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Interactive Whiteboard (IWB): A review of literatures on its affordances and benefits

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Over hundreds of years of modern education system has been developing and implemented in the schools at European countries and slowly around the world. Not only the education system has changed, but also more and more tools and gadgets had been invented and developed for the sake of better education. In most developing countries like Malaysia, Indonesia, Thailand, and Brunei, Interactive whiteboard (IWB) becomes a strange tool for most new and even experienced teachers. The purpose of this study is to review back the related literature reviews of the effectiveness of the use of IWB for teaching and learning which currently have mixed findings on its contributions as a tool in the classrooms. Thereafter, it believes will lead to the understanding of the use of IWB for teaching Chinese characters.

Key words: Interactive whiteboard, Educational technologies, Teaching tools

Introduction

The integration of Information and Communication Technology (ICT) into pedagogical practice is getting common as the rapid growth in global technology development. Since a decade ago, educators and learners around the world were started adapt to 21st century pedagogical practice, where ICT had been either integrated or becomes complementary part of classroom lesson. Thus, ICT has been included as one of the transformation changes in nation's latest Education Blue Print (PPPM) 2013- 2025 as the focus to the future of national education development.

As development in science and technology are getting advanced and growing exponentially, education technology development is not exempted from the trend too. More and more educational related tools and products are created to enhance teaching and learning experience, such as interactive whiteboard (IWB).

Interactive whiteboard (IWB) is currently one of the most advance teaching aids in the classroom. It is an instructional tool that allows computer images to be displayed onto a board using an LCD projector. The teachers can write, draw, and manipulate the elements on the screen by using a pen or their finger as a pointing device. Items can be

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dragged, clicked and copied and teachers can handwrite notes and draw diagrams, and then save them for future use. IWB is also the first electronic instructional technology designed primarily for use by teachers (Betcher & Lee, 2009). Many general consumer electronic products, such as radio, television or personal computers, were initially designed for the use in home and office, and then adapted for use in school. IWB technology was conceived specifically with education in mind; hence many vendors and educators develop many courseware and instructional tools software dedicated for the use of IWB.

The use of chalkboard in the classroom has a long history and it became the most important and traditional teaching tool for teacher since a century ago. However, there are many limitation of a conventional chalkboard. Chalkboard provides a shared and focused memory for a meeting, allowing flexible placement of text and figure, which complements our human capabilities for manipulating spatial memories. However, the space on the board is limited and items on the board have to be erased when that space is needed for else, and rearranging items is very inconvenient when they just must be manually redrawn and then erased. Handwriting on a chalkboard can be illegible. Chalkboards are also unreliable for information storage (Stefik, M. et al. 1987).

Therefore, the use of IWB in the classroom is now getting more popular as it can break the limitation of chalkboard. Besides that, initial research on the use of IWB in primary and higher education is promising. Studies have documented that both teachers and students like the technology (Beeland, 2002; Smith et al. 2005) and that students are more engaged and motivated to learn when whiteboards are employed (Beeland, 2002; Smith et al. 2006). In addition, many research studies have noted that use of IWB shifts instruction from presentation to interaction and students' focus away from teachers and onto content, making IWB lessons more student centered than traditional ones (Cuthell, 2005).

IWB impacts students' learning in many ways. It helps to raise the level of student engagement in a classroom, motivates students and promotes enthusiasm for learning. IWB supports different learning styles and have been successfully employed in hearing and visually-impaired learning environments. Research also indicates students able to stay focus longer during the lesson, and students able to review notes saved from the IWB easily. In addition to student learning, observations also indicate that designing lessons around interactive whiteboards can help educators streamline their preparation and be more efficient in their ICT integration (SMART, 2004).

Statement of problems

Many educators have incorporated technology as an instructional tool to raise student engagement (Yang et al., 2012; Kervin et al., 2010; Pauline & Wong, 2015; Wong, Mohd Sahandri & Mahizer Hamzah, 2015). As students' technological interests and skills change, creating an engaging environment became difficult (Rosen, Carrier, & Cheever, 2010). Nowadays, implementation of IWB into the lesson becomes one of the tools to create engaging learning environment in the classroom.

Many scholars and educators found that the use of IWB has delivered many positive effects on learning and advantages for pedagogical practice (Beauchamp, 2004; Smith et al., 2005; Hennessy et al., 2007; White 2007; Higgins et al., 2007; Preston & Mowbrary 2008; Murcia, 2008a, 2008b; and Murcia & Sheffield, 2010). However, in Malaysia has only little researches on the impact of use of IWB in Malaysian schools (Jamaludin et al., 2005, Wong et al., 2013) that look into their use and to explore

pedagogical manner needed to enhance students learning whereas interactivity requires a new approach to pedagogy.

Although many studies have been conducted previously in the use of IWB in teaching and learning, there are mix findings based on those empirical studies. In Guðmundsdóttir's study (2014), findings show that the use of IWBs doesn't exhibit significant improvement on collaboration, communication, or interaction between students (Beauchamp & Kennewell, 2010; Blau, 2011; Schuck & Kearney, 2007). Gillen et al. (2007) also found the use of IWB in the classroom is still a teacher-centred, whole-class approach teaching practice, just as the traditional pedagogy practice (Hall & Higgins, 2005). Indeed, so far the IWB is mainly located in teacher territory rather than being in the student domain.

The above statements have been supported by the findings from Beauchamp and Kennewell (2010). According to them, the introduction of an IWB increases the amount of classroom instruction and one-way communication from teacher to student (Beauchamp & Kennewell, 2010). Indeed, the findings also indicated that interaction between the teacher and students remains very traditional and is not so much characterised by interactivity (Beauchamp et al., 2010; Hennessy, 2011). According to Beauchamp et al. (2010), the value of creative and improvised elements in the classroom is thus not managed well enough. Teachers' lack of knowledge upon the features and potential of IWB and occasionally technical difficulties avoided them to deliver the lesson with the aid of IWB too (Al-Faki & Khamis, 2014; Wong, Rosma, & Goh, 2012).

Furthermore, the impact and effectiveness of teaching and learning Chinese characters using IWB on students has not been much research done so far (Xu, 2011). Most previous studies and researches on using IWB in pedagogical practice are in the context of teaching preschool, Science and Mathematics, English art and higher institution study.

Based on the statement above, the researcher believed it is important to understand the advantages and affordance, also it obstacles of using IWB in teaching and learning Chinese characters based on previous empirical studies. The purpose of this study is to review back the related literature reviews of the effectiveness of the use of IWB for teaching and learning which currently have mixed findings on its contributions as a tool in the classrooms. Thereafter, it is believed will lead to the understanding of the use of IWB for teaching Chinese characters.

Interactive whiteboard as effective learning tool

As IWB seems like a tool that is specifically designed and primarily benefits the teachers and instructors, however, indeed it is made for improving and promoting innovative teaching and learning experience in the classroom (Smith *et al.*, 2005). Another word, IWB is also a potential learning tool that benefits students on learning.

According to a study done by BECTA (2007), IWB is capable to exhibits many advantages as a learning tool, such as: 1) Increase the excitement and motivation of students in the classroom. 2) To provide more opportunities for students to participate and having collaborative learning in the classroom. 3) To develop personal and social skills (Levy, 2002). 4) Ability to save and print handwritten note and materials on the board and students are able to understand complex ideas and concept (Smith, H., 2001). 5) Different learning styles can be applied as a teacher can request a variety of resources to fulfill specific needs (Bell, 2002). 6) To enable students to become more creative in

their presentations to their classmates, increased self-confidence (Levy, 2002). 7) Provide access for children and students with disabilities (Goodison, 2002).

The main advantage of IWB as a learning tool that promotes learning is compatibility with multimedia materials and multi-sensory capability. The multimedia presentation enhances students' memory via visual images. Science students report that IWB has helped them remember more of their college (Damcott et al., 2000). Foreign language learners also reported that multi-sensory input made learning more efficient and easier to memorize (Thomas, 2003). In addition, amenities IWB to present the information in vivid colors, and to annotate, hide, manipulate, move and zoom in on or focus on the image, including text, also said to enhance the learning process (Damcott et al, 2000.; Bell, 2002; Levy, 2002; Thomas, 2003).

The physical and tactile natures of IWB are also stimulating student's eagerness to touch the whiteboard and teach (Clemens et al., 2001). Since IWB allows students pointing, writing, drawing and interacting with the whiteboard with either a finger or stylus, hence it also promoting kinesthetic learning that helps to reinforce students' learning effectiveness (Virtual Learning, 2003).

IWB also able to presents various multimedia materials efficiently and spontaneously. This is because IWB allow teacher and student to retrieve information and resource instantly right on the whiteboard during the lesson, this helps students easier to understand the ideas and concepts on the spot (Levy 2002). Furthermore, IWB is also claimed it could accommodate a variety of 'learning styles' as a teacher can present any type of resource that suits for a particular student needs' (Glover & Miller, 2001; Billard, 2002; Bell 2002).

The IWB also appear to bring together a variety of resources to help students understand complex ideas (Holmes, 2009; Wall et al, 2005). The needs of students with different learning styles can all be handled (Holmes, 2009). In other words, potential students have more opportunities to participate, collaborate, and develop their personal and social skills (Levy, 2002).

Interactive whiteboard as an effective tool for teaching languages

Effectiveness of IWB in teaching and learning language has been investigated by a number of researches (Gray et al., 2005; Pang, 2006; Tozcu, 2008, Xu, 2011). Some teachers reported that students are more focused on words and spelling when teaching using the IWB, supported them in promoting students to learn the language (Gray et al., 2005)

A study reported that the use of visual effects such as colors, highlights, and animation helps to emphasize and draw attention to ease the student to learn and understand the patterns of the language. This study also reported that IWB offered teachers diverse ways to draw attention to the patterns and characteristic of grammar. The finding showed a positive effect on language skills development among students. It also found that the teachers have more time to teach students when language lessons and activities are ready to launch at a touch on the whiteboard screen. (Xu, 2011).

Many teachers also use a wide range of materials on the IWB. Thomas (2003) describes the use of IWB facilitate the highlight, annotate, drag, drop and hide the contents of a linguistic unit, websites, documents and text-based multimedia slide show. Facility to mix the visual and aural disputed information to facilitate the process of language learning, as students can make connections between what they see and what they hear.

With regard to leaning Chinese characters using the IWB lessons or any kind of IWB, there is not much research done so far. However, in an empirical study by Tozcu (2008), it was found that challenging teaching can be a useful non-Roman scripts is supported by the use of IWB, visual and interactive presentations that enable students to understand more quickly and more easily.

Pang (2006, 2008, 2009), teacher participants in this study, which has been developed and promoted IWB pedagogy of learning Chinese, the report is evidence that the results of his IWB pedagogy, academic results improved, and that he can solidify the syllabus, increase speed and achieve learning goals more quickly.

Interactive whiteboard on students' academic achievement

In a survey administered by Higgins (2010), the data and interviews collected from 68 teachers were determined that the they felt that the IWB did helps them to achieve their expected learning outcome and cited a number of factors such as the abundance of resources available, the stimulating nature of the presentation, and the flexibility that the technology offered. In Swan's (2008) research on the effect of the use of IWB on student achievement in English Art and Mathematic lesson also showed that the students whose teachers used IWB for instruction perform slightly better on state assessment than the group whose teachers did not use IWB.

However, a study by Weimer (2001) to measures student attitudes and motivations towards a class project using an experimental design. The result showed IWB did improve student motivation in learning in the class instead of academic achievement.

Interactive whiteboard on students' motivation

Student motivation is an important aspect that requires educators' priority concern and efforts in order to promote effective learning (Morgan, 2008). According to social cognitive theory and constructivism, learning is influenced by the environment where learning process takes place. Any factor in the learning environment has potential to affect learning effectiveness. Therefore, a consideration of the potential affective factor is important in creating an effective learning environment. In a research done by Fisher (2006), a group of primary school students' assessment results are measured and compared before and after the use of the IWB in classroom lessons. Although the finding showed no significant improvement in students' assessments performance, however she discovered that student motivation is an important factor that contributes to effective learning.

Student motivation is interest and excitement causing action and teaching style while using the IWB is correlated with student's time on-task and attitude to learning. The results showed that students are more motivated are due to intrinsic stimuli, interactive and dynamic visual material delivered by the IWB (Miller et al., 2004).

In Miller and Glover (2002) research, they studied the effect of using the IWB on teaching methods in five primary schools in England. They listed and ranked the advantages that most often associated with the use of interactive whiteboard as well as on student's motivation. They concluded that student motivation is improved significantly. In case study conducted by Cogill's (2002) at primary school, she also found that IWB did help to attracts students' attention to the lesson.

A study conducted by Weimer (2001) to investigate the effect of using IWB motivation with two groups of secondary school students. One group was using the IWB and the other group was not, and then the two groups are reversed in a second test. The survey result was showing that there was indeed a correlation between motivation and use of IWB, students were enjoyed using the IWB thus exhibit higher level of motivation

Conclusion

The focus of this study is to understanding the effectiveness of using IWB for teaching Chinese characters by reviewing the previous literature reviews on the effectiveness of the use IWB in pedagogical context in the classroom. Based on the review of previous empirical studies, it has been found that IWB is indeed an effective teaching and learning tool that delivers positive impacts to students' academic achievement and motivation. The studies also found that IWB helps to improve in teaching and learning various subjects, including languages.

In term of language pedagogy, IWB is not limited to deliver an effective teaching and learning experience on Latin based or Roman scripts languages, but it also found as a useful tool to teach and learn non-Roman scripts such as Hindi, Pashto, Dari, Persian, and Hebrew characters. IWB enables students to understand non-Roman scripts more quickly and more easily through visual and interactive presentations (Tozcu, 2008).

In term of teaching Chinese language, an empirical study on IWB pedagogy on Chinese language is also showing improved academic results, solidify the syllabus, increase speed and achieving learning goals more quickly (Pang, 2008). IWB is also found effective in memorisation and recognition of Chinese characters (Xu, 2011). From these empirical studies, we can deduce that IWB could be an effective tool for teaching Chinese Character.

Furthermore, the multi-sensory nature of IWB promoting kinesthetics learning that helps to reinforce students' learning, thus made learning more efficient and easier to memorise (Thomas, 2003; Wong, Siti, Goh, & Hafizul, 2013). Since IWB allows students pointing, writing, drawing and interacting with the whiteboard with either a finger or stylus, students can learn to write newly learnt Chinese characters on the IWB, and the tactile feature stimulates student's eagerness to touch the whiteboard and learn (Clemens et al., 2001).

There are various Chinese characters input method (IME) available for the computers and touch-based devices, where handwriting methods is requiring users to write in the right order of strokes and structure. Hence, students would have to write the Chinese characters correctly and precisely on the IWB. This is a kind of kinesthetics learning that may foster recognition of Chinese character and memorisation of the writing of Chinese characters. Hence, this empirical finding shows that IWB could be an effective tool to teach and learn Chinese characters.

Although this study has summarised the empirical findings from previous studies and literature reviews, however it is clearly to understand that the use of IWB delivers many advantages in pedagogical practice. With the multi-sensory and tactile nature of IWB, it has high potential for kinesthetics learning. Therefore, it is great for learning handwriting, particularly leaning Chinese characters, which is requiring more memorisation and recognition.

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