhlich (1995) underline the importance of ''unpredictability'' in natural discourse (p. 21). In other words, the higher the unpredictability is in the classroom, the more communicative the classes are. In communicative classes, classroom interaction has a central role since it helps to create an active learning environment for students while the students collaboratively exchange their ideas and knowledge with each other or with the teacher (Meng &Wang, 2011).

Natural discourse is mainly unpredictable and may be on various topics; the participants engage in an interaction with each other taking turns and giving their opinions freely, so unpredictability needs to be included to the activities in the classroom (Nunan, 1991). According to Spada and Fröhlich (1995), when the unpredictability is higher, the students become more motivated to communicate in the classroom. Since the interaction is at the very central part of communication (Allwright, 1984), in communicative classes unpredictability enhances the possibility of interaction in the classroom.

Figure 1 shows that the proportions of unpredictable information are higher in both of the groups (IWB: 86 %; non-IWB: 74 %) than predictable information. This means that the teacher provides students with information which is not easy to be known in advance, which is an important criterion in communicative classes. The proportion of unpredictable information the teacher provided students with is slightly higher in the IWB classes, which raises the possibility that IWB use contributed to more interaction in the classroom. It should be noted that the reason why the percentage of unpredictability was higher in the IWB group might be that the dialogue between the teacher and the students was based on questions the students asked because of their unfamiliarity with the topic. It is probable that the students' familiarity with the topic in the non-IWB group was a bit more than that of the students in the IWB group. Since the students in the non-IWB group seemed primarily focused on completing the activity, the number of the questions asked to the teacher was not as great as the number of questions asked by the IWB group. Thus, since the students asked more questions in the IWB group, a dialogue based on unpredictable information between the teacher and the students was more likely, and might have changed the proportion in both groups.

Figure 1 indicates that in both groups, the proportions of the genuine requests by the teacher asking for information is higher than pseudo requests for information, with only a very minimal difference in percentages between the groups. Since there is only a slight difference between the two groups, it does not appear that the use of material (IWB versus regular whiteboards) makes any difference in terms of the *requesting information* category.

The last category in Figure 1, *sustained speech*, explores the proportion of teacher turns in which the teacher participates in extended discourse (sustained) or

limits his speech to one sentence or clause (minimal) (Spada & Fröhlich, 1995). In Figure 1, the proportion of *sustained speech* is higher in the IWB group while the higher proportion belongs to *minimal speech* in the non-IWB group. Therefore, the results show that there might be a connection between IWB use and more sustained speech. Although this situation seems to indicate a negative impact on the communicativeness of the IWB class and a reduction in the interaction in the IWB classroom, it is balanced out by the fact that the students also used more sustained speech in the IWB group (See figure 3). Thus, it is impossible to clearly say that the use of the IWB or the regular whiteboard has an effect on extended speech. It is possible that the teacher simply gave more explanations of the concepts according to the group because the students in the non-IWB group were observed to have more comprehensible knowledge of the topics taught, which was understood from their answers to the questions asked by the teacher.

Figure 2 indicates the average proportions of the subcategories in the student utterances category. The proportion of each subcategory was calculated separately for the IWB and non-IWB groups.

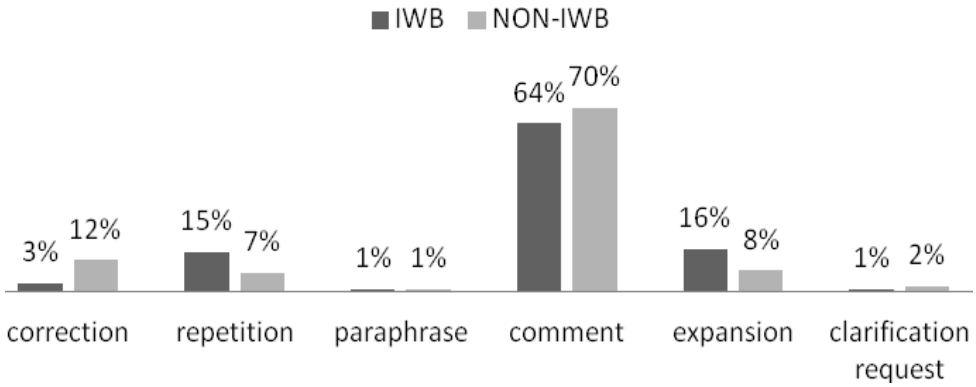

Figure 2. The average proportions of incorporation of student utterances by group in teacher verbal interaction.

As can be seen in Figure 2, all the predetermined subcategories under *incorporation of student utterances* were found to have occurred at least once in the observed classrooms. The first subcategory is *correction*. The results indicate that the proportion of the correction of students' incorrect utterances by the teacher is higher in the non-IWB group, meaning that the teacher corrected more student utterances in the non-IWB class. The next subcategory, *repetition* has an 8% higher proportion in the IWB group highlighting the fact that the teacher repeated student utterances more in the IWB classes than the non-IWB classes. The proportion of *paraphrase* is the same in both groups. *Comment* is the category with the highest proportion of all subcategories under *incorporation of student utterances*. This finding indicates that the teacher spent the most time making positive or negative comments on students' utterances. Its proportion is still slightly higher in the non-IWB group. The next subcategory, *expansion* has an 8% higher proportion in the IWB group, which shows that in the IWB group, the teacher spent more time extending the content of the students' utterances. Finally, the proportions of *clarification request* in both of the groups are low, though the teacher asked students for clarification slightly more often in the non-IWB classes.

Student Verbal Interaction

In the *Student Verbal Interaction* feature, the categories of *discourse initiation*, *language use*, *information gap*, *sustained speech* and *incorporation of student/ teacher utterances* were analyzed and their proportions are presented below in bar graphs to show the similarities and differences of the categories in the IWB and non-IWB groups.

Figure 3 represents the average proportions of *discourse initiation*, *language use*, *information gap* and *sustained speech* categories analyzed through the

communicative features of student talk in exchanges between the teacher and students in six visits to the IWB and non-IWB classes. The subcategories of *information gap* are the same as those in teacher verbal interaction. *Sustained speech* is also divided into the same subcategories as in teacher verbal interaction with only one difference, which is the *ultra minimal* subcategory added to *sustained speech* in student talk. Unlike teacher verbal interaction, categories of *discourse initiation* and *target language* were also analyzed in student talk by means of the COLT part B. *Discourse initiation* has no subcategories, but *language use* is divided into two subcategories in order to identify which language is used: *native language (L1)* or *foreign language (L2).*

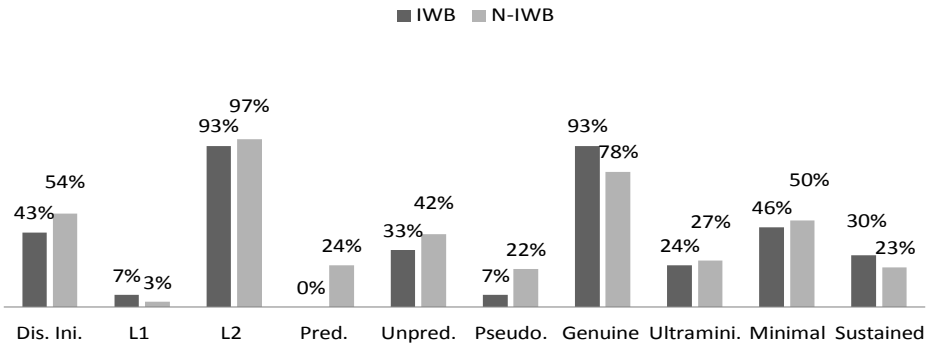

*Figure 3.*The average proportions of discourse initiation, language use, information gap and sustained speech by group in student verbal interaction.

Figure 3 shows that a bit less than half (43%) of total student turns in the IWB group were classified as discourse initiation while the proportion is higher (54%) in the non-IWB group. This means that although the proportions of discourse initiation are quite high in both of the groups, student-self initiated utterances were more frequent in the non-IWB classes, which might result from the fact that the

students' readiness level for the topic was observed to be higher in the non-IWB group.

Next, the figure represents the proportions of L1 and L2 use in IWB and non-IWB classes. The proportions of L2 use are very high in both of the groups. However, it should be noted that in both groups the students spoke in their L1 to the extent that the teacher allowed them to.

The average proportions of giving information indicate that the students in the non-IWB group used more unpredictable information in their talk than the students in the IWB group. Also the results show that no examples of giving predictable information in student talk were observed in the IWB class. Although in both of the groups the students requested information by asking both pseudo and genuine questions, the ratios are different with respect to the subcategories. While requesting information, students in the IWB group asked more genuine questions (93%), which means that more attempts happened in the IWB group for the participants to communicate. The proportion (78%) was a bit lower in the non-IWB group. It is possible that more interaction occurred in the IWB group because of the number of questions asked requesting information which the speakers genuinely did not know the answers to; it is also possible however, that the differences between the two groups' results are simply the result of differences between the actual students in the two groups.

The last category is *sustained speech*. The highest proportion of all subcategories in *sustained speech* belongs to *minimal* in both of the groups. In the IWB group, *minimal* is followed by *sustained* (30%) and then *ultra minimal* (24%) while the proportion of *ultra minimal* (27%) is slightly higher than *sustained* (23%) in the non-IWB group. Basically, student utterances in both groups mostly consisted

of minimal speech, which means that student turns of one or two words, long phrases, or one or two main clauses were used highly in both groups. The proportion of ultra-minimal (few word) utterances was roughly the same for both groups while the proportion of sustained speech in the IWB group was slightly higher than the non-IWB group. This result might be the indication of the relation between the interaction and the IWB use, since similarly the teacher speech included more sustained speech than the non-IWB group. However, it should also be noted that the students' coincidental familiarity with the topic in the IWB group might have affected the result.

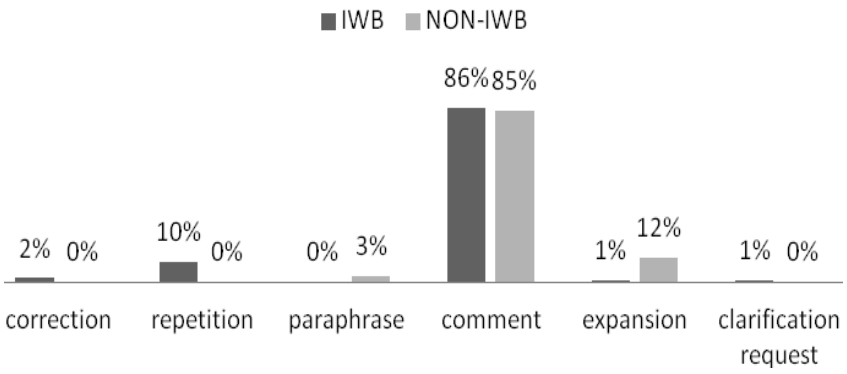

Figure 4. The average proportions of incorporation of student/ teacher utterances by group in student verbal interaction.

Figure 4 shows that the subcategory with the highest proportion of all under incorporation of student/ teacher utterances is *comment*. With only a 1% difference in proportion, the students in both groups frequently reacted to the teacher or other students' utterances by giving positive or negative comment responses. Therefore, the result shows that the use of IWBs or regular whiteboards made no difference with respect to *comment*.

There were also no major differences between the two groups with respect to *correction/ paraphrase/ clarification request*, but slight differences could be seen

between groups on *repetition* (done only by the IWB group) and *expansion* (done only by the non-IWB group). Spada and Fröhlich (1995) express that the incorporation of student and teacher utterances is important in communication in order to contribute to the learners' language development. Figure 4 indicates that although the proportions are not so high, the students in both of the groups did elaborate to some extent on teacher utterances but there were no real differences based on use of the IWB or regular whiteboard. The minor dissimilarities between the groups with respect to the categories of repetition and expansion might be simply a result of the students' familiarity with the topic being taught or even just coincidence.

Conclusion

The next chapter presents the discussion of the results in detail, pedagogical implications of the study and the limitations of the study followed by the suggestions for further research.

CHAPTER V: CONCLUSION

Introduction

This study investigated the impact of IWB use on classroom interaction in tertiary level education. The study aimed to find the similarities and differences with respect to classroom interaction between the teacher and whole class, students and students, and the teacher and individual students in EFL classes supplemented by either an IWB or a regular whiteboard. The participants of the study were freshmen EFL students taking an English & Composition course. The participating teacher taught two groups: a control group, which was taught with a regular whiteboard and an experimental group, which was taught with an IWB. The study sought to identify any differences arising from the use of the IWB in the classes, in other words, whether the use of the IWB has an impact on the amount of classroom interaction (interaction between the teacher and whole class, student(s) and student(s), the teacher and a particular student or vice versa). Also, the teacher or student verbal patterns in the IWB and non-IWB groups were analyzed to see if any particular verbal patterns were emphasized depending on whether IWBs or regular whiteboards were used in the classes. In this study, six classes were observed in total and the classes then were compared in terms of the categories on a modified COLT observation scheme (Spada & Fröhlich, 1995). Later on, the data were analyzed qualitatively and quantitatively in accord with the methods formulated by Spada and Fröhlich (1995).

This chapter will discuss the findings of the study with respect to the relevant literature. Later on, the limitations and pedagogical implications of the study will be presented. After that, based on the findings, suggestions for further studies will be made.

Findings and Discussions

In this study, the following research question was investigated:

1) To what extent does the use of Interactive Whiteboards (IWBs) contribute to classroom interaction in tertiary level English as a foreign language (EFL) classes?

In the next part, the findings are presented according to the categories in the COLT observation scheme (see Appendices 1, 2 and 3), namely: the interaction between the participants, the group organization, the use of material, teacher verbal interaction and student verbal interaction.

The IWB and Classroom Interaction

The findings of the research indicated that the impact of the IWB on classroom interaction was neutral with respect to the interaction patterns investigated through the COLT observation schemes. The percentages of the interaction between the teacher and particular students, the group organization, the use of material, and all forms of both teacher verbal interaction categories (e.g. incorporating student utterances by correcting, repeating, paraphrasing, commenting, expanding student utterances and requesting clarification for their utterances) and student verbal interaction categories (e.g. using target language, giving predictable or unpredictable information, requesting pseudo or genuine information, using ultra-minimal or minimal utterances in their comments, incorporating student or teacher utterances by correcting, repeating, paraphrasing, commenting, expanding their utterances and requesting for clarification) were very similar in the IWB and non-IWB groups. However, minor differences between the percentages of the categories in the IWB and non-IWB groups raise some possibilities about the potential impact of the IWB on the categories investigated.

Discussion of Part A

Part A of the COLT showed the general pictures of the classes in terms of the interaction between the teacher and whole class, student and student, teacher and a particular student. Although the percentages were very similar in the IWB and non-IWB groups, slight differences did occur.

The percentages of the interaction between the teacher and whole class and the teacher and a particular student were slightly higher in the IWB group than in the non-IWB group while the interaction between or among students was a bit higher in the non-IWB group. This finding corresponds with some research in the literature. Smith et al. (2006) and Levy (2002) also noted an impact of IWBs on the amount of teacher to whole class interaction. Smith et al. (2006) investigated pupil and teacher interaction in literacy and numeracy classes taught in IWB equipped classrooms. Their study suggested that the whole class interaction was greater than student-student interaction in the IWB classes. Levy (2002) carried out a study exploring pupils' and teachers' feedback on IWB use in primary education. In her study, IWBs were noted as increasing teacher-whole class interaction since they are easily and readily used for making presentations. When this result is taken into consideration, it raises the possibility that IWB use may somehow lead to a reduction in student-student interaction in the classroom.

In interactive classrooms both teacher-learner and learner-learner interaction are vital. Of these two however, the interaction between or among learners often gets greater attention because it is viewed as a way of increasing student talk in the classroom and of enabling students to work and communicate freely without teacher control (Harmer, 2001; Sullivan, 2000). Knutson (2001) says in a traditional classroom discourse, the focus of which is restricted to teacher-student interaction,

the teacher manages the discourse in the classroom –generally she or he asks questions, the students whom the teacher chooses answer the question and the teacher gives feedback. In such a learning setting, only a few students engage in any interaction, and even then it is extremely limited because their learning process does not go beyond answering teachers' questions and listening to the teacher (Knutson, 2001). Sullivan (2000) expresses that especially group work situations, in which students engage in interaction with each other, are the most effective since they provide students with the opportunity to interact with each other more.

Long's (1996) Interaction Hypothesis suggests the importance of negotiation of the meaning for language acquisition. When the learner utters a sentence which the interlocutor does not understand, the interlocutor gives feedback showing that there is something wrong with what the learner has said. Thus, they both negotiate the meaning and, thanks to the correct feedback the learner gets from the interlocutor, the learner learns the correct form (Long, 1996). Thus, interacting with others becomes very important in language acquisition. Knutson (2001), on the other hand, expresses the crucial role of student-teacher interaction for effective language development since the teacher is the person who can give the most efficient input to the learner. However, he also underscores that varying the interlocutors in the classroom increases the opportunities for students to interact. Such an environment in the classroom can be created with student-student interaction in pair work, group work or even whole class activities because as Knutson (2001) writes, the students' attempts to produce the language are very precious as students' use of communicative strategies such as asking for help, clarification, or arguments about the topic are expected to both improve their learning over time and increase their autonomy in the classroom.

For the slight difference in the percentages of interaction groups in this study, it should be noted that these might have arisen from differences in the student groups themselves, such as previous knowledge about and personal interest in the topic that was being taught. Also, IWB use was, of course, new in the IWB group. Therefore, the novelty effect of the board may have led to a decrease in student-student interaction since the students were focused on doing the activities on the IWB carefully and when a problem occurred with the board, or when they had difficulty in handling the electronic pen or tools used to drag or drop the items on the IWB, they directed their questions to the teacher instead of their classmates. Such circumstances may have resulted in an increase in the amount of interaction between the teacher and student(s).

Through the COLT observation scheme Part A, the percentages of the use of the IWB or regular whiteboard were calculated. In both of the groups, the actual users of the IWB or the regular whiteboard were explored with the intent to investigate if the teacher predominantly used the IWB or allowed students to use it, and if there were any differences in the ratio of use depending on whether it was the regular board or the IWB. The results indicated that in both groups students used the regular or interactive whiteboard predominantly while the teacher kept his use of both boards at a minimum level. Therefore, the change in the board did not make any change in who used the board more.

The findings also showed that when the two groups were compared with respect to the percentages of the use of the IWB and regular whiteboard, the use of the IWB was slightly less than the use of the regular whiteboard. This situation might have arisen as a result of the teacher's lack of practice with the IWB since he had been using the IWB for only three weeks when this research started.

Discussion of Part B

Through the categories in the COLT observation scheme Part B, the communicative features of teacher and student talk were investigated. As a result of the analysis, no significant differences were found between the categories of teacher or student verbal interaction patterns, though slight variations were noted.

Predictable vs. Unpredictable Information. The analysis of the teacher talk in the IWB and non-IWB groups indicated that the patterns the teacher used in both groups were very similar although some slight differences were noted. Under the category of *giving information*, the predictability and unpredictability subcategories were analyzed to explore if the teacher's talk included information which could be easily anticipated by the students. In this study, speech patterns in the teacher's talk were coded as unpredictable if the teacher, for example, answered a student's question by expressing his own personal opinion. In this study, the percentage of unpredictable information the teacher used giving information was 86% in the IWB group, compared with 74% in the non-IWB group. Spada and Fröhlich (1995) explain that the predictability or unpredictability of the information in the dialogues between the teacher and students is important for more communicative classes. If greater unpredictability can be found, it would raise the possibility that the IWB helped to increase the communicativeness in the classes.

Allwright (1984) expresses the relation between interaction and communicativeness by noting that interaction is the core of communicativeness, and that communicativeness in a classroom can be enhanced when the interaction between the teacher and students is most like natural discourse. Natural discourse involves unpredictability, turn taking and questioning (Spada and Fröhlich, 1995). Therefore, this study might suggest that in the IWB group the quality of the teacher

talk had slightly more communicative features than in the non-IWB group when the quality of the teacher talk was evaluated in terms of *unpredictability*. However, it should also be noted that this finding cannot be generalized to all IWB classes because the finding might have arisen from some students' being more familiar with or interested in the topic being discussed in the IWB group.

The higher percentage in *unpredictability* of teacher talk in the IWB group may also suggest that even though student-student interaction was lower—a potentially negative effect with respect to interaction--the quality of the interaction was in a sense higher, in that it was slightly more unpredictable.

In the article, "Using Interactive Whiteboards to Orchestrate Classroom Dialogue," Mercer, Hennessy and Warwick (2010) investigated how the interactive features of an IWB could be used to increase dialogic interaction between teacher and students and student and student in primary and secondary classes in the UK. In their definition of dialogic interaction, they underlined the importance of organization of classroom talk and explained that efficient classroom talk is possible when both the teacher and students are actively involved, in other words, giving their opinions about others' comments, providing reasons or rationales for them, and suggesting new ideas. Expressing the importance of teaching principles arranged appropriately to make the most of an IWB, Mercer et al. (2010) state that the IWB use in their study indicated a positive impact on dialogic interaction in the classroom.

Likewise, Higgins (2010) mentions the effect of IWB use on classroom interaction in literacy and numeracy strategies in primary schools. The findings of his two-year-study suggested that IWB use in his research classes showed more interactive classroom talk due to the increase in "open-ended questions, length of answers from students and use of follow up questions" (p. 89). Thus, Higgins (2010)

draws attention to the fact that IWB use may have had a positive impact on classroom interaction, though still expressing the difficulty of concluding such a certain result from his research data.

The (un)predictability of the information in students' utterances was analyzed in accord with the same procedure of that used with the teacher talk. The results showed that in this case, the unpredictability was higher in students' talk in the *non*-IWB group. This finding seems at first to be at odds with the finding in teacher talk, in which the unpredictability was higher in the IWB group. However, it should also be noted that no predictable information was coded in student talk in the IWB group while 24 percent was coded in the non-IWB group. Such a result shows that student talk overall was less in the IWB group than in the non-IWB group, but the quality of the speech that occurred could be considered highly communicative.

Pseudo vs. Genuine Questions. In both of the groups, the teacher used genuine questions more than pseudo questions. Spada and Fröhlich (1995) express the difference between genuine and pseudo questions by explaining that genuine questions are those to which the questioner genuinely does not know and could not easily guess the answer while the answers of pseudo questions could be anticipated easily. The findings showed that there was only 1% percent difference in the IWB and non-IWB groups with respect to the teacher's genuine or pseudo questions. Therefore, it is possible to conclude from this finding that the use of the IWB did not have either a positive or negative impact on the teacher's questioning in the classroom.

In student talk, the findings show that the proportion of genuine questions students asked in the IWB group was higher than in the non-IWB group. Therefore, while the ratio of overall interaction did not change as a result of the IWB use, it may

be argued that with IWBs there is the potential that the quality of the interaction in the classroom is 'better' since genuine questions are considered to represent more real-life like communication in the classroom (Spada & Fröhlich, 1995)

Minimal vs. Sustained Speech. The teacher's and students' speeches were categorized as minimal/ ultra minimal or sustained according to the length of the clauses they used in their answers to each other's questions. The findings indicated that the teacher used more sustained speech in the IWB group and more minimal speech in the non-IWB group. Seedhouse (1996) discusses the issue of second language classroom interaction which needs to be like natural discourse; in other words, the interaction in the classroom should include turn takings, and the participation in the dialogue should be equal for anyone participating in the communication. Seedhouse (1996) emphasizes the importance of allowing students more time to speak than teachers for an effective learning environment.

In the present study, the high proportion of the teacher's sustained speech in the IWB group may connote a restriction in communicativeness in the classroom because more sustained teacher talk means less student talk in the IWB group. However, more sustained teacher speech in the study may be the result of the fact that the teacher attempted to answer students' questions in the IWB group more than in the non-IWB group. In the IWB group more student-initiated sentences, including questions which the teacher needs to explain more, were coded. The teacher in the study, for instance, got questions such as how to do task, or questions which led him to clarify an explanation made by a student or to make a student's answer or explanation clearer for other students. Thus, the teacher may have kept his speech longer by giving more examples for students' comprehension of the task or

explaining the situation in detail. Therefore, it is not possible to generalize the finding to all classes taught with an IWB.

Incorporation of Student/Teacher Utterances. The categories investigated under this feature are correction, repetition, paraphrase, comment, expansion and clarification request. Of all the categories, comment was the one with the highest proportion in both of the groups. This result may be because of the content of the classes and the way the teacher taught them. The classes were based on the philosophy of games, and as part of this, the teacher asked students to answer questions to reveal what they knew about the topic taught in the class. For comprehension, the teacher asked the students questions about the texts they had studied. Therefore, the students and the teacher discussed the items related to the topic and sometimes made comments about the related pictures the teacher showed. When the two groups were compared to see whether there were any differences in the categories according to the kind of the board used, only minor differences in the proportions of the categories were revealed. It could not be concluded therefore that the IWB has any certain effect on teacher talk regarding the aforementioned categories.

Similarly, student talk was also analyzed to explore the differences in the same categories with the teacher talk. The findings again did not show a possible impact of the IWB on the dominance of any particular categories in student talk. Therefore, the results showed overall that the interaction in the classroom was not enhanced through the use of IWBs. Although the class material used in the non-IWB group was adapted to be used on the IWB, the teacher generally used the same approach and techniques that he used when teaching with the regular whiteboard. Ultimately, neither did IWB use change the dynamics of the activities – group/ pair

or individual work, nor did it greatly affect the dialogues that occurred between the participants in the classes. Thus, the teacher created essentially the same class environment while using both the regular whiteboard and the IWB, and taught in basically the same way in both of the groups.

Discourse Initiation. This category enabled the investigating of the proportion of student- initiated utterances in both of the groups. The findings indicated that there were more student-initiated utterances in the non-IWB group. According to Thornbury (1996), student initiated discourse contributes to classroom discourse since it shows equality in starting the dialogue in the classroom. In this study, the proportion of student initiated sentences was 54% in the non-IWB group while it was 43% in the IWB group. Based on this difference, it might be suggested that in the non-IWB group, students felt more confident to initiate dialogue than the students did in the IWB group. Whether IWB use actually had an impact on the decrease in student-initiated utterances in the IWB group or not is very challenging to determine. It is possible that the differences between student groups in terms of contextual background and/or inhibition may have affected the finding, since the students in the non-IWB group were observed asking more questions to the teacher about the topic and giving more explanations about the teacher's questions. However, the exact causes of the proportion differences in student initiated utterances between the groups remain purely speculation since possible factors such as students' contextual background and inhibition were not assessed in the study.

Use of Target Language. This category was used to see whether IWB use has any impact on the target language use. The results indicated that there was no significant difference between the two groups in their use of the target language. The

use of L1 in the classroom was not much overall. Nevertheless, when total L1 use was averaged, the proportion of L1 use was slightly lower in the IWB group.

The proportion of target language use was high in both classrooms, but it should also be noted that the students used the L1 only to the extent that their teacher allowed them to use in both groups. The result suggests that the IWB does not have a direct relation to increasing target language use in language classes, but on the other hand, it cannot be said to have a negative impact on it, either.

This study aimed to explore the differences in classroom interaction based on what can be considered as a realistic description of IWB use—in other words, the kind of use that might actually be expected from a real teaching situation, not a focused research context. Therefore, the participant teacher was given a certain amount of training on IWB use, and then was allowed to freely create his materials and decide on his own lessons using the IWB. He was not asked to use any particular IWB features specifically, and he was not reminded to make use of the IWB. Rather, he decided on the material to be used and the way he would teach it. He received only a minimal help to adapt his material to use on the IWB. The results of the study, while not showing significant differences between the two groups, may however reflect more closely what might happen in classrooms if teachers are only provided minimal training and technology. The results are a strong reminder that a change in teaching and in learning outcomes is possible when the teachers and the students are fully prepared and supported throughout the process.

Limitations of the Study

Various limitations can be noted in terms of the small size of this study. First, only two groups – one in a class using IWBs and another in a class using a traditional whiteboard -- were observed. In each of these groups, there were only approximately

15 students. This number may not represent a very wide population of tertiary level EFL students; therefore, the findings can only suggest possible implications with respect to IWB use.

Secondly, the students in the experimental and the control groups were taught by the same teacher. While this was a positive factor in trying to isolate differences based on the use of the IWB, having more participant teachers and investigating differences in several teachers' instructional practices when supplemented by a regular board or by an IWB might have provided different results and could have allowed for the comparing and contrasting of different approaches and kinds of instruction.

In addition, because of time constraints, the methodology of this study included only six observations in total for both the IWB and non-IWB groups. Had a more longitudinal study been conducted, more different interaction patterns might have been observed, or the percentages of the categories calculated might have changed.

Another limitation of the study stems from the instrument: the modified COLT observation schemes. The analyses of the data collected via this instrument were calculated by noting the starting and ending times of the main activities and the episodes within them. Therefore, the analyses were able to reveal only an overall picture of the events and approximate calculations for each category in the instrument. However, if more detailed measurements and calculations could have been made with the help of electronic devices developed for this aim, more reliable results might have been found.

Pedagogical Implications of the Study

Classroom interaction is well accepted as a critical feature in language classes if students are to learn effectively (Allwright, 1984). The rapid developments in technological areas bring new devices that can be used for the benefit of better language teaching and learning. In this study, IWBs, which have been increasingly used in learning settings since the 1990s, were investigated in order to explore if this particular technology has any negative or positive impact on classroom interaction.

The main finding of this study is that IWB use does not influence classroom interaction dramatically. The study does not indicate great contributions of IWBs to classroom interaction; therefore, it may be concluded from the study that an IWB is not the critical factor enabling students to interact in the classroom. On the other hand, IWBs do not have negative effects on interaction, either. An IWB is not likely to detract from interaction. Hence, making the most of the IWB depends on the teacher and how the IWB is used in the classroom. In order to benefit from the IWB most in the classroom, teachers, first of all should be aware of the fact that the technology alone does not bring effectiveness. For effective classes especially for communicative ones involving lots of interaction in the classroom, teachers need to focus on developing their pedagogy because the technology is only the means for serving to that purpose. Another implication resulting from the findings is that teacher trainers should help teachers learn how to integrate the IWB into their classes effectively. If indeed IWBs are going to help promote interaction in language classrooms, the trainers should also provide their students with specific instruction on how the IWBs could be used more interactively.

The study indicated that student-student interaction in the IWB class was a bit less than that in the non-IWB group. This result may have been due to students'

limited exposure to IWBs in the observed group. Therefore, teachers should be aware of such a possible early problem and should arrange IWB activities in the classroom allowing pair work or group work so that student-student interaction in the classroom can be enhanced.

Also, the study showed that the interaction between the teacher and the whole class (as a choral) was slightly higher in the IWB group. This finding may arise from IWBs being primarily used for presentation purposes. Therefore, the trainers should warn educators about potential risks in the use of IWBs, and should provide them with an efficient training to make the most of the interactivity of IWBs.

Suggestions for Further Research

This research basically focused on exploring the differences in the classroom interaction types when an IWB is used in a tertiary level foreign language classroom. The size limitations of the study might be addressed in order to enhance the study's generalizability and achieve more reliable results, so this study may be replicated with a larger participant group over a longer observation period using different or multiple instruments.

In the experimental group, there was very little intervention into the teacher's IWB use. The teacher was not forced to use particular IWB features such as, accessibility to multimedia resources in coordination with other interactive components of the IWB such as activslate or active response. Nor was the teacher asked to apply a particular pedagogy specifically to increase a particular skill. Hence, a future replication of this study involving a more specific teacher training program on IWB use; investigating the impact of focused IWB use with a predetermined pedagogy on classroom interaction might provide interesting further insights into the potential of this particular classroom technology.

The impact of the IWB use on classroom interaction was investigated at the tertiary level using a modified COLT observation scheme. COLT observation schemes include more categories than the ones investigated in this study, the other categories in the scheme such as *student modality, content, content control, reaction to form and message* might also be investigated in order to see if there are any differences in those categories depending on IWB use. Such studies might provide further insights into the possible impact of IWBs on the classroom interaction in EFL contexts.

This study indicated that the higher ratio of *unpredictability* in the IWB class might be an indication that certain communicative features of the teacher's talk were higher in the IWB group, thereby increasing the quality of interaction in the classroom. A more in-depth qualitative investigation into the factors supporting this finding may be important to explore how IWB use might increase communicativeness, which is essential in language classrooms.

In IWB classes, a rise in interest among the participants to use the IWB was observed. However, how IWB use affects the interest in the classroom was not in the scope of this study. Therefore, this study gives some speculations about the novelty effect of the IWB, an effect that may disappear over time as the students and the teacher get used to this technology. A further study might be conducted to explore how the interest factor of IWBs changes over time.

Conclusion

This study has aimed to reveal the relationship between the use of IWBs and classroom interaction in comparison with the interaction patterns that occur in classes equipped with regular whiteboards. Since there is lack of studies investigating

particularly the interaction between EFL students in tertiary level education resulting from the use of the IWB, the study contributed to the relevant literature.

The study has showed that there are no major differences in classroom interaction when the IWB is used or not. The IWB has neither an increasing nor decreasing effect on classroom interaction. However, based on the casual observation in the IWB and non-IWB groups, the study raises the possibility that this technology may help to inspire students' interest. Therefore, successful practices of IWB use can be recommended to be integrated into the curriculum by means of a careful adaptation of the materials and a systematic and intentional training in how to integrate technology into the classroom.

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