



**INTERNATIONAL BLACK SEA UNIVERSITY
FACULTY OF EDUCATION AND HUMANITIES
DOCTORAL PROGRAM IN EDUCATION SCIENCES**

**Managing Classrooms with Interactive White Board (IWB): Using IWB
and its Effects on Learning Outcomes and Learner Motivation while
Teaching Geometry (A Case Study of Ishik University in Iraq)**

Hamdi Serin

Extended Abstract of Doctoral Dissertation in Education Sciences

TBILISI - 2016

Scientific Supervisor: **Diana Mtchedlishvili**

Assoc. Professor, Doctor, at International Black Sea University

(supervisor's signature)

Experts (full name & academic title):

1. **Prof. Dr. Natela Doghonadze**

2. **Assoc. Prof. Dr. Mehmet Şahiner**

3.

(if any)

Opponents (full name & academic title):

1. **Assist. Prof. Dr. Faisal H Nesayef**



2. **Assoc. Prof. Dr. Irma Barbakadze**

3. **Prof. Dr. Nino Nakhutsrishvili**

(if any)

INTRODUCTION

Recently, there has been growing interest in the inclusion of technological devices in education. In particular, interactive whiteboard has been largely used in educational settings. Its wide use in educational environment has contributed to learner achievement to a significant extent.

According to Özden (2002), technology-aided education is defined as an individual or community device of implementation that everybody can proceed, according to the level of personal perception and comprehension of knowledge, and it is applied by using the materials of the courses for providing an opportunity to get education in the most suitable time and place for themselves; it is also accessed over Computer and its network (LAN, Intranet, Internet); it has multimedia features and is prepared in interaction with pedagogical characteristics; it does not only transmit information and data, but also it tries to give skill.

In addition to the fact that the application of technology in the mathematics education (in most of the countries) has recently started, there are very significant findings about the impact of technology support on mathematics teaching. Thus, it is inevitably required to make radical changes to be able to provide much more effective and beneficial teaching in the Mathematics (Memişoğlu, 2005).

Geometry is an area of study of mathematics dealing with shapes and space. This area of study has an important role in developing students' critical thinking and problem-solving skills (Pesen, 2006). Students start to understand and express the world around them by means of geometry and they analyze and solve the problems. They can also express from the perspective of the shapes to understand the abstract symbols better. Within this context, they can understand the shapes around them and can set up connection between daily life and mathematics.

Technology might have different roles and impacts on learning process of geometry as well as mathematics on the whole. Not only is it used as a channel in the transmitting information to the students, but also can it be used as a cognitive device that will ease cognitive burdens of the students in the process of sharing information because these technological aids enhances mathematics and, in particular, geometry knowledge of the students and helps learners with their development of critical, mathematical and three-dimensional thinking skills as well as problem- solving abilities.

The way how the technology is implemented is the one of the main factors affecting class management. In the applications of technology-aided education based on behavioral approach, traditional lecturing method is supported so that student motivation is increased. In a class which employs constructivist approach, student-centered studies are given priority. Consequently, classroom management techniques will automatically change. The studies in the literature have shown that the integration of technologies into the class medium will both give birth to positive consequences and on the other hand some troubles will merge (Gerard et al., 1999; Jones, 2004). The physical elements like the set arrangement of the class, number of computers, dust status in the class, weather temperature have become the items that are added to the classroom management. Additionally, the technical problems faced by teachers also started to affect lesson teaching and automatically classroom management, as well. Teachers make use of technology to bypass such problems because, as Karataş and Güven (2008) stated, the technological devices provide diversity for teaching activities; increase student motivation and active participation in the lessons; and support high-level thinking skills, for example, dynamic geometry software used in mathematics teaching is getting more popular day-by-day. Using effectively accurate software with dynamic properties in geometry teaching gives opportunity to support experiences and teach geometry through searching method for students. As the themes in geometry involve more abstract concepts compared to other domains in mathematics and some in the content are related with three-dimensional objects, students must think in a complex way by using imagination much more (Yıldız, 2009).

Significance of the Study

The developments in the technology have caused various changes and consequences by affecting the learning process in which the classrooms and learning environments are equipped with the required hardware and supported with the related software. However, in some countries this transformation process is a bit slow compared to most other countries. Within this sense, this study is a unique case study discussing the importance and the role of the interactive whiteboards on learning and teaching outcomes in Iraq, where the biggest part of the education provided for students is still based on traditional approaches. On the other hand, this study was held and applied at Ishik University in which all classrooms are equipped with interactive whiteboards. In this sense, this study is a virgin study to be held at Ishik University in Iraq, particularly in the field of geometry.

Novelty

This study attempts to relate the concepts of interactive whiteboard incorporation in geometry teaching. The dissertation finds the integration of interactive whiteboard in geometry classes highly useful, yet highlights some important issues that should be dealt with while using it. In spite of the fact that there are many studies investigating the results of using interactive whiteboard in Mathematics classes, there are very few studies on its implementation in geometry classes.

The topic is totally new for the region, where the study was held (Iraq), and where geometry instruction is still carried out via traditional methods.

Theoretical and Practical Value

The study discusses the role of interactive whiteboard in classroom management, motivation improvement and learner achievement. This study suggests an innovative approach to teaching geometry, which includes interactivity of learners in geometry classes. The potential of IWB allows to use software's that eases the comprehension of geometry as they provide an excellent learning environment in which learners interact and participate actively. Consequently, this kind of learning environment motivates learners and triggers their attention towards geometry learning. Furthermore, the study has found that classroom management is highly facilitated by the implementation of interactive whiteboard.

Interactive whiteboard has been considered a significant tool in geometry learning and teaching. This study reveals that its use in geometry classes makes huge contributions to the learning environment, classroom management, motivation, and learner achievement. IWB creates interactivity in the learning setting which has a key role in the learning process because interactivity not only improves motivation of learners but also their overall achievement. Through interactivity learners' participation in the learning process is fostered thus they are actively immersed in learning.

The study has a great practical value, as it suggests a useful way of geometry learning and teaching to students, teachers and researchers. IWB can empower learning through presentations that facilitates the comprehension of geometrical concepts. These presentations allow learners to approach a problem of geometry from different dimensions by enabling them to develop thinking skills.

Objectives of the Study

This study investigates the role of incorporating technology into Geometry classes. It compares traditional methods and technology-based instructions and discusses the learning outcomes of both strategies. Furthermore, this study examines the managerial and practical benefits of Interactive Whiteboard in geometry classes. The objectives of the study are:

- a. To explore the differences between traditional and technology-based teaching in geometry classes.
- b. To demonstrate the advantages of the interactive whiteboard in mathematics and geometry classes;
- c. To find out the influences of utilizing technology in the students' learning outcomes in Geometry classes;
- d. To discuss the significance of the interactive whiteboards on classroom management;
- e. To illustrate how to turn traditional classes into student-centered classes;
- f. To discuss the role of technology in teaching Geometry and the learning process.

Statement of the Problem

Mathematics and geometry learning has always been source of frustration for learners. Learners cannot easily understand abstract problems that requires imagination. However, technology-aided classroom environment can facilitate the learning process; particularly, Interactive Whiteboard allows teachers to deliver geometry as well as mathematics in an enjoyable and motivating way. Unlike traditional teaching methodologies, technology-based instructions are more effective during teaching and learning process and enable learners to comprehend them with ease. By means of the positive effects of the Interactive Whiteboards, students pay more attention and gain much more motivation. As for the teachers' perspective, teaching is supplemented by the technological aids. For instance, abstract and complex topics can be visualized by use of the technology; the time is saved; much more examples can be done as well as classroom management is supported.

Research Questions

1. What effects does interactive Whiteboard have on achievement of Geometry learning?
2. What are the attitudes of teachers' and learners' towards technology in geometry teaching?
3. Does technology-based education influence learners' motivation?

4. How do traditional and technological instructions differ in terms of promoting learner achievement?
5. What are the possible benefits of the application of interactive whiteboards in geometry classes in terms of learner motivation, comprehension and classroom management?
6. Does the use of interactive whiteboards have positive impact on student engagement in Geometry classes?
7. What management strategies are the most useful in the inclusion of interactive whiteboards in Geometry teaching?

Research Hypothesis

The hypothesis of my dissertation is:

Interactive Whiteboard has positive impact on classroom management and learner achievement in Geometry classes,

- ✓ The use of interactive whiteboard positively influences classroom management.
- ✓ The use of interactive whiteboard motivates learners and promotes their concentration.
- ✓ The use of interactive whiteboard creates an enjoyable learning environment.
- ✓ The increased student involvement, concentration, comprehension and motivation yield higher student achievement.

Methods of Research

To solve the problems discussed above, the study utilized the following methods of research:

- ✓ Review and analysis of existing literature on the topic
- ✓ Questionnaires
- ✓ Experiment
- ✓ Statistical analysis of obtained data
- ✓ Interview

Structure of the Dissertation

The dissertation comprises the following parts: introduction, 3 chapters, conclusion and appendices. It involves 34 tables and 14 figures. Its volume is totally 122 pages (184 pages, including all parts and appendices).

Organization of the Chapters

This study discusses the effects of using Interactive Whiteboard on learning and teaching outcomes at Ishik University in Iraq.

The introduction involves an overview of the significance of the research, its novelty, practical and theoretical value, research methods, and hypothesis.

In the first chapter of the study, basic definitions are given, the types of software used for geometry teaching and the role of technology in general and the Interactive white Boards in particular are discussed.

In the second chapter, the study gives background information by making references to the previous studies on the investigated issue that have been conducted.

In the third chapter, the study examines the university students' psychological peculiarities and their impacts on learning geometry and development of materials in parallel to the classroom management. Also, this chapter focuses on the effects of Interactive Whiteboard activities and application on geometry learning.

The fourth chapter analyzes the data gathered during this study. The collected data has been analyzed through graphics and charts in this chapter. Major findings are presented.

In the conclusion part, the results of study are discussed. The answers to the research questions are given.

CHAPTER 1 LITERATURE REVIEW

Technology-aided instruction has changed the traditional approaches to the courses requiring abstract and mathematical thinking like geometry. Rather than presenting the courses in the way of lecturing, these courses are supported by the use technology-supported devices, IWBs in particular since these devices not only provide time economy, but also multiple opportunities to be utilized by both the educators and the learners. In this way, the motivation and the success increase. The lessons are turned into entertaining atmospheres in which the students feel less worried and more active during the teaching process. Besides some negatives sides, the IWBs provide numerous positive contributions to the classroom management, motivation and the attitudes of the students towards the geometry.

CHAPTER 2 REFLECTIONS ON THE ROLE OF INTERACTIVE WHITEBOARD IN GEOMETRY CLASSES

Depending on the many studies some of which have been illustrated above, it is true to say that the IWBs have an important place in the education and it has changed the ways how the learning and teaching processes are treated. Especially, considering the geometry into consideration, these devices are the supplementaries that increase the motivation of the students by providing interaction between the learners and the educators. Because of the multi-functional properties of these boards, it becomes easier to manage the classrooms and the learning is not jailed into the walls of the schools, rather it has become a fact which is always available by help of the internet and sharing options. Since these boards strengthen the interaction between the learners and the teachers, the mental presence/participation of the learner increase that brings the academic success, in parallel.

Teaching geometry with IWBs involves various activities, such as routine true/false (for theoretical items), multiple choice (for both theoretical and problem-solving tasks), drawing according to the problem's conditions or making a drawing for proving a theorem, as well as more creative making origami, holding competitions, doing puzzles and making animation.

For the teacher, IWBs help to

- develop, maintain, edit, apply and reuse visually impressive materials with a 3-D effect, when necessary
- make drawings exact and high quality, with color application, where needed
- save classroom time wasted in traditional classrooms on writing on the board and deleting again and again
- present the materials in a motivation way
- provide feedback
- during the lesson, to go back to remind something that has already been learned / done
- involve students in hands-on activities
- assess students effectively and fast
- share course materials
- visualize the abstract items
- provide multifunctional activities
- have an entertaining lesson

- reduce the monotonousness

For the students, IWBs help to

- understand the materials better
- concentrate of the materials under study
- learn from each other
- fulfil hands-on activities, be involved and motivated
- be motivated
- develop their creativity
- solve more geometrical problems
- have interaction with the lesson and the teacher
- get remote access for the course materials
- easily adapt themselves to the software
- provide easier communication with the teacher, even while out of the classroom.

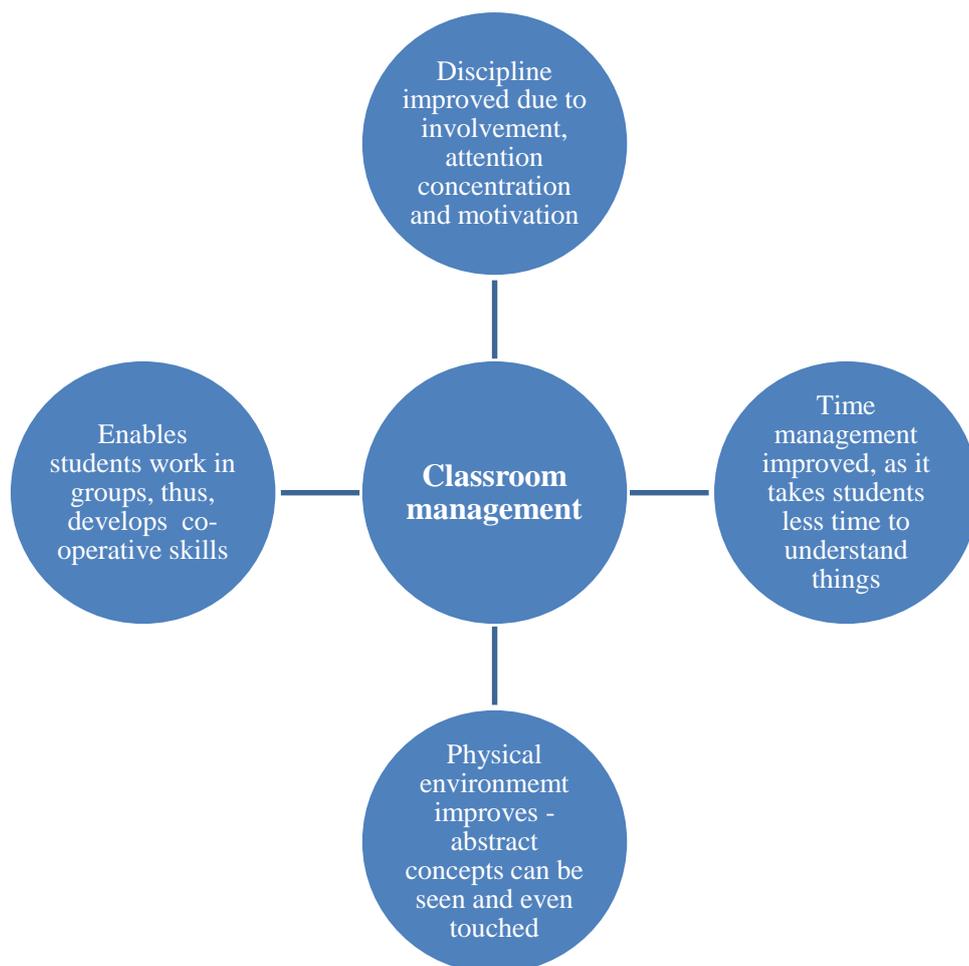


Figure 1. The impact of IWB on classroom management

As seen in the figure, the use of interactive whiteboard enhances concentration, motivation, time management, group working of learners which play the key role in classroom management.

Table 1. Activities that are used during the classes

	Practice	Teaching	Learning	Fun	Assessment
Animated lectures and presentations	√	√	√	√	
Origami	√		√	√	√
Project-based tasks	√		√	√	√
Math Days	√		√	√	√
True - False Activity (during teaching the concepts)	√	√	√		√
Pictures	√	√	√	√	
Videos		√	√	√	
Puzzles (during teaching the concepts)		√	√	√	
Animations	√	√	√	√	√
Sliding Activity	√	√	√	√	√
Free Drawing Activity	√		√	√	√

Table 1 displays the classroom activities employed in geometry classes in the study. The students have a tendency to get bored during the geometry classes because of the majority of the abstract items and subjects. They have difficulty in focusing on the class and as mentioned before, it is essential to *see* rather than *look* so focusing occupies a significant place. Therefore, enriched sources of the activities (see table 1) are very helpful in breaking the monotonousness of the lesson.

In Figure 2 it is shown how classroom management in geometry classes can be achieved. The application of different software such as 3D Cabri, GeoGebra contributes to classroom management. The table also provides some useful activities that can be used through the use of these software and the final table yields possible outcomes the activities lead to.

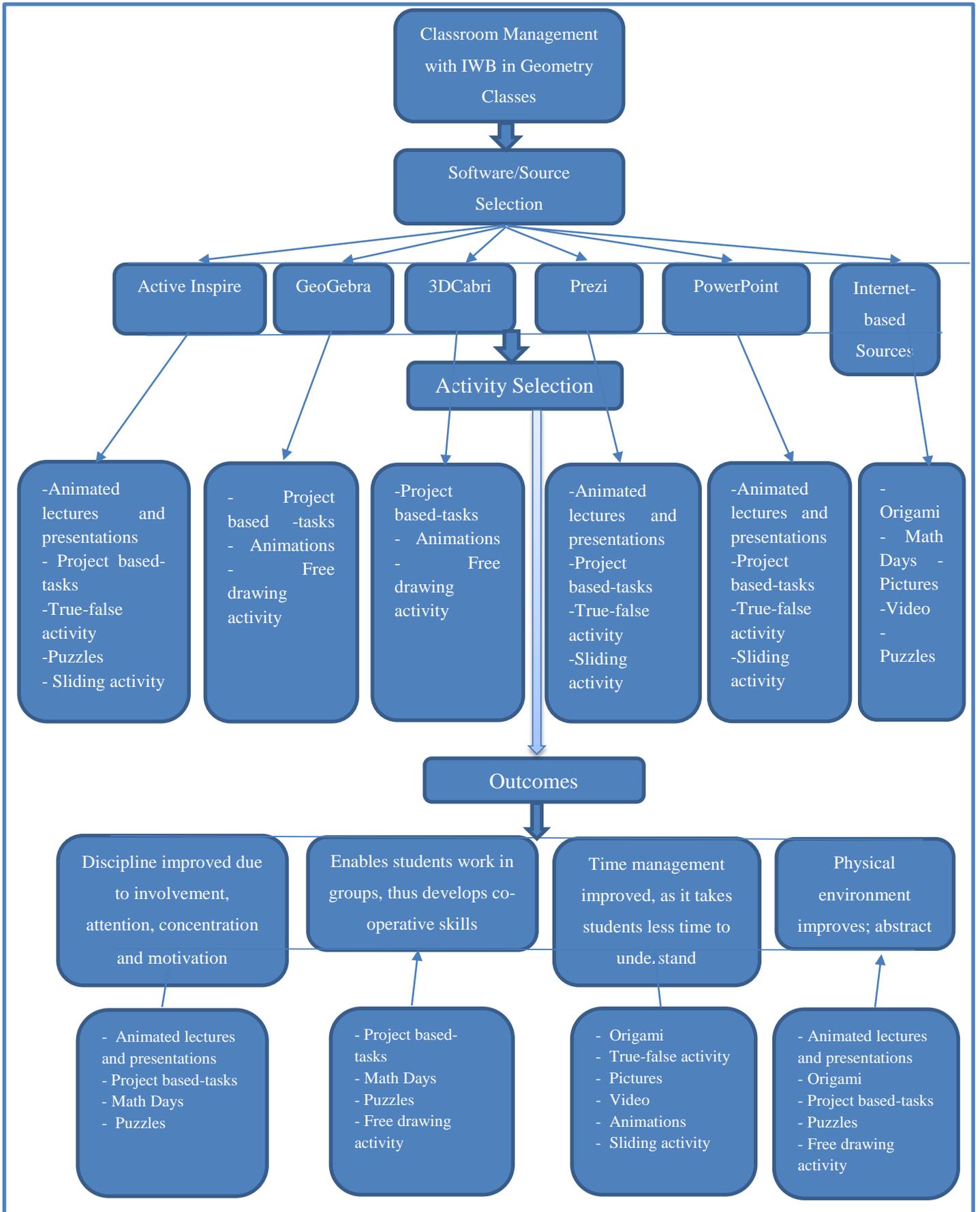


Figure 2. Classroom Management with IWB in Geometry Classes

CHAPTER 3: RESEARCH HELD AT ISHIK UNIVERSITY

Organization of the study

ISHIK UNIVERSITY is a private university owned by the Fezalar Educational Company. The university was established in 2008. Moving to its new campus in 100 meter Street, the institution has 6 faculties with 15 departments and given alumni from all faculties. Additionally, Ishik is also a TOEFL Center besides Continuing Education Center.

In 2014-2015, Ishik Sulaimani Branch was opened and started education with prep classes of Engineering and Business Faculties. The university has also started Student Exchange Programs through which the first group of 16 students from different departments has been sent to different universities in the different countries.

The university makes use of the latest technology in its campuses and international lecturers from 7 different countries give professional education in English language.

The faculties occupied with the premises of Ishik are Science, Engineering, Dentistry, Administrative Sciences and Economics, Law and Education that cover various departments.

Education Faculty covers English Language Teaching, Physics Education, Biology Education and Mathematics Education Departments.

Mathematics Education Department was established in 2013. The medium of the instruction is English and the duration of the education is 4 years. The students are accepted to this department in accordance with the criteria given by the Ministry of Higher Education and Scientific Research of Kurdistan Regional Government. The criteria of the admissions are:

- ✓ Only the graduates from the Sciences are eligible to apply.
- ✓ Students' average for the Placement Test of the Ministry must be equal to 60 points or higher.
- ✓ 80 students from (local or international) are accepted for this program.

At Ishik University, Mathematics Education Program is designed to allow teacher candidates to take a variety of classes related to the development of secondary and high school students.

The Program of Mathematics Education to be taught in the English language has a mission that includes teaching, research and service consistent with the wide missions of the faculty of education and the universities in these areas.

The classes are equipped with Interactive Whiteboards, projectors and touchscreen computers with single credential access system in which all lecturers have their own specific home folders to put the related documents. The documents are prepared in the offices and accessible via home folders. Lecturers do not have to carry any software or hardware in this sense. On the other hand, it is sometimes problematic for the lectures to be able to make use of these technological options. Within this context, training workshops are arranged for the lecturers in need.

The courses are given in the way of presentation most of the time for the social sciences, but as for the applied sciences, it is given through the experiments or other applicable methods. Interactive Whiteboards, in this sense, are very important. For example, geometry lessons are taught by using 3DCabri software which is reflected on the smartboard as well as an ActivInspire Application of the board itself. There is also a traditional whiteboard which gives opportunity of writing quick notes for the lecturers in addition to the software used during the classes. The activities made during the lessons are saved and given to the students to make the learning permanent.

The students are given tasks or additional duties regarding the courses from *student access system* and *imoodle system* in which all students and academicians have their designated pages to give tasks and to make the required announcements. Additionally, students are given a questionnaire about the lecturers, courses and the university via these systems and feedbacks are evaluated in the end of each semester to take the required cautions.

The curriculum has been supported with the Information Technologies courses also because it has been detected by these questions and the observations of the lectures that some students are not sufficiently good at computer skills so they have difficulty in following or using the software inside or outside the university. Additionally, the questionnaire and pre-tests have shown that geometry courses have been given in the late high school final class. Students focus on the Placement Test to be applied by the Ministry of Higher Education and Scientific Research and this exam, Mathematics have an important place where geometry is presented as a subdomain so it is given minor significance compared to the most of the subjects. Thus, the

geometry education at Ishik University starts from the very basic geometry by also taking into consideration that the alumni of the department will be able to teach in the primary, secondary or high schools after the graduation; in this sense the approach to teaching is somehow pragmatic.

Design of the Study

The study employs both qualitative and quantitative methods at the same time. Qualitative research covers many questions “that help us understand and explain the meaning of social phenomenon with as little disruption to the natural setting as possible” (Merriam, 1998, p.5). Moreover, “the qualitative researcher collects open-ended, emerging data with the primary intent of developing themes from the data” (Creswell, 2003, p.18). This study utilizes a qualitative research approach to observe the effects of using Interactive Whiteboards on the motivation, outcome and the performance of the learners, data has been gathered through the questionnaire applied to the students and also by the tests. For this purpose, open-ended questionnaire questions, as well as interviews were used. Besides, quantitative approach has been used in this study to draw meaningful results from examination scores learners had been given as pre, mid and post-tests followed by the exams. Quantitative analytical approaches enable to report data results in numerical terms which help measure the credibility of research findings. In the dissertation, quantitative approach was used to measure students’ learning outcomes through pre, while, and post-testing.

Sample Selection

The target population of this study was students. Ishik University Mathematics Education Department’s students participated in this study. Two groups of learners were created and each group contained 20 learners so totally 40 students were selected in this research. The students in both groups were formed according to the results of the Placement Test, applied by the Ministry of Higher Education and Scientific Research, from which the students are supposed to get 60 or higher points from Maths that includes geometry subjects. Also students must study science subjects in high school. Moreover, it should be borne in mind that the placement exam scores of learners in both groups are very close to each other. The groups as A or B were chosen randomly. No additional criteria were employed.

Each group was applied a questionnaire and also pre, mid and post tests and also six exams. At the same time 3 lecturers and 5 students from experimental group were interviewed.

At the beginning of the semester, the students were informed that their examination results were going to be used in the experiment conducted for this dissertation. However, they were not reminded this fact each class to avoid any possible stress and discomfort that might occur between the two groups.

Data Collection

The experiment lasted for two semesters. The results obtained from the exams and the questionnaire were evaluated by using SPSS analysis software.

Data for analysis included test and examination scores of the learners and questionnaire results. The primary method of data collection was setting learners' examinations, as the pre-test was followed by three exams; the mid test was tracked by three exams as well as the post-test.

The learners in the control group were applied traditional geometry instruction in which only the whiteboard was used and the lessons were not supported by the technology containing Interactive Whiteboard. At the end of the academic year, students were applied questionnaire.

The learners in the experimental group were applied modern geometry instruction in which both the whiteboard and the Interactive Whiteboard were used. Besides sometimes using traditional equipment and methods, the lessons were supported by the technology containing Interactive Whiteboard, projectors, computers and other media. In the end of each semester, students were applied questionnaire. Moreover, data was collected from the interview of lecturers and students as well.

Ethical issues

Although learners were not aware that they were part of the study, while gathering data feeling of stress and discomfort arose.

The study did not reveal the names of the students who could not get sufficient results. In the same context, the same method was used for the questionnaire results as well. The students that the questionnaire and the experiment results and/or the names of the students would not be announced under any circumstances as well as not affect their academic results at university.

Gender and ethnicity is another ethical issue the study deals with. The participants involved national and international students of both genders. This study would not make any

comparison among the scores of learners from different genders and nations. The lecturer's fundamental role in this study was to find out how to make geometry lessons understandable and encourage learners by improving their outcomes, performance and motivation.

Additionally, the university administration was also informed about the study and the relevant permissions were provided.

Data Analysis

This study is based on questionnaire and exam results of the learners. The exam results of two semesters belonging to the learners played the paramount role in deciding the effect of using Interactive Whiteboard on the learning outcomes and motivation. Exam results of the students in both groups were calculated and they were transformed into tables, charts and figures.

The analysis was done by the comparing each exam to each other for each group. For each comparison, a table, chart and SPSS analysis were given.

As for the questionnaire results, they were compared to each other and the comparison was given as table, chart and SPSS analysis.

Interview findings and their analysis

5 students and 3 teachers were interviewed to determine the effect of the use of IWBs on classroom management. It was performed in English language because the language of the instruction at Ishik University is English; therefore, it was chosen as the interview language. If the students, who were clever, careful and mindful of the interview, had any problem in understanding the questions, then they were given translations to provide correct comprehension and their answers were recorded. Later on, the transcription was typed.

In the same way, the teachers who have given courses in two methods: traditional way and by using IWBs, were interviewed and their answers were also typed. Some questions were the main questions and some other were the supporting ones, so the answers were interpreted accordingly.

Below find the typical and interesting answers to the interview:

- **The use of interactive whiteboard increases learners' motivation in geometry classes.**

Interactive whiteboard is a useful tool to employ in the geometry classes. It motivates and increases learners' concentration. This board can be used as an effective supplementary resource for the teachers to enhance the content of the lessons and to contribute to the flow of the classes. Students are bored most of the time during the traditional classes because of the nature of geometry. These interactive boards affect the perspective of the learners in the learning process.

- **The use of interactive whiteboard promotes learner achievement**

Interactive whiteboard has a direct impact on the students' academic achievement and success. As stated by Erginbaş (2006), the use of technology during the lessons reduces the anxiety and worry level in the classes.

- **The use of interactive whiteboard facilitates classroom management**

Classroom management is an essential factor to increase the learner achievement (Celep, 2000). The lecturers/teachers can make use of different techniques and/or supplementary tools to be able to set up classroom management in the classes. Within this sense, Interactive whiteboards are quite useful devices to be made use of by the educators in order to get students engaged in the learning process.

The learning environment influences the learning and teaching effectiveness; for that reason interactive whiteboard can enhance classroom management in the learning settings (Evertson and Weinstein, 2006).

- **The use of interactive whiteboard provides effective instruction and education**

With the introduction of the interactive whiteboards in classes, the concept of material has changed a great deal. The material is no more limited to the notebooks or the borders of the classroom and it is not totally bounded to educators. By means of these boards, both the learners and the educators have a chance to access the data and information very fast, to have the support

of the additional software and through the different options provided by the IWBs, the obtained data or the notes can be shared, as well.

➤ **The technical background concerning affects the classroom management and concentration**

While technology provides many opportunities, it also brings some difficulties, if the required education on how to use is not obtained. Sabanci et al. (2014) have mentioned that these technological devices cause some troubles in terms of classroom management, such as having technological failures because of integrating old software into new computers; using low quality/model IWBs; the software used does not allow flexible operations to teachers because of lack of technical information and more.

➤ **The use of interactive whiteboards with additional software affects the education and provides time economy**

The interactive whiteboards alters the learning and teaching styles. In terms of time saving these boards gives a chance to have an unlimited white board area and to save the files and the documents as well as recycle them. Besides, aided with the additional software, they increase participation of the students and their academic success.

➤ **The use of interactive whiteboards increases student participation in the classes**

Levy (2002) stated in her study that the implementation of interactive whiteboard triggers more teacher-student interactions by boosting discussion, questioning, and greater student participation in the lessons.

➤ **The use of educational technologies contributes to the interaction between student and the educator**

Gerard et al. (1999) have stated that “the merit of SMART Board [a brand of IWB] is that it enhances conversation” between teacher and students. The interaction between student and the educator is very important to set up a comfortable atmosphere during the learning process. In this sense, the teachers have to consider to arouse a communicative medium to get the students to be engaged in the lessons.

➤ **The use of interactive whiteboard increases students' motivation**

Bush et al. (2004) have mentioned that the boards made teaching more visual and learning more interactive, in turn encouraging greater participation from the pupils, improving their motivation and concentration. The monotonousness of the lessons is one of the great barriers before the students' success. In such a class medium, the learners are bored with the topic discussed. The method to be employed by the educator will change this situation. Within this sense, IWBs are quite beneficial to contribute to the learner's motivation because as the more they are motivated, the more they are ready to learn.

➤ **The use of interactive whiteboard changes students' attitudes towards geometry**

Piroska Biro (2011) has concluded in his study that students appreciate technological devices, because of it the lessons become more interesting, more joyful, funnier and easier to understand the subjects. Furthermore, they feel more motivated because they can make search about the topics on the internet which makes learning process more enjoyable.

➤ **The use of interactive whiteboard affects students' critical and abstract thinking abilities**

Most of mathematical, including geometrical, concepts are abstract notions requiring a high level of cognitive activities. When students achieve these cognitive skills, the learning process becomes completed. As most of the items are both abstract and complex, the instruction and methodology are very important. Interactive whiteboards provide a serious aid for the educators to turn the abstract concepts into materialized units. In this way, students can perceive any abstract subject easily and this directly affects their thinking abilities.

Limitations of the Study

The study is based on a case study. Case studies do not show the whole part of a study, but they demonstrate a small part of it, so it can be said that case studies focus on a specific issue. Besides, case studies mostly reflect specific space and time. This study is specific to Ishik University mathematics department students who are freshmen and the study covers two semesters. The study emphasizes the influence of implementing Interactive Whiteboard on learning and teaching at Ishik University in Iraq. Nevertheless, the researcher argues that the

findings of this study could be generalized at least to a certain extent. The results of this study can be adapted to other learners in other places.

This study demonstrated similar results as previously conducted researches. For that reason, the results of this study could be utilized for other institutions that wish to transform their classes into technological one with Interactive Whiteboards.

CONCLUSIONS & RECOMMENDATIONS

This research demonstrates that university students in the experimental group (integrating IWB into instruction) have had significant effects on motivation, the learning outcomes and the classroom management, compared to the students in the control group (using traditional methodology of teaching). This means that integration of the IWB into instruction positively contributes to the academic success of the university students besides the classroom management.

In the age of information technologies, educational technologies play a significant role in the education and instruction. Among those technologies, the place of the interactive whiteboard is not indisputable. These boards provide the opportunity to present geometry lessons in an entertaining and motivating way. On the contrary to the traditional instruction methods, technology-aided education is much more effective and beneficial in teaching and learning process. Interactive Whiteboard brings a new and fresh atmosphere into the classroom, by which the learners pay more attention to the class and get motivated. Consequently, their attitude towards geometry changes in a positive way and their academic success increases.

Geometry is challenging at times, but it can be made much more joyful, funny and comprehensible. Interactive whiteboard is a beneficial device to give the comprehension in the geometry classes. It motivates the learners and increases their concentration. Further, it provides an effective classroom management for the educators.

Traditional methods most of the time have difficulty in creating good learning environment for the learners, but this does not mean that traditional methods were totally inefficient. The need to use educational technologies somehow has become a prerequisite because the technology improves very fast and the adaptation has become necessary to be able to

keep up with the rest of the world. That is why schools make investments on the IWBs and expect the teaching staff to use interactive boards actively. Within this context, use of IWBs has become challenging for the educators, because the students can easily catch up with the latest technology; they can quickly make shift from one technology to another and adapt themselves to the new ones, so the inadequacy of the educators on the use of technology is a paramount problem in front of the educators in terms of classroom management and providing effective teaching.

The use of computers and Interactive Whiteboards can enhance geometry learning, because by means of IWBs it is possible to provide more examples and exercises in a very short time, and different methods and practices can be applied, and consequently they provide immediate feedback, so that learners can have self-evaluation. For instance three dimensional geometrical origami shapes.

According to Wubbels and Levy (1993), the interaction between the teacher and student is very significant because it will affect interest, motivation and the academic success. Within this context, interactive whiteboards are one of the supplementary sources for the educators.

Learning outcomes go in parallel with the participation ratio of the students. Of course, only physical attendance is not sufficient. It must be accompanied by the mental readiness. IWBs provide a comfortable learning environment for learners. Students participate willingly and confidently in the classes. Interactive Whiteboard is a creative tool that draws learners' attention because it contains many resources and exercises in geometry.

While traditional instruction is one-directional from teacher to the students, computer-aided instruction can offer many varieties to sustain learning process effectively; the teacher is not only the source of information, but is an active presenter of the knowledge and a guide who will direct the students by providing a suitable learning environment in terms of classroom management.

The major peculiarities of the IWBs have a potential to provide the educators with the opportunity to apply multiple and interactive teaching options. Additionally, these utilities can help the educators convert the conventional class atmosphere into a student-centered and collaborative place (Somyurek et al., 2009).

To sum up, learners significantly change their attitudes towards geometry in a positive way if IWB is incorporated into geometry instruction effectively. The students' motivation is increased and their academic achievement is fostered as well.

The research recommends the lecturers to adapt technological tools in their classes. In particular, the use of interactive whiteboard in geometry classes cannot be ignored. When interactive whiteboard is used, learner's motivation, concentration, achievement, interactivity, participation increase in the classroom. Of course, IWBs cannot automatically increase students' motivation and learning outcomes. They should be applied by teachers qualified to do so, also effective methods and classroom management are needed. This study has proved that these factors are significantly enhanced by the implementation of interactive white board in geometry instruction and it is shown that achievement of learner's increases (approximately for 35 %), which is especially essential in developing countries.

List of publications in which the main ideas and findings of the dissertation are reflected:

1. Serin, H. (2015, May). The Effects of Interactive Whiteboards on Teaching Geometry. 5th International Research Conference on Education, May 1-2, 2015, Tbilisi, Georgia, 390-394.
2. Serin, H. (2015, June). The Impact of IWB on Learner Achievement in Mathematics Classroom: A Case Study. *International Journal of Social Sciences & Educational Studies*, 1(4), 4-9.
3. Serin, H. (2015, September). The Role of Interactive Whiteboard on Motivating Learners in Mathematics Classes: A Case Study, *International Journal of Social Sciences & Educational Studies*, 2(1), 10-15.
4. Serin, H. (2015, September). The Role of Technology in Whole-Class Teaching, *International Journal of Social Sciences & Educational Studies*, 2(1), 25-27.
5. Serin, H. (2015, October). The Role of Interactive Whiteboard on Classroom Management, *International Journal of Academic Research in Progressive Education and Development*, 4(4), 94-100.
6. Serin, H. (2016, April). Investigating the Role of Interactive Whiteboard Technology in Learner Engagement and Achievement in the Mathematics Classroom, *Journal of Education in Black Sea Region* 1(2), 141-147.