

The effects of using an Electronic Interactive Whiteboard in Developing students' Attitude, Cognitive Motivation and Academic achievement

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Abstract

The aim of this study was to identify the effects of the use of an interactive whiteboard on the development of the students' attitude towards study, cognitive motivation, and academic achievement in the eighth grade in basic education in the Sultanate of Oman. The attitude towards study, cognitive motivation and academic achievement scales was applied to a sample of (176) students from two basic education schools in one area. 86 students were chosen from school one as an experimental group and they used the electronic interactive board in teaching, and 90 students were chosen from school two as a control group using conventional way. Results showed statistically significant differences between the students in the two groups in the attitude towards study, cognitive motivation and its dimensions (motivation to acquire knowledge, the risk of acquiring knowledge and employment of knowledge), and academic achievement in favor to the students using the interactive whiteboard. The researchers recommended the use of interactive whiteboard technology in all schools, and training teachers to integrate it in teaching.

Keywords. electronic interactive whiteboard - attitude towards study- cognitive motivation -academic achievement.

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1. Introduction

Technology in Education is very much essential to meet the global challenges. Students can use new technology as it becomes available, and often complete tasks more efficiently. When students use technology to complete a task correctly, they will probably use the same technology again in a similar situation. The learning must require the learner to do more than just read page after page. Requesting frequent responses and interaction keeps learners engaged. A picture or short video can say a lot more than words and also can hold learner attention. In the era of globalization, the explosion of technologies is impacting the world in more ways than it can be imagined.

According to AKBAğ & PEKTAğv (2011) the rapid changes occurring in information and communication technologies have also altered the traditional classroom environment and instructional methods. Beeland (2001) states that, starting from the mid-1990s, electronic interactive whiteboards are a good example of new technologies used in today's classrooms. These whiteboards based on computer technologies seem to be replacing traditional black or white boards, which were once considered indispensable (AKBAğ & PEKTAğv, 2011). Interactive whiteboards need to be connected to a computer, a projector and a touch screen electronic whiteboard. At the heart of the interactive whiteboard lies a touch screen smart board (Klammer et al., 2001) which students can use the touch screen whiteboard to experiment, solve, write and erase applications such as visual experiments, visuals, animations and graphics. Electronic microscopes, multimedia materials, videos, data tables, CD ROM, or the Internet may be used depending on the software programs used by these whiteboards (Miller, Glower and Averis, 2005).

Interactive whiteboard is one of the most important tools of information technology as part of adaptation to the classroom Brown et al., 2011); Sears; Swanson & Mainzer (2011). The interactive whiteboards which are also known by names such as smart board, electronic board, provide persistence in learning providing visual materials supported with sound and animation (DeSantis, 2012). the interactive board consists of a combination of a computer, an interactive board, an interactive pen, a projector and with the use of some software. Sarı & Guven (2013).

The interactive whiteboard (IWB), also called the interactive whiteboard (IW) or the interactive digital whiteboard (IDW), is an electronic whiteboard on which the teacher can display content projected from a computer, tablet, or other source, and which can be used as a touch screen (using a pen or finger) Chen & Tsai (2013). The IWB is usually used for multimedia presentations that can include images, audio, video, and Internet links (Dinsa & Emran, 2011).

According to Gashan & Alshumaimeri (2015) the benefits of using new technologies in mathematics education

as well as increasing the success, are seen as important in respect to positive attitudes towards math, increasing attention, unease towards mathematics courses and fear reduction and, more importantly, analytical and effective thinking habits (Bruce et al., 2011). On the other hand, Isman et al. (2015) lectured the 7th-grade geometry topics with educational games on the interactive whiteboard and investigated the effect in the understanding of the issues and he found that using of interactive whiteboard makes it easy to grasp and understanding of materials.

According to Rokeach (1972) as cited in (Martino and Zan, 2001), attitudes are defined approaches as an organization of several beliefs focused on a specific object or situation tendency one to respond in some preferential manner. The attitude is a psychological or mental preparation status that is formed as a result of experiences, that has a leading or dynamic influence on a person's behaviors towards all objects or situations in which he or she has been involved (Freedman, Sears and Carlsmith, 1989). Attitudes are intensive feelings, relatively stable, which are consequence of positive or negative experiences over time in learning a topic. also defined the attitude as a combination of tendencies, human emotions, fears, beliefs as to a distinct problem and prejudices. attitude is a tendency present in a person and directed to objects, events or human beings in the light of his or her experiences (Chen, 2008). In addition, attitude was constructed the consequence of person according to his/her past experiences and it is a behavior preparatory tendency rather than an observed compartment.

The motivational variables including self-efficacy and task value are significant predictors of students' achievement. However, considerable research also revealed the significant role of cognitive engagement in students' achievement (Kahraman & Sungur, 2011); Greene, Miller, Crowson, Duke, & Akey, 2004). Cognitive engagement concerns students' willingness to expend effort and long period of time to comprehend a subject deeply or master a difficult skill and the type of processing strategies that they use for learning (Fredericks, Blumenfeld & Paris, 2004; Ravindran, Greene, & Debacker, 2005; Rotgans & Schmidt, 2010).

The social interactions among the students in the classrooms may have important role in improving their self-efficacy. Similarly, teacher attitudes towards the students' behaviors can have determinative role in shaping their motivation (Kulwinder (2014). If a science teacher, for example, encourages students to involve in an activity and help them see mistakes as part of learning, students can feel more efficacious and enthusiastic to take part in the activities (King & McInerney, 2014).

Purposes of the study

This study was aimed to explore the effects of the use of an interactive whiteboard on the development of the students' attitude towards study, cognitive motivation, and academic achievement in the eighth grade in basic education in the Sultanate of Oman. The research questions to obtain these views were as follows:

1. Are there any statistically significant differences in the attitude towards the study due to using the electronic interactive whiteboard in teaching?
2. Are there any statistically significant differences in dimension cognitive motivation and the total score due to using the electronic interactive whiteboard in teaching?
3. Are there any statistically significant differences in academic achievement due to using the electronic interactive whiteboard in teaching?

2. Method

Research method: Quasi-experimental research method was used in this study. Quasi-experimental research is research that resembles experimental research but is not true experimental research. Although the independent variable is manipulated, participants are not randomly assigned to conditions or orders of conditions Because the independent variable is manipulated before the dependent variable is measured, quasi-experimental research eliminates the directionality problem.

Participants: A sample of (176) students from two basic education schools in one area in the Sultanate of Oman were chosen. 86 students were chosen from school one as an experimental group and they used the electronic interactive board in teaching, and 90 students were chosen from school two as a control group using conventional way. The two groups were equivalent in intelligence and the previous achievement.

Data Collection Instruments

- 1- Raven matrices scale: The Raven's standard progressive matrices having 60 images in 5 sets A, B, C, D & E were administered collectively to measure intelligence which are in the form of designs with a missing piece. The subject selects one of six choices which will complete the design correctly. The

- tasks involve attending to the stimulus figure followed by a series of analyses of the choices leading to selection of the appropriate response. Raven (1986).
- 2- Cognitive motivation questionnaire: The questionnaire included the sub-sections (motivation to acquire knowledge, the risk of acquiring knowledge and employment of knowledge) total 36 items The items are answered on a 3-point Likert from strongly disagree to strongly agree, The Cronbach alpha reliability check was ringing (0.73 - (0.79), and experimental validity with achievement was (0.78).
 - 3- Questionnaire of students' attitude towards the study (ATS) (prepared by the researcher), using their experience and the related literature, self-report questionnaire, the final form of the questionnaire was consisted of (28) items including background information and Likert-scale items was administered. Then validity of the questionnaire was checked by using expert judgments, and criterion validity, its reliability was checked by using internal consistency (Cronbach α equation), it was (0.84).
 - 4- Academic achievement: Two standardized achievement tests were used to assess the students' achievements in mathematics and reading comprehension. The achievement tests were paper-and-pencil tests that were administered at the participating schools. The mathematics test was based on an item bank of 50 multiple choice questions, the reading comprehension text consisted of several short texts about which multiple choice questions were formulated. An item bank of 46 questions was used. Thus, different versions of the mathematics and reading comprehension tests with both anchored and unique items were used for students. The reliability for the mathematics test was .94 and for the reading comprehension test it was .92. Since we attempted to explain students' academic achievement in general, a latent factor based on both test scores was included in the path models.

3. Results

To answer the first research question which sate: Are there any statistically significant differences in students' attitude towards the study due to using the electronic interactive whiteboard in teaching? T-test was used to determine if there was any significant difference between the two groups.

Table 1. Independent samples t-test for the performance of both groups on attitude towards the study (ATS)

| Group | N | df | Mean | t | Sig. |
|--------------|----|-----|--------|--------|--------|
| Control | 90 | 175 | 94.72 | 8.39** | 0 .000 |
| Experimental | 86 | | 110.58 | | |

Note: **P <0.01

For attitude towards the study (ATS), the result in (Table 1) shows that there is a statistically mean difference for (ATS) ($t=8.39$, $p < 0.01$). Therefore, there is adequate evidence to accept the hypothesis, as there is a statistically significant difference in means between two groups on (ATS) favor experimental group.

To answer the second research question which sate: Are there any statistically significant differences in dimension cognitive motivation and the total score due to using the electronic interactive whiteboard in teaching? a T-test was used to determine if there was any significant difference between the two groups.

Table 2. Independent samples t-test for the performance of both groups in the dimension cognitive motivation and total score

| | Experimental | Control | T | Sig. |
|-----------------------------|--------------|---------|--------|--------|
| Acquire knowledge | 31.17 | 27.51 | 5.36** | 0 .000 |
| Risk of acquiring knowledge | 30.34 | 25.36 | 6.01** | 0 .000 |
| Employment of knowledge | 29.57 | 25.47 | 5.72** | 0 .000 |
| Cognitive motivation | 91.08 | 78.34 | 7.73** | 0 .000 |

Note: **P <0.01

For cognitive motivation, the result of (Table 2) shows that there is a statistically mean difference for total score ($t=7.73$, and their dimension; 5.36, 6.01, 5.72 $p < 0.01$). Therefore, there is adequate evidence to accept the hypothesis as there is a statistically significant difference in means between the two groups in the dimensions of cognitive motivation and total score favor experimental group.

To answer the third research question which sate: Are there any statistically significant differences in students' academic achievement due to using the electronic interactive whiteboard in teaching? a T-test was used to determine if there was any significant difference between the two groups.

Table 3. Independent samples t-test for the performance of both groups on the Academic achievement.

| Group | N | df | Mean | t | Sig. |
|--------------|----|-----|-------|-------|------|
| Control | 90 | 175 | 67.59 | 67.59 | 0.05 |
| Experimental | 86 | | 72.18 | | |

Note: *P < 0.05

For academic achievement, the result of (Table 3) shows that there is a statistically mean difference for Academic achievement ($t=4.21$, $p < 0.05$). Therefore, there is adequate evidence accept the hypothesis as there is a statistically significant difference in means between the two groups on Academic achievement in favor of experimental group.

4. Discussion and Conclusion

Teaching with the interactive whiteboard has a significant impact on the cognitive motivation and students' attitude towards the study of the students and it improves and academic achievement. These results are similar to results conducted by Balta & Duran (2015); Gashan & Alshumaimeri (2015); Ipek, I., & Sozcu (2016). Their results showed that when interactive whiteboard used correctly and appropriately, it will enrich learning environment and it will be efficient tool to develop motivation, problem-solving and critical thinking skills of students (Lefebvre et al., 2016). On the other hand, Szabo and Turel & Johnson (2012) investigated the effect of the interactive whiteboard technology on student achievement, they showed that regardless of how efficient method it cannot replace the blackboard. In his description study to examine the impact of the interactive board on mathematics achievement in primary education, the conclusion is that using technology is having a huge impact on the cognitive motivation, students' attitude towards the study and academic achievement. While some teachers are implementing technology use often other teachers are using technology very little during their instruction. The results on the common achievement assessment depending on technology use. In fact, the teacher who used technology the most had the largest student passing percentage of all the teachers.

The individual's attitudes towards study presented alteration when subject to the influence of improvements apart from himself. interactive whiteboard contribution to this alteration seemed to be quite high. teachers were generally assessed the students by using interactive tools, Students' attitudes towards technology used according to the field they are studying have a positive attitude towards study compared to other students. This result is consistent with the studies performed by Chao, W. (2003), Chen, C. H. (2008). and Kaplan and Roblyer, M. (2003), Park, S. H., & Ertmer, P. A. (2007). The decisive course of student selection in the field is more interactive. It can be said that process will be educated in a field related to a higher education, and therefore they are more successful in achievement and attitudes towards interactive teaching are more positive than others. On the other hand, some of the students choose this field because they will see technology tools in upper education, while others choose this field to escape from science courses. The majority of students in other areas choose these areas as an escape from traditional method, where it is necessary to make choices based on interest, desire and profession.

Accordingly, designing learning environments that help students enhance their self-efficacy level appears to be important to improve their science achievement. According Sedaghat, M., Abedin, A., Hejazi, E., & Hassanabadi, H. (2011), individuals' self-efficacy level can be developed from four sources: task mastery (e.g., success experiences); social persuasion/support; vicarious experiences (e.g., Observing others); and emotional or somatic states. Accordingly, science teachers can support their students' self-efficacy development stressing the linkage between the students' effort and their successes rather than making the normative comparisons

In addition, learning materials and activities in science classrooms should allow the students to have successful experiences enhancing their self-efficacy level. Additionally, social supports like teachers', parents' or classmates' verbal encouragements help the students improve their self-efficacy level. Those verbal encouragement messages should stress that the student has a competency to achieve the related science tasks and activities, but those messages should be realistic and suitable for the students and not beyond their current knowledge and capabilities

The reason technology use is having a stronger impact on the common cognitive and emotional assessment is how the technology is implemented. All teachers not received the same technology last year with very little information on how to use it. Further research is needed to understand how this new technology affects student learning and teaching at the level of all categories of factors. The results obtained will constitute the point of starting to investigate the positive effects of IWB integration for learning and teaching.

5. Recommendations

As a result, teaching with the interactive whiteboard is effective in improving students' cognitive motivation and students' attitude towards the study of the students and it improves and academic achievement. In this context, it is proposed that in the classroom teaching teachers should give place to the interactive whiteboard activities. As for research that can be done in the future, the impact of the interactive whiteboard teaching on students for effect of another variable.

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