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Secondary students' perspectives on the use of the Interactive Whiteboard for teaching and learning of Science in Malaysia

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Abstract

This study which was exploratory in nature, aimed at gaining insights into students' perspectives in the teaching and learning of Science using the Interactive Whiteboard technology. Interviews were carried out during lessons in the classrooms of three selected schools. This study shows that the interactive whiteboard can motivate the students as well engage them with the teaching and learning process. The appropriate use of the IWBs promotes increased classroom interactions. The introduction of IWBs into the classroom entails much more than the physical installation of the board and software. Results from this study indicate that students interact more in classrooms where technology is used effectively.

Keywords: Interactive Whiteboard, Teaching and learning of Science, Classroom interactions

1. Introduction

Skills regarding information and communication technologies (ICTs) have gained incremental importance for education, employment and communication in recent years. ICTs have become significant tools to access information, educate individuals and conduct interactive instructional activities regardless of time and location (Mobbs, 2002).

Technology has changed dramatically and the advancement has affected almost every aspect of our lives. However there is a great need to discover if technologies when utilized, will enhance education and the learning process. A classroom environment where technology is used in innovative ways could lead to improve learning and teaching (Wishart & Blease, 1999).

The interactive whiteboard (IWB) is one example of such emerging technologies. The IWBs allow teachers and students to relate with technology in a manner that was not previously possible. The touch-sensitive board allows users to interact directly with applications without having to be physically at the computer which is projecting the image onto the board, providing two-way interaction between the teacher or student and the medium. This level of interaction allows a wider range of participation by the student, leading to an increased state of engagement, in the learning environment as found by Bryant & Hunton (2000).

2. Background of study

Interaction among the students is promoted with use of IWB, The interaction between the students, the learning materials and the teacher, also increases as a large work space is provided for hands-on work with multimedia resources. A display surface large enough for everyone to see encourages high levels of student interaction as found in research done by Latham (2002). A teacher and a student can interact with the IWB at the front of the class while the students remain involved. As research from the United States, the United Kingdom and Australia indicates, the IWB allows for the progress of classroom activities that are engaging for students (SMART Technologies Inc., March 2006). This encourages more participation and interaction in the classroom and greater focus in the teaching and learning process. As a result, student learning outcomes are improved.

In the United States, research by Gerard and Widener (1999) found that the interaction in the classroom was being supported by the interactive whiteboard. In addition, it also helped with the presentation of new cultural and linguistic elements. Research by Solvie (2001) revealed that the interactive whiteboard was a novel and created enthusiasm for learning in the students. Further, Solvie (2004) discovered that "Visual display in the form of diagrams, webs and pictures, as well as use of colors and shapes to highlight text, prompted engagement (in SMART Technologies Inc., March 2006, p.6)." Additional U.S. studies focusing on the attitudes of middle-school students and teachers towards interactive whiteboards indicate a strong preference for the use of interactive whiteboards in the classroom. The result of Beeland's (2002) study, indicated that interactive whiteboards can be used to increase student engagement during the learning process in the classroom.

Within the context of using the Interactive Whiteboard in the teaching and learning of Mathematics and Science, many surveys have been administered that target views (e.g., teachers and policy makers) about the effectiveness of using this technology tool to improve students' achievement in teaching and learning of Mathematics and Science . Noticeably absent from the dialogue are student perspectives. Students are growing up with evolving technologies and often adapt to them more quickly than educators who are trying to develop new, innovative ways to teach. We believe that students' perspectives are particularly important given the unique historical context in which we live today. Thus, the objective of this study, therefore, was to elicit the students' perspectives on the teaching and learning of Mathematics and Science using Interactive Whiteboard.

2.1 Connecting to Learn: Student Engagement

Learning an integrally social activity because most people need to strengthen their understandings and beliefs by asking others questions (in SMART Technologies Inc., March 2006, p.7). The social learning theory is grounded in the perception of the social learner and for the purpose of knowledge construction. Student engagement is seen as a key component. These learning aspects are shown in the following figure:

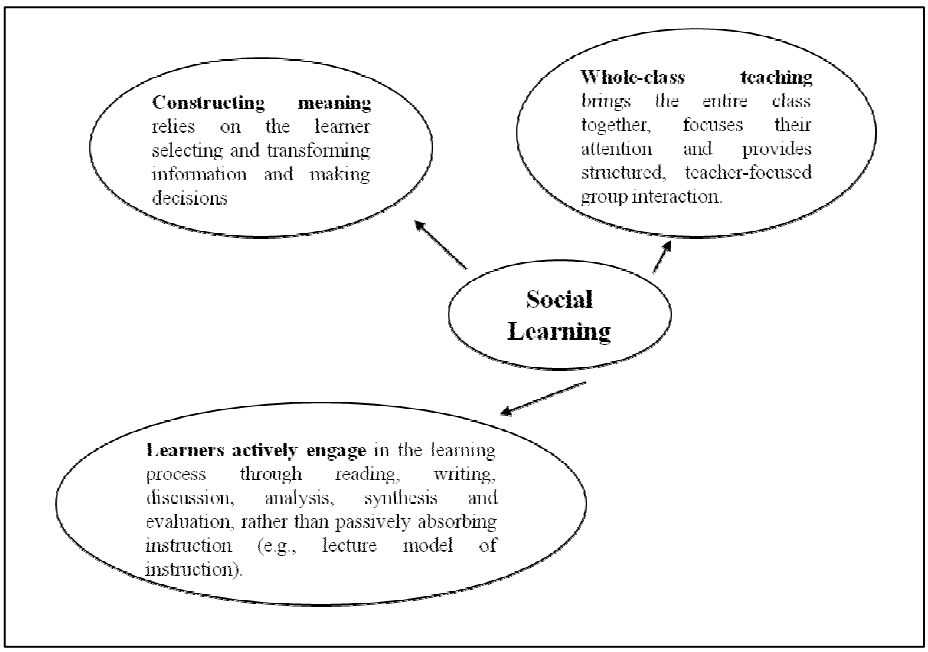

Figure 1. Student Engagement in Social Learning

(Source: Adapted from SMART Technologies Inc; March 2006)

Figure 1 above shows a common feature in the three aspects of social learning; the understanding that student engagement is vital to learning. Growing collection of international research proves that IWBs encourage student engagement in the teaching and learning process.. In a classroom in which students' voices are honored, the teacher gains access to information about students' perspectives and subjective experiences that promotes responsiveness to students' educational, social, affective, and physical needs (Dewey, 1904; Erickson & Shultz, 1992; Oldfather, 1991; Weinstein, 1989).

One of the most important factors that affect teaching and learning as well as student motivation to learn is student engagement. A barrier to learning is created when students are uninterested toward learning. Thus, the use of interactive whiteboards is one current method of delivering instruction that could assist with engaging students in the learning process. The IWB can be used to deliver instruction in visual learning, auditory learning and tactile learning (Beeland, 2002).

In visual learning, the use of an interactive whiteboard is for incorporating text, pictures, animation and video. The auditory learning refers to use of words orally for pronunciation, and speeches, as well as for listening to sounds or listening to music. Tactile learning refers to students physically interacting with the interactive whiteboard.

Educators can use digital resources while maintaining active interaction with the entire class and encourage a higher level of student interaction in both teacher-directed and group-based exchanges (Gerard & Widener, 1999). Perhaps one of the biggest challenges of integrating ICT into learning environments is maintaining active interaction with students. Rohrkemper (1989) emphasized the importance of interactions with others, as well as with tasks, in working through problems with difficult learning.

Rohrkemper and Corno (1988) found that students can learn important adaptive strategies when they are confronted with stressful situations, and argued that these adaptive strategies can and should be deliberately promoted within classrooms.

Goodison (2002), Levy (2002) and South Texas Community College, (2002) examined students' view of the using IWBs in learning Science. Goodison (2002) investigated primary schoolchildren's awareness of the linkage between ICT and the way they learn, including the use of IWBs interactive whiteboards. The researchers also examined the role of IWB in assisting classroom instruction, social learning and student engagement with technology. Meanwhile Levy (2002) through the use of data from classroom observations, interviews with teachers, and student questionnaires and focus groups, examined the issues in the implementation of the IWB. The researcher examined the ways in which the use of IWB had changed the teaching and learning process; the way teachers teach and the way students learn. The researcher also looked at the problems faced by both teachers and students in the use IWBs.

South Texas Community College, (2002) reported the findings of a survey of 609 high school students in Texas, measuring the amount of use and perceived value of IWBs. The survey found that Interactive whiteboards were considered to have helped learning "a little" or "a lot" by 92% of the students.

Interactive whiteboards have positive effects on teaching and learning as outlined in BECTA (2003). The following benefits of the Interactive Whiteboards for students have been identified by various research as using the IWB, students have greater opportunity to participate in the learning process, thus helping them develop their social skills (Levy, 2002), students need not worry about note-taking as notes can be saved and printed (Walker, 2002), IWBs can be used to create dynamic and interactive presentations that can help students' understanding intricate concepts (Smith, 2001) and allow students to be more creative in presenting their work to the class and increase self-confidence of students (Levy, 2002).

3. Methodology

This study, which was exploratory in nature, aimed at gaining insights into students' perspectives in the teaching and learning of Science using IWBs technology. Hence this inquiry employed the qualitative design, which allowed close interaction between students and IWBs in the natural setting. Focus group interviews were employed to gather data for this study.

The sample consisted of 12 Form Two (fourteen year olds) classes from three public secondary schools in Penang, a state in the northern part of Malaysia. The participants comprised groups of ten students from each of the 12 Form

Two classes. It was crucial that the sample was selected from students who volunteered to take part in the research since their cooperation in the focus group interviews was vital to the study.

3.1 Data Collection

The focus group interviews were conducted with twelve focus groups of 10 students in each class after the sequence of 40-minute or 80-minute lessons had been conducted by the teachers. As this research focused on the use of interactive whiteboard in the teaching of Science, the teachers involved were of Science background plus with interest in integrating technology in the teaching and learning process. All the focus group sessions were video recorded and lasted approximately an hour each. All focus group sessions were transcribed in full and used as part of the analysis.

3.2 Data Analysis

The discussion of each session of the focus group was transcribed and then analyzed to uncover the themes of the information made available from the interviews. Transcriptions were then coded using the derived categories from the discussions held. All the information was coded into specific categories. A set of categories were further developed which aimed to elicit students' perspectives on the teaching and learning of Mathematics and Science using Interactive Whiteboard. During the joint research seminar sessions, iterative coding was developed.

4. Findings

The students' perspectives were analysed under four categories; Learning, Interaction, Motivation and Environment. Students perspectives under each of these categories were looked at in the teaching and Learning of Science using the Interactive Whiteboard.

When students were asked if the use of IWB helped with their learning, there were positive responses. Students felt that the process of learning was made easier and more interesting. They found the material taught was now easier to understand and agreed that it was more fun to learn using IWB. The products of learning improved as students found that they now understand better, understand more and learn more at the end of the lesson. The student enjoyed the lesson and the colors and pictures helped them to remain focused and remember better the emphasized points in the lesson. However there was also one negative response on the speed of the IWB, Students found it slow and not as fast as their other technological gadgets that they use.

The students gave positive responses when asked if they acquired new skills. They said that they gained new skills in using the IWB as they could write and draw on it and were happy to participate in the lesson by answering questions using the IWB.

Students felt that the level of classroom interaction increased with the use of IWB in the teaching and learning of Science. They enjoyed using the touch screen and moving objects around to solve puzzles and answer questions.

Students were motivated in learning with the use of IWB. There were positive responses such as "more interesting", "more interactive", interesting animation', "very colorful" and "can pay attention better". The only negative comment was "sometimes very slow and lag a bit". Students were also of the opinion that using the IWB is also good for the environment as less use of paper and ink.

5. Conclusions and Recommendations

Results from this study indicate that students interact more in classrooms where technology is used effectively. Technology integration that brings about an increase in student motivation helps towards enhancing the learning process. Students get engaged in the learning process that use technology which makes the lesson interesting and fun. The Interactive Whiteboard allowed increased students' participation in the classroom during the lesson. It also helped in the facilitation of the whole group instruction that is more collaborative when compared to a traditional teaching and learning process which tends to be more passive and direct instruction orientated.

The findings from this study is in line with results from the survey conducted by South Texas Community College (2002), reported that the more often a piece of technology is used, the more it supports learning and with findings from other recent reports (e.g Kratcoski, Bates, & Hopkins, 2007; Mechling, Gast, & Krupa, 2007). These reports demonstrate a growing trend in increased reliance on technologies for entertainment and communication among students. Thus, if these technologies can be utilized effectively in classroom teaching, it will bring about an obvious increase in the level of learning as students would be motivated to participate in the lesson.

In Malaysia, Interactive whiteboards are relatively new. Hence, more research, both in quantitative by nature and qualitative by nature, is much needed to shed light on all aspects of their use. Interactive whiteboards are quite new and alien to most teachers and students as well. It would be beneficial to do research in schools that have embedded the Interactive whiteboards in the classroom practice. This would assist in assessing the impact after the Interactive whiteboards are no longer felt a novelty. Much research is needed to assess the advantages and disadvantages of Interactive whiteboards, to justify the cost incurred in integrating this technology into the teaching and learning environment. Such research would be useful to make sure that schools make the right choices and get value for money. Such research would also assist in deciding if alternative emerging technologies can be used as lower-cost solutions.

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