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Interactive Whiteboards in Classrooms: Debates, Issues, and Impeding Factors

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Abstract: This paper compiles the review of the literatures revolving around the studies on the use of interactive whiteboards in schools. It criticizes and summarizes the current debates, issues, and impeding factors found in empirical studies. Through various articles related to the studies about technology and interactive whiteboard in schools dated from 1986 to 2014, the findings of this critical review suggest that teacher-centered versus student-centered mode of instruction is one of the most debated issues highlighted across studies. Unfortunately, teachers are being continuously blamed on the way they use the interactive whiteboards. The method technology is introduced to the teachers, teachers' willingness and negative perception on technology initiatives, trainings, and technical problems, are among other issues and impeding factors that hampers the interactive whiteboards implementation in schools. This paper also identifies the gap in the literature and calls for future research in areas such as the role of context and school community involvement in the diffusion process of interactive whiteboard technology.

Keywords: interactive whiteboard technology, teacher-centered, student-centered, issues, problems

1. Background

The interactive whiteboard is deemed as the most advance technology at present. A report by the SMART Technologies Inc. suggests the benefits of the interactive whiteboards on students when used by teachers: "Educators can use digital resources while maintaining dynamic interaction with the entire class, provide computer-based learning without isolating students and encourage a higher level of student interaction in both teacher-directed and group-based exchanges." (2006, p. 5).

As its name implies, interactive whiteboards have the affordances to be used in an *interactive* manner and could support *interactive* learning (Mildenhall, Swan, Northcote, & Marshall, 2008). Based on the literature, it is found that interactive whiteboards have been used in schools for orientating lesson, orchestrating interactive teaching-learning activities (Gillen, Littleton, Twiner, Staarman & Mercer, 2008; Coyle, Yañez & Verdú, 2010), creating and saving lesson resources (Hall & Chamblee, 2009; Littleton, Twiner & Gillen, 2010), and linking them with other technological resources (Armstrong, Barnes, & Sutherland et al., 2005). Empirical studies showed that in many ways, these aforementioned types of usage underpin teachers' manner in integrating interactive whiteboards in their teaching.

2. Research Purpose, Questions, and Methods

The purpose of this paper is to provide evidences from empirical studies that have been carried out on the interactive whiteboards in classrooms. Because the interactive whiteboard technology have become more ubiquitous and its endowment initiatives in schools are increasing over the past decade, this paper summarizes the key issues arising from these initiatives as a means to provide insights into the implementation of such technology. The questions that drive the review of the literature are: (1) What

is/are the current trends or debate(s) in literature on the interactive whiteboard initiatives? and (2) What are the issues and impeding factors toward interactive whiteboards implementation in schools? The review of the literature involves various research studies of the related field dated from 1986 to 2014. Such collections of research studies are gathered through the researchers' comprehensive search on articles based on the questions that motivate this study.

3. Discussion

3.1.Teacher-centered versus Student-centered Debates in Interactive Whiteboard Classrooms

The question of whether the mode of lesson delivery should be teacher-centered or student-centered has become a debated issue among scholars. With the interactive affordances of the digital whiteboard, teachers are expected to make their instructions more student-centered rather than teacher centered (Taylor, Harlow, & Forret, 2010; Kershner, Mercer, & Warwick et al., 2010; Northcote et al., 2010; Şad & Özhan; 2012). Other studies emphasize the importance of student authority in maneuvering their own learning (Kennewell, Tanner, & Beauchamp, 2008; Harlow, Cowie, & Heazlewood, 2010).

Beauchamp (2004) found in his study that most of the time, teachers retain control of the interactive whiteboards, giving little to no chance for students to explore and navigate the technology or to perform tasks on the board. Although the mode of instruction may not be student-centered, this step may result in the students being able to learn how to use the technology by ovserving teachers' use. In contrary, Northcote et al. (2010) argue that too much control of interactive whiteboards by teachers does not only limited students' opportunity to use the board, but it also leads to a teacher-controlled classroom.

Similarly, Kennewell et al. (2008) point out that the implementation of interactive whiteboards might be regarded as a backward step towards teacher-centered learning. They argue that learning is becoming more teacher-centered when teachers enforced a more traditional approach in the use of interactive whiteboards. This is consistent in both studies conducted by Kershner et al. (2010) who analyzed students' semi-autonomous use of interactive whiteboards, and Zevenbergan and Lerman (2010) who explored the various approaches used by teachers for mathematics teaching in interactive whiteboard environment.

Miller, Glover, and Averis (2005) recommend maximizing the number of students working on the interactive whiteboards for a student-centered instruction. This can help students develop confidence in using the technology as well as influencing their peers to participate in classroom activities centered on the board. However, amidst the debates of teacher-centered versus student centered instruction, there is a gap on how much we know about teachers' goals. Such gap lacks in addressing teachers concerns when using the interactive whiteboard, which may include their specific learning goals that must be achieved during a specific time frame. Can they possibly achieve their goals by allowing students to use interactive whiteboards in an unlimited manner hoping that students can be more participative?

A recognized pattern emerging from the literature portrays teachers as being repeatedly blamed for the manner in which they use the interactive whiteboards in classrooms. For instance, overuse of interactive whiteboards is said to promote teacher-centeredness (Northcote et al., 2010). Studies have reported that the use of interactive whiteboards has resulted in teachers becoming more active while students are becoming more passive (Holmes, 2009). Some teachers use the interactive whiteboards as a form of supported didactive role (Miller et al., 2005) hence the affordances of interactive whiteboards to support interactive teaching are often overlooked (Holmes, 2009; Northcote et al., 2010). It seems that everything that the teachers do on the use of interactive whiteboards is not seen positively.

de Koster, Volman, and Kuiper (2013) attempt to define the difference between a teacher-centered or student-centered instruction based on the person in charge of the interactive whiteboard. They claim that a lesson is teacher-centered when knowledge transmission was done by the teacher and a lesson is student-centered when content sharing occurs between teachers and students. Nevertheless, the classroom's interactivity should not be judged based on the basis of who operates the board alone. They

also call for realistic expectations among the technology imposers and teachers when looking at how the interactive whiteboards are used in classrooms.

It is really delicate for teachers to strike a balance to juggle their several obligations and paying attention to students' needs while at the same time thinking of creative ways to maximize the use of interactive whiteboards. The current literature points to the importance of letting students to have more control of the interactive whiteboard with the idea that this could increase their participation in classroom activities and engagement in lessons (Miller & Glover, 2002; BECTA, 2003; Kennewell et al., 2008; Wood & Ashfield, 2008; Harlow et al., 2010). However, very little is known about how this idea could be translated as a teacher-centered or student-centered instruction, and the ecological factors that foregrounds the mode of such instructions found across studies.

3.2.Issues and Impeding Factors

For every innovation that tries to make its way into a system, there exist several processes that may support or impede its use and implementation. Rogers (2003) calls this as the innovation-decision process where innovations can be rejected at any time during or after the adoption process. According to him, the innovation decision could be made either by an individual, collectively, or authoritatively by the leader of a social system. Across studies, there are evidence on how such decisions have affected the adoption process and its continuity.

Glover and Miller (2002) suggest that leadership type affects the implementation of interactive whiteboards in schools. Teachers in the schools where Glover and Miller (2002) conducted their study were not keen to integrate technology into their classrooms because they were fearful that this innovation would become just another "educational gimmick" (p. 6). However, when the faculty heads started to implement the interactive whiteboards and demonstrated ease of use, the teachers started to gain confidence in the technology. This phenomenon of a domino effect where one movement from the faculty heads had sparked movements to other teachers. The smooth implementation and use of interactive whiteboards demonstrated by the faculty heads were visible to the teachers, resulting in positive reactions.

On the contrary, in another school in the same study, the head teacher made an authoritative innovation-decision whereby he pursued a policy of forcing staff members to use the new technology. Interactive whiteboards were installed in classrooms without the teachers' knowledge. The head teacher contended that this step would leave his teachers with no choice but to use the interactive whiteboard. Nevertheless, this approach raises issues of disadvantage, especially when teachers were not ready or willing to use the interactive whiteboard in their teaching. This may lead to the underuse of technology and is seen as a waste especially when the installation has cost a massive amount of investment (Cuban, 2001).

Cuban (1986) listed several factors that hinder teachers' use of technology including unwillingness to change and invest time to learn that leads to teachers' failure to recognize its affordances, unfamiliarity to technology, fear of trying new innovations, and frustration with past experiences. Teachers' deep-seated beliefs in their current pedagogical stance, and flawed implementation, also contributed to the under-utilization of technology in schools. These are the underlying factors to the processes that impede the use of interactive whiteboards in schools.

In contrast, Northcote et al. (2010) argue that overuse of technology could lead could affect the locus of control in classroom activities, thus lead to a teacher-centered instruction. Accordingly, this leads to the impediment of teacher-student partnership during lessons and shared authority in interactive whiteboards usage. They add that such impediment diminishes the opportunity for students to interact directly with interactive whiteboards.

Training is advocated as one of the most important elements in the process of technology diffusion and implementation as a means to prepare teachers for the transition of a classroom without technology to one with an interactive whiteboard (Beauchamp, 2004). According to Miller and Glover (2002), insufficient training and limited development of interactive whiteboard teaching skills are key problems to the successful use of interactive whiteboards. Teachers also need a certain amount of time to

familiarize themselves with technology (Md. Khambari, Moses, & Wong, 2009). Moreover, a longer time is needed to prepare lessons that use interactive whiteboards.

Buckingham (2006) argues that technology should not be assumed as a neutral means for everyone. Rather, people should be educated about the technology and how to effectively use it. Therefore, training is important as it provides teachers with the appropriate knowledge before simply putting the technology in their hands and letting them decide what they could do with it. Although teachers' training for interactive whiteboards is widely mentioned in the literature, to date, there was no mention of whether teachers are satisfactorily trained to use interactive whiteboards in an interactive manner.

Wood and Ashfield (2009) also emphasize that teachers must have control over their own lesson by choosing and deciding on the appropriate software. Now that there is an increase in the numbers of ready-made teaching resources, teachers have unconsciously become slaves to the software instead. If teachers are blindly using the commercial software and later found that the software could not help them achieve their objectives, this phenomenon may frustrates them, leads to the rejection of the interactive whiteboard (Rogers, 2003), and disregard such technology altogether from their pedagogy.

Şad and Özhan (2012) found that technical glitches such as electricity outage or de-alignment of pen, and natural distraction such as sunlight glare on the screen of the interactive whiteboard made the students upset and interrupts the use of the technology. Ju and Ya (2014) suggest that the digital feature of the interactive whiteboard offers a more hygienic classroom as compared to the dusty blackboard the teachers in their study used to use, and its ability to display multimedia has improved students' attention, participation, and digital literacy. However, they found that the touch sensitive feature was a limitation because it only allows one user to use it at a time.

Beauchamp's (2004) study found that student teachers predominantly perceive interactive whiteboards as an important feature of their future teaching. Experienced teachers, however, needed more convincing before they are ready to use it. Similarly, Cuthell (2005) laments that the number of schools that have changed their praxis is very small. In many cases, when a new policy is being formulated, teachers who are the implementers at the grass root level are seldom consulted. What can be learned from these studies is that a needs analysis is needed prior to the diffusion of an innovation. As such, before innovations are to be permanently placed in the classroom, information needs to be gathered on whether or not teachers prefer to have the interactive whiteboards in their classroom.

When interactive whiteboards are put into implementation in schools, teachers are expected to use the technology in their teaching. Zevenbergan and Lerman (2008) found that teachers fear of not fulfilling their professional responsibilities if they did not use the interactive whiteboards in teaching. This example provides evidence where teachers are caught in the middle between their personal pedagogy that they have been comfortable with, and the professional responsibility to keep themselves and students in tap with the latest advancements in education. Having to make a delicate decision of whether to use or not to use the technology is an issue yet to be explored in future studies.

4. Concluding Remarks

The literature to date converges on the advantages of interactive whiteboards as a tool that opens up various possibilities and teaching pedagogies. Unfortunately, there are also emerging trends of teacher blaming whereby they are criticized for the manner in which they use interactive whiteboards in classrooms. However, there is no clear definition of how an instruction with the interactive whiteboard should be regarded as student-centered or teacher-centered. Additionally, nothing about the amount of control of the interactive whiteboard by the teachers and students are discussed in the literature to clearly define the mode of instruction. Among the key issues identified in the literature highlight the importance of teachers' readiness to integrate the interactive whiteboard technology in their classroom, as well as education authority's role in diffusing new innovation to teachers. Conflict of interests between teachers (on their pedagogy) and technology imposers (on how they visualize teachers to use the interactive whiteboards) could lead to the underuse of the technology. Perhaps the teacher-centered or student-

centered debates, and teacher blaming issues, do not even make sense if areas such as teachers' interest and pedagogy as well as their nature of work, are explored and understood.

Rogers (2003) has warned, "many aspects of diffusion cannot be explained by just individual behavior" (p. 23). He says, among others, that the overall system should be studied to draw its several influences on its members. Based on his piece of advice, it became more evident that the literature on the interactive whiteboard use in schools lags behind in a number of areas. For instance, the nature of the school system such as its administrative system, its social, cultural, and historical practices, its climate and rules; the perceived attributes of the interactive whiteboard, and the type of the community the interactive whiteboard is diffused to, are the areas that are still remain barely touched in the literature. Additionally, nothing about the function of the school was mentioned in the literature on technology in the education system. This paper calls for future studies to take on the quantitative or qualitative nature of research to explore with more depth on the context and the social system in which interactive whiteboards are situated.

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