THE SUITABILITY OF INTERACTIVE WHITEBOARD IN TEACHING FOR MALAYSIA SMART SCHOOL AMONG TEACHERS

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ABSTRACT

This paper discuss about the suitability of interactive whiteboard as a instructional tools in teaching Physics at the selected secondary school. The school is categorized as smart school and the sample is taken from the SMK Clifford, Kuala Kangsar. The school has been selected by the Ministry of Education as one of the pioneer school that used interactive whiteboard for the first time of its kind.

The studies consist of the suitability in meeting the needs for the teachers in teaching Physics subject at the secondary school. The school itself has been supplied with the interactive whiteboard as a medium of instructional technology in teaching. This research is looking into Multiple Intelligence theory which is applied into Neuro-Science Informed pedagogy that is applicable with the teacher activities via the techniques applied to the sets of teaching instructions and self explorative learning.

Keywords:
Interactive whiteboard, instructional design, teacher, multiple intelligence theory, Physics

INTRODUCTION

Studies on the role of computer-assisted learning in promoting concept development, active learning, interactive learning, collaborative learning and transfer of knowledge have produced modest support (Ena Howse, et. al.; 2000). The study by Carey & Kacmar (1997) shows that the use of interactive whiteboard would stimulate more interactive and productive exchanges about management concepts and subsequently improves critical thinking of students. The study by Halpern (1998) shows that interest in critical thinking processes was based on a view that transfer of knowledge into practice is dependent upon the critical thinking that occurs during the acquisition of concepts. Transfer of knowledge is a key educational goal and difficulty in transferring management concepts is well recognized (Champagne, 1999).

Failure to transfer knowledge can have a negative effect on the functioning of work teams, productivity and job satisfaction (Newstrom, 1986; Baldwin and Ford, 1988; Broad & Newstrom, 1992). In 1983, Howard Gardner, an education professor from Harvard University came out with an opinion that the traditional thinking regarding to intelligence which is based on IQ test was so limited. He suggested eight different intelligence to take into accounts all human potential which are:

- verbal / linguistic intelligence
- logical / mathematical intelligence
- visual / spatial intelligence
- kinesthetic intelligence
- musical / rhythm intelligence
- interpersonal intelligence
- intrapersonal intelligence
- naturalist intelligence

During the observation in Physics Form 4 class for the topic of Gravity, its shows that interactive whiteboard really helps to promote the basic and environment concept of Gravity. At the same time, it also proved the multiple intelligence theory is applied into active, interactive and collaborative learning through the usage of interactive whiteboard as an instructional tool in the class.
Interactive whiteboard could obviously facilitated teachers to manage the knowledge transfer in teaching and learning process during the implementation of the student centered strategy. Teachers can use it with a computer alone or with a data projector to capture written or typed information on the interactive whiteboard, manipulate the data, store it and recall it later for integration with information from internet sources or data previously stored on a disk. According to Griffith (1999), the extent to which people use technology may depend upon their understanding of its features and their ability to make sense of it. Therefore, this paper examined the suitability of interactive whiteboard in teaching process for Malaysia smart school among teachers.

LITERATURE REVIEW

The History
Sekolah Menengah Kebangsaan Clifford (SMK Clifford) starts it history as a Malay School which has been built in a month of December 1897. During that time, this school is named as “Hogan School” because of its very first headmaster name, Mr. James Percival Charles Hogan. In 1928, this school got its new name through the name of the Straits States Governor and Malaya High Commissioner on that time, Sir Hugh Clifford. Before war, the progress of this school much depends on the teachers which come from Europe, Arab, Chinese, Indian and Malay as well. During World War 2, this school has been changed to the administration center of Japanese Army. After war, the teachers were working together to rebuilt this school. SMK Clifford offer Science subject starting on 1946. Most of its graduate were very successful and got a chance to further their study at Singapore Raffles Medical College, Serdang Agricultural College and also overseas universities especially Britain. The results of the Senior Cambridge Examination has shown the highest achievement where no Malay students failed in the exam at that time.

The school has launched Express Class in the year of 1949 for standard 4 and 5 students. Starting on 1958, the secondary and primary school has been separated into two different schools. New syllabus has been introduced like Trading, Shorthand, Typing and Entrepreneurship. The school also has introduced Malay language as a first language into it class. At the year 1970, the Science stream for the form 4 students has been opened for the students of a Malay stream. During the 70’s, the Form 6 Arts students and Science stream has been opened to the SPM school leavers.

Till the year 1973, the school was still conducting two session of schooling, which is the morning session for the form 3 and form 6 and the afternoon session for the form 1 and form 2. Beginning of the year 1979 the school period has been one session beside the change of the main language fully in Malay. The Clifford school has been chosen to conduct the special program class for the high achievers of the “Penilaian Darjah 5” starting of the year 1983.

Clifford Secondary School has been chosen as the Smart School beginning of the year 1st January 1999. All the technology equipment has been placed at B level. Among the hardware components that has been supplied are 37 PC unit, 2 notebooks, 1 laser printer, 1 color printer, 1 scanner, 2 LCD, 1 camera digital, 3 servers etcetera. All the hardwares have been placed inside the computer lab, the teacher’s room, the office, the server room and the library. The system that has been installed in the client is Windows 98 and the server computer is using NT 4.0. Among the installed softwares are Microsoft Office 2000, SSMS and Mc Afee. All the computers are connected within a LAN network and could be access to the internet using proxy server. To make the job effective the smart computer system, a teacher has been elected as the appointed coordinator for the smart school to administer the system. For the maintenance of the device, all the problems would be log to the Help Desk operated at the Technology and Education Department. The process handled by the SAPURA has been prolonged till June 2003.

The Smart School Project
Since the smart school initiative was launched in July 1997 as one of the seven flagship of the MSC Malaysia, much has been achieved, but one of the most critical includes the establishment of the 88 Smart Schools as a consequence of the pilot project by the Ministry of
Education (MoE). These 88 Smart Schools were initially identified to act as the nucleus for the reference of smart school concepts, materials, skills, and technologies developed by MoE. However, analysis such as the Impact Study on 2005 indicated that the infrastructure set up by the MoE, including the provision of computers, applications and ICT coordinators to the various schools, needed to be optimally managed and used.

On 7th April 2006, National Information & Technology Council (NITC) saw the Prime Minister, YAB Datuk Seri Hj Abdullah Ahmad Badwi has acknowledged the Minister of Education (MoE), Datuk Seri Hishamuddin Tun Hussein’s proposal for Multimedia Development Corporation (MDeC) to uplift the 88 smart schools to become model school. In order to uplift the 88 smart school, six acceleration programmes has been draft out to be implemented. Those six programmes are Re-branding of the 88 smart schools, Professional Development Programmes, Communication Plan, On-site Monitoring Programmes, Programmes Management of Enhancement and Deployment of Application Programmes and The Smart School International Conference 2007.

Among these 88 schools, 47 of them are targeted to achieve 5 stars ranking in 2007 and SMK Clifford is one of them. To encourage active participation of this schools including SMK Clifford, the ICT utilization of the smart schools must be measured and graded. There are several monitoring devices planned but of prime importance is the Smart School Qualification Standards (SSQS) with the Star Ranking as guide. To reinforce ICT usage, training workshops, online value-adding applications and on-site guidance are being implemented.

**Star Ranking Methodology**

A 4-step methodology has been developed for assessing the 88 smart schools and deriving the Star Ranking of each school:

1. **Key Performance Indicators** : The first step to the methodology is to establish Key Performance Indicators of the ICT Focus Areas. These KPIs set the accepted conditions and assign scores upon which the Star Ranking is based.

2. **Survey and Appraisal** : Having established the KPIs, each smart school will be surveyed to ascertain the conditions of each ICT Focus Area. The survey will be conducted quarterly while the online monitoring system captures live data that will verify the survey.

3. **SSQS** : The Smart School Qualification Standards (SSQS) outline the ICT Focus Areas each smart school is appraised on. Each area carries its own weightage reflecting its significance in the SSQS. These areas are Utilization (40%), Human Capital (30%), Applications (20%) and Technology Infrastructure (10%). To qualify as a smart school, the schools must achieve the minimum conditions (or 1 star) specified for each KPI within the ICT Focus Areas.

   **Utilization**
   Monitors the extent to which the school makes use of ICT in its operation, management, teaching and learning activities. Utilization accounts for 40% of the Star Ranking appraisal as it forms the integral part of transformation.

   **Human Capital**
   Refers to the competency of end users in integrating ICT in teaching, learning and/or administration. Human Capital accounts for 30% of the Star Ranking appraisal.

   **Applications**
   Refers to the various applications provided by the MoE and others that the schools have adopted. It accounts for 20% of the Star Ranking appraisal.

   **Technology Infrastructure**
   Not only audits the provision of the infrastructure itself (provided by MoE) but also looks at maintenance and support of the infrastructure within the schools. As a large portion of the
infrastructure provision is determined by MoE at the central level, this focus area accounts for only 10% of the Star Ranking appraisal.

4. Star Ranking: The goal of this exercise is the quarterly Star Ranking, where the smart school are measured in the ICT Focus Areas and ranked between 1 to 5 stars. Schools which do not qualify for any Star Ranking may regard that as a clear indication that they do not qualify as model smart schools, and urgent steps need to be taken to get back on the development track.

ICT Benchmarking in Education
As ICT become increasingly widespread, schools as well as education systems as a whole need to develop performance indicators to monitor the use and outcomes of the technologies. These indicators are needed specifically to monitor the types of ICT resources available, the extent and nature of professional development efforts, and changes in teaching/learning practices.

The indicators show how ICT should be used not only as a basic operational tool (such as the number of computers and online connectivity) but also as a communications tool which promotes the development of creativity, active, interactivity, collaborative learning, critical thinking and problem solving. At this point, the relationship between ICT and several strategies and theories of teaching and learning can be built through the suitable instructional tool such as interactive whiteboard. With the advantages that provides by this tool, the theory of multiple intelligence which was introduced by Howard Gardner also can be implemented.

Interactive Whiteboard
An interactive whiteboard is a touch-sensitive technology that connects to a computer and a projector. The projector displays teacher’s computer desktop on the surface of the interactive whiteboard. Using finger as a mouse, users touch the screen to open and control computer applications.

An interactive whiteboard is an effective way to engage and inform students. During the observations of teaching and learning process in the Physics Form 4 class, the teacher can incorporate not only text but sound, video and web-content using one simple and easy to use tool. The teachers can highlight information and capture feedback when she teaches using an interactive whiteboard.

Some of the interactive whiteboard such as SMART board provides extra advantages. Teachers can write notes in digital ink directly over background images, including documents, images, videos or websites. Teachers can also save their notes as a webpage, PDF or a powerpoint presentation and post them on a website or a course management system. The teachers also can customize their presentations as they teach, incorporating last minute changes without being limited to their prepared material.

Implementing Active, Interactive, Collaborative and Problem based Learning and Multiple Intelligence theory through Interactive Whiteboard as an Instructional Tools
Active learning needs participation from the students in a classroom instead of just listening to the teacher. Some of the suggested activities are discussion, problem solving, reading, writing or giving response to the question which need an answer that not only a factual answer but also the student opinion and suggestion. According to McConnell (1996), this is very important because the passive students who are just listening to the teacher only can concentrate within 10 to 15 minutes in a classroom. McConnell also has applied the active learning approach in his The Theory of Computation course and resulted that the students who are involving actively in learning process could do it better compare to the student which are passive.
The Physics for Form 4 courseware which can be used with interactive whiteboard that provided for Teaching and Learning Science & Mathematics in English (PPSMI) could generates active atmosphere in a classroom besides the interactive environment. During the observation in the Physics Form 4 classroom, it clearly shows that the students are very active when answering the questions or giving an opinion. For an example, when the teacher give a question like “How can you (student) say about the gravity on the moon?”. The students are trying to explain and describe the answer in so many kind of statement. In their previous knowledge and experience through media, they know that the gravity in the moon is weaker compare to the earth. But they cannot give the perfect answer even though the teacher has giving the answer in a number format. The answer only appears and plays around inside their mind. This is why they are becoming so active and competing each other to give the best answer continuously.

As we can see, the best way to answer this question is through action (practical). The students know that the best way to give an answer is through the “action” but this cannot be done because of several factors such as hesitate to act. Via the usage of interactive whiteboard, this problem can be solving easily. The teacher will call upon student to come to the front of the class and ask them to draw a path from the surface of the moon as high as they want on the interactive whiteboard by using their finger. Once they click play button, the astronaut image will jump up slowly by following the path that has been drawn before.

At the same time, the student also can do a comparison with the gravity condition on the earth. They can draw the same path on the image which represent the earth and click the play button. As a result, the can see and compare the time movement of the astronaut when they jump on the moon and on the earth. This kind of learning can creates the very active and interactive classroom environment where the students are eager to come in front of the class and try to draw a gravity path based on their own imagination.

Collaborative instructional technologies promote interactive exchanges between the learner (student) and the technology and among individuals in groups. Collaborative computing allows groups to build common databases or repositories of information and together retrieve, replicate, edit and expand it (Raatz; 1993). As a result, more effort can be focused on decisions and deeper critical thinking can occur. This can be seen through the example of gravity topic that given above. To get an answer for the problem (question), these students will discuss with each other about the pattern of the gravity path that they can draw to see the gravity effect on the moon compare to the earth.

In related group studies, Larsen et al. (1985) showed that cooperative learning groups exhibited higher levels of transfer of learning. Yang (1999) demonstrated that a group who shared information and synthesized ideas in a collaborative computing context showed
greater gains than a non-computing group by creating a broader network of signs and meanings in an assigned task.

![Image](image.png)

**Figure 2:** The Physics Form 4 teaching and learning using interactive whiteboard (2)

Multiple intelligences is the current evolution of the psycho-pedagogy. Starting from the Behaviorism theory, the evolution expands to the theory of Cognitivism, Constructivism, Social-Constructivism and the latest Neuro-Science Informed Pedagogy which applies the theory of multiple intelligences.

The implementation of multiple intelligences theory tallies with the progress of the people technology that we have today. In a today’s classroom, students already have the background about the knowledge that they gain from the mass media for instance. Through the observation of the Physics Form 4 class, the students already have the knowledge about the moon, earth and gravity that which they get from the sources like drama, movie, film or documentary. In the class, the teacher is responsible to facilitate this student to expand their mind about what is gravity all about. The teacher will give a problem statement and the student will discuss the answer among them (collaborative learning) to generate the idea of available solution. In the example given, the students are trying to draw a logical gravity path which represents the object movement on the earth. If they are trying to draw nonsense, automatically their friend will laugh at them and this environment automatically tells the student “don’t give such answer because it is wrong and nonsense”.

In the observation of Physics Form 4 classroom for the Gravity topic, the student already shows at least half of the human ability in receiving and generating the knowledge according to the eight intelligences:

- verbal / linguistic intelligence – expressing their idea through verbal explanation of the gravity comparison between moon and earth
- logical / mathematical intelligence – trying to give a logic path of the gravity
- visual / spatial intelligence – drawing a logic path on the interactive whiteboard
- kinesthatic intelligence – the movement of the astronaut according to the gravity line drawn.
- interpersonal intelligence – giving an idea of the differentiation between the gravity path which they draw on the moon image and earth image.
- intrapersonal intelligence – collaborative learning (discussion) within members in the same group.
- naturalist intelligence – expressed through the gravity path which they has draw,
- they realize that each object on the earth move in a different way and this is actually reflect the nature of the earth through its gravity attribute.
CONCLUSIONS

From the observation of the Physics Form 4 classroom for the Gravity topic, it clearly shows that the usage of interactive whiteboard really helps teacher to facilitate their student while exploring and transferring the new knowledge. The active, interactive, collaboration and problem-based learning atmosphere also can be created through the usage of interactive whiteboard. The expand usage of this whiteboard as instructional tool in the classroom also can manipulate the theory of multiple intelligences such as verbal / linguistic intelligence, logical / mathematical intelligence, visual / spatial intelligence, kinesthatic intelligence, interpersonal intelligence, intrapersonal intelligence and naturalist intelligence. This is tally with the ICT benchmarking in education which has been outline by MoE and MDeC where the potential and capability of the student in a classroom is optimally managed and used. Looking at the effectiveness of the usage of the interactive whiteboard to facilitate knowledge transfer, its strongly recommended the usage of this instructional tool in the schools all over Malaysia.

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