The Impact of IWB on Learner Achievement in Mathematics Classroom: A Case Study

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Abstract: Interactive Whiteboard has recently been very popular in education. Unlike traditional methods, technology enhanced learning in particular the use of Interactive Whiteboard leads to effective instruction in the classroom. The use of Interactive Whiteboard has a positive effect upon comprehension, high concentration, enhanced motivation and learner participation which are considered as major factors in efficient learning. This study investigates the role of Interactive Whiteboard on learner achievement in Mathematics classroom. 40 university students participated the study. While the students in the control group had instruction through traditional methods, students in the experimental group were instructed through IWB. The study lasted 6 weeks and it was found that students in the experimental group yielded better results in the examinations than the control group.

Keywords: Interactive Whiteboard, Effective Learning, Achievement, Mathematics

1. Introduction

Recently Interactive Whiteboard (IWB) has been widely used in the classroom and the implementation of IWB has changed education. Compared with traditional approaches, the use of IWB in the classroom has been found more effective because it has made great contributions to the teaching and learning process. There is a widespread assumption that IWB can motivate learners to engage in learning. Unlike traditional methods which cannot create an effective learning environment in the classroom, IWB can promote learners' enthusiasm for higher achievement. Furthermore as IWB can turn the teaching and learning process into fun, learners become more engaging. Learner engagement holds an important place during instruction because involved learners learn more efficiently. Traditional methods are mostly teacher-centered yet IWB promotes student-centered learning thus its effective use can capture learners' attention. IWB has the potential to enrich the classroom environment through offering a great many interactive activities which learners can truly benefit from. Accommodating different learning styles leads to a more productive learning environment.

2. Literature Review

With the advent of technology, IWB has been integrated into classrooms and has become "an innovation that is gaining considerable presence in many contemporary classrooms" (Zevenbergen & Lerman, 2008, p. 107). IWB offers many varied opportunities in the classroom hence it might change "people's ways of learning and thinking" (Papert, 1987, p.23). The impact of IWB on classroom instruction and enthusiasm for learning cannot be underestimated. Many researchers emphasize the effects of IWB on motivation and learner engagement (Bacon, 2011; Türel & Johnson, 2012; Aytac, 2013; Özerbas, 2013). Not only are learners immersed in activities conducted through IWB in the classroom with great passion and zeal

but also teachers' teaching efficiency is promoted. Aytac (2013) highlights the use of IWB in the classroom and concludes that it "raises not only children's motivation for study but also teacher's teaching efficiency" (p.1907). Motivation is enhanced, concentration is raised and learning is promoted when IWB is used wisely in the classroom (Hall & Higgins, 2005; Levy, 2002). Learners are immersed in the classroom activities more actively in a learning environment where IWB is implemented, moreover high level of interaction is achieved (Smith et al., 2006).

IWB has been widely used in Mathematics classroom as well. Mathematics has always been source of frustration for many learners yet the use of IWB facilitates learning mathematics (Heddens & Speer, 1997) and since IWB can create a low anxiety learning environment in the classroom learners think more effectively (Peker, 1985). IWB is used in a wide range of activities in the classroom so lessons are more lively and enjoyable (Alakoc, 2003). Furthermore, IWB plays a major role in motivating learners. Motivation has a key factor in achievement (Kaya, 2001). In a study conducted by Tataroglu (2009) with 124 students it was found that the use of IWB enables learners to produce more positive attitudes towards learning mathematics. Another study by Andic (2012) revealed that IWB promoted achievement of learners in mathematics classroom. In a nutshell, IWB is a useful tool that influences learner achievement.

3. Research Questions

This research has tried to investigate the following questions:

1) Does the use of IWB in mathematics classrooms facilitate learning?
2) Does the use of IWB in Mathematics classrooms influence learner achievement?

4. Methodology

4.1 Aim

This research aims to examine the impact of IWB on student achievement. It has been widely recognized that the use of IWB in the classroom has produced positive achievement effects. The study mainly puts emphasis on the contributions of IWB to learner achievement in Mathematics.

4.2 Participants

Two groups participated in this study: control group and experimental group. Both groups consisted of 20 students who were first year students at Mathematics department at Ishik University in Iraq. The department has two classes in first year group and each group has 20 students. The classes were created randomly. While one of the groups was used as control group, the other one was used as experimental group.

4.3 Data Collection

Data collection took place over a period of six weeks. Learners in both groups study the same content and work through the same curriculum. While learners in the control group studied through traditional methods, learners in the experimental group studied through the use of IWB. Weekly examinations were

held in which learners in both groups had the same questions. It was said to learners that the results of the examinations would contribute to their final grades.

4.4 Data Analysis

This study analyzed data consisting of six test scores**.** The collected data in six weeks were transformed into tables and graphs.

Table 1: Exam Results of Control Group

Name of student	First Exam	Second Exam	Third Exam	Fourth exam	Fifth exam	Sixth Exam
Student 1	84	85	86	86	88	90
Student 2	82	83	84	85	86	88
Student 3	79	79	80	82	83	85
Student 4	78	78	78	82	81	84
Student 5	77	78	77	80	81	82
Student 6	75	75	74	76	78	81
Student 7	73	74	74	75	76	79
Student 8	70	71	73	72	74	78
Student 9	69	69	71	70	72	75
Student 10	68	68	70	70	72	74
Student 11	68	67	69	68	70	73
Student 12	66	66	67	68	70	71
Student 13	64	64	66	67	69	69
Student 14	61	61	63	65	64	67
Student 15	60	60	62	63	62	65
Student 16	60	60	62	61	59	64
Student 17	58	59	60	61	58	63
Student 18	56	57	59	60	58	62
Student 19	55	55	57	60	57	61
Student 20	51	53	53	55	56	60
Average	67.7	68.1	69.2	70.3	70.7	73.55

Table 2: Exam Results of Experimental Group

Name of student	First Exam	Second Exam	Third Exam	Fourth exam	Fifth exam	Sixth Exam
Student 1	84	86	88	89	90	90
Student 2	83	84	85	88	89	89
Student 3	81	82	83	87	89	88
Student 4	79	81	82	85	87	87
Student 5	77	78	81	84	86	86

Student 6	76	77	80	83	85	85
Student 7	73	76	78	82	84	85
Student 8	71	73	76	81	82	84
Student 9	70	72	75	80	81	83
Student 10	69	71	74	78	79	82
Student 11	68	69	73	75	78	80
Student 12	66	66	71	73	75	80
Student 13	65	65	69	71	74	79
Student 14	61	64	67	70	72	78
Student 15	61	63	65	67	68	77
Student 16	60	61	63	65	66	76
Student 17	59	60	61	63	64	74
Student 18	58	59	60	61	62	70
Student 19	57	58	59	61	60	67
Student 20	54	56	58	60	60	63
Average	68.6	70.05	72.4	75.15	76.55	80.15

Figure 1: The averages of exam scores of both groups in all weeks

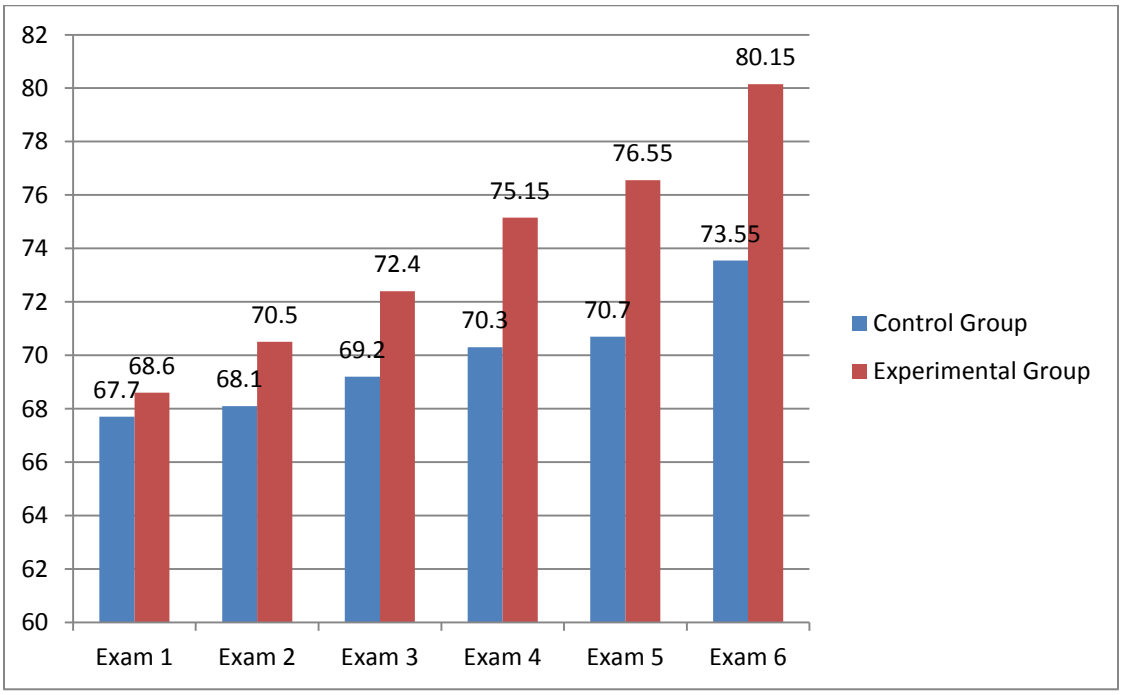
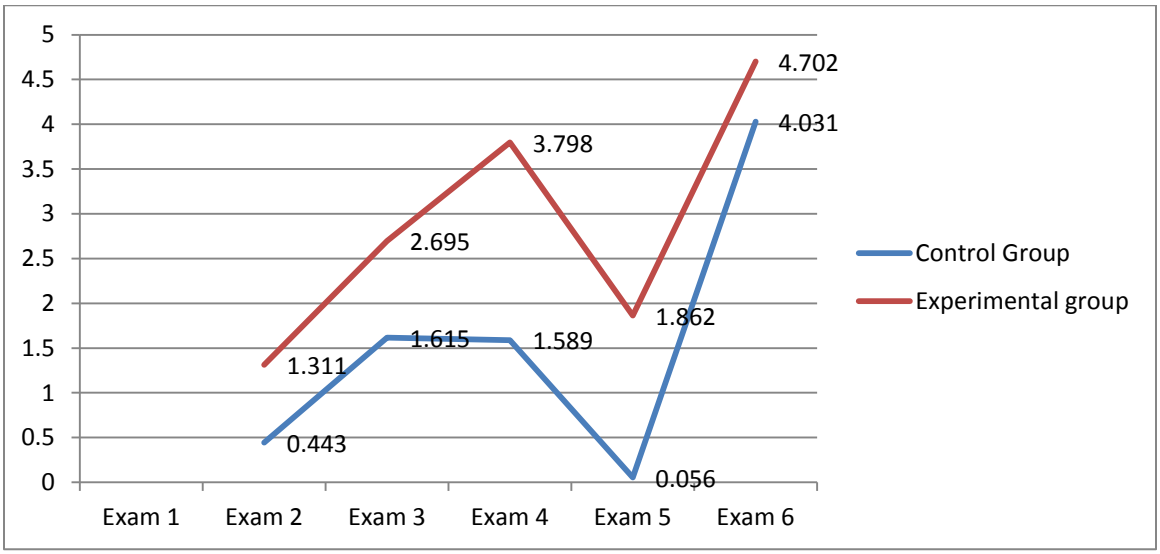


Figure 2: Achievement growth of both groups in all weeks



5. Findings

This research investigated the impact of IWB on learners' achievement in mathematics classroom. To examine the role of IWB, learners in both control and experimental group were instructed through different strategies and had weekly examinations. While instruction to learners in the control group was given via traditional methods, it was given to learners in the experimental group via the use of IWB. The averages of the examinations of learners in the control group were respectively 67.7, 68.1, 69.2, 70.3, 70.7, 73. 55 (Table 1). The averages of the examinations of learners in the experimental group were respectively 68.6, 70.05, 72.4, 75.15, 76.55, 80.15 (Table 2). The study revealed that learners in the experimental group had higher achievement in the examinations. In all examination averages it was observed that learners in the experimental group had better results (figure 1). When the achievement growth of weekly results was examined, it was seen that learners in the experimental group improved better (figure 2). For instance learners in the control group had an average of 67.7 in the first week and 68.1 in the second week. These results yield that the achievement growth of learners in the control group for the second week is % 0.443. In the same vein learners in the experimental group had an average of 68.6 in the first week and 70.05 in the second week. These results yield that the achievement growth of learners in the experimental group for the second week is % 1.311. When table 3 is examined, it was seen that in all weeks throughout the study the achievement growth of learners in the experimental group is higher. This study has found out that the use of IWB facilitates comprehension of mathematics and improves achievement of learners.

6. Conclusion

When implemented appropriately, IWB can enhance achievement of learners. Its influence on motivation, concentration, and creation of enjoyable learning environment contributes to higher

achievement. IWB has potential to enable learners to do better. Various activities that can be conducted through the use of IWB can encourage learners to learn efficiently.

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