



The interactive whiteboard: A transitional technology supporting diverse teaching practices

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Abstract

This article describes the findings of a qualitative study investigating teacher perspectives on the impact of interactive whiteboards (IWBs) on their classroom teaching practice, using intensive case studies focusing on six primary and secondary teachers from two rural schools. The study found that all teachers were enthusiastic, had seen improvements in student engagement, and were able to develop and evolve their IWB teaching strategies through explicit reflection. However, there was considerable diversity both in the ways in which the IWB was used and in the degree to which teachers changed their classroom teaching practices. Whereas some (Glover and Miller, 2001; Kennewell, 2006) have been critical of IWB adoption without clear pedagogical transformation or without utilisation of all IWB features, we argue that one of the IWB's key benefits is that it can be used initially without requiring a big shift in pedagogy but that it may gradually afford more major pedagogical changes over a longer period of time. These findings are important for the design of professional development in schools because with such a diversity of perceived IWB affordances, effective professional development is more likely to take the form of informal practice sharing than of specific hardware or software training.

Keywords: interactive, transitional, teaching.



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INTRODUCTION

In the field of education at all levels there is much excitement, concern and angst regarding the involvement of technology in the learning process. Views can range from excitement at the idea of a 'connected classroom' to a fear of computerised tutorstotally replacing the classroom teacher. Adding to some of the concerns is the sheercost of technology, often seen as financially crippling as

far as the school environment is concerned. Despite a number of researchers questioning the impact on schools of large scale investment in technology (e.g. Cuban, 2001; Somekh, 2004), few practitioners or researchers in the field would deny that there is value in the application of some technology to learning. More commonly, there is concern amongst those responsible for educational budgets as to the best allocation of scarce financial resources. One of the more promising recent developments has been the increasingly widespread availability of interactive whiteboards (IWBs), which, using a combination of a computer, a data projector and a large, touch-sensitive screen, provide an interface allowing tactile, widely observable and collaborative interaction. These pieces of equipment are being increasingly appreciated for their versatility and learning enhancement potential (Lee & Winzenried, 2009).

There is a growing body of literature related to interactive whiteboards (IWBs) and their potential value in the teaching and learning process. Early literature tended to consist of case studies of implementation of IWBs in particular classrooms or schools, focussing either on the capabilities of the technology (Smith, 2003), on the perspective of teachers (Gatlin, 2004), the perspective of students (Hall & Higgins, 2005) or combinations of all three (Glover & Miller, 2001; Schuck & Kearney, 2007). One of the largest early trials of IWB implementation in Australia was that undertaken at Richardson Primary School in the Australian Capital Territory (Kent 2004; Lee & Boyle, 2003). The consensus from these various case studies was that IWBs were more readily adopted by teachers than many earlier technologies, that IWBs provided a range of technical capabilities of potential benefit in achieving positive learning outcomes across the full curriculum spectrum in contexts from early childhood to upper secondary, but that such benefits were very much dependant on the ways in which teachers used the IWBs in their own classrooms.

More broadly a number of researchers have attempted to explore the bigger picture question of whether information and communication technologies (ICTs) in general can improve learning and teaching (Higgins, 2003; Wishart & Blease 1999), but the general consensus amongst researchers is that the more pertinent question is not whether ICTs can improve learning but how the potential learning benefits of particular technologies can be harnessed in particular learning contexts for achieving particular learning outcomes and what enabling and constraining factors exist that can help or hinder the learning process. Consistent with this more complex view of the role of technology in the learning process, more recent research on IWBs has focused on specific issues associated with IWB teaching and learning practice (Beauchamp, 2004; Glover, Miller, Averis & Door, 2007; Lewin, Somekh & Steadman, 2008) or has compared

the affordances of IWBs with other learning technologies (Haldane, 2007; Lee & Winzenried, 2009).

There are three key potential benefits of IWBs that are most frequently discussed in the literature: increases in student engagement, more effective visual representation, and learning through greater classroom interactivity. These are discussed in turn in the following paragraphs.

Beeland (2001) reports on a study showing an increase in student engagement as a result of the use of IWBs. Interestingly however, the applications of the IWB and the balance in its use by teachers and students had a direct effect on student engagement, though the same degree of effect was not necessarily consistent. Morgan (2008) studied the effect of IWBs on student engagement in junior high schools and also found beneficial effects of IWBs on student engagement in classroom lessons as well as improvements in student behaviour.

Various researchers have highlighted the capabilities of the IWB in displaying visual representations as being of major importance for learning, consistent with earlier studies exploring the value of visual representation more broadly for learning (McKendrick & Bowden 1999; Smith & Blankinship 2000). For example, Holmes (2009) highlights the value of visual representation of mathematics concepts using an IWB. In contrast, Reedy (2008) criticises the inappropriate use or overuse of PowerPoint presentations with IWBs and data projectors and the negative impact it can have on the degree to which learners actively engage in complex thinking and reasoning. Cutrim Schmid (2008) adds to this debate in identifying key benefits to the use of multimedia representations for language learning but also identifying potential problems with cognitive load and a lack of cognitive engagement if such representations are used inappropriately.

Chuang, Shen and Wang (2008) argue that the learning benefits of IWBs are very dependent on students interacting directly with the board themselves rather than, for example, observing the teacher doing so and that this interaction is particularly valuable when interactive responses are made public and discussed with the class. Across the literature, IWBs have been used interactively and it is on this score, that they appear in the literature to have performed particularly well (see, for example, McCormick, 2007). As pointed out by Cutrim Schmid (2008) for example, the actual type of interaction with the board is important and there is evidence (see, Zevenbergen & Lerman, 2008, for example) that frequent low level interaction with the board may have a detrimental effect on the depth of cognitive engagement (see further discussion below).

Armstrong, et al. (2005) consider classroom change with the introduction of IWBs and find that the role of the teacher is pivotal to these changes. Glover

and Miller (2001) concur, identifying three types of teachers with differing attitudes towards the adoption of IWBs: missionaries, tentatives and Luddites. In later work they concluded that in order to realise the potential benefits of an IWB, a number of conditions related to teacher attitudes had to be met: "(a) there was a will to develop and use the technology; (b) the teachers had to be willing to become mutually interdependent in the development of materials; and (c) there had to be some change of thinking about the way in which classroom activities were resourced" (Glover & Miller, 2002, p.5). Beauchamp (2004) also emphasises the important role of the teacher in facilitating learning benefits from IWBs, and identifies five categories of teachers' use of the IWB: black/whiteboard substitute, apprentice user, initiate user, advanced user, and synergistic user. Shenton and Pagett (2007) agree that pedagogical change resulting from the implementation of IWBs is very much teacher dependant and identify diversity in IWB teaching approach as a key outcome of their own study.

A number of studies have found that IWBs are readily adopted by teachers and that their usage patterns continue to evolve over time. Bennett and Lockyer (2008) for example intensively studied four classroom teachers' use of an IWB over two school terms and concluded that all teachers found the technology easy to use and all were able to readily integrate the technology into their classroom teaching. Similarly Hedberg and Freebody (2007) in a study of 13 teachers' use of IWBs in conjunction with digital learning objects, found that "by the end of the year-long experience of innovation, almost all 13 participating teachers had moved to higher levels of use of the two innovatory technologies", (p.3). Gatlin (2004) suggests that initial teacher resistance is overcome after they experience positive changes in student participation and interest once the technology is introduced and advocates that IWBs be permanently installed in classrooms to give teachers a sense of ownership over the new technology.

In some contexts, IWBs have been promoted to teachers as requiring little or no change to existing lesson plans and this has been a perceived advantage (Gatlin, 2004). Kennewell (2006) also suggests that the use of an IWB generally does not require a fundamental change in the teacher's pedagogical paradigm, although he does not necessarily see this as a positive, because, he argues, the technology may be used in such a way as to reinforce rather than transform current teaching approaches. A number of authors have found that teachers' pedagogical approaches when using an IWB were consistent with the approaches they used when teaching without technology (Bennett & Lockyer, 2008).

METHOD

The research carried out was a quasi-experiment where the research procedure divided the group into two, namely the experimental group and the control group with a mixed method approach. The researcher ordered the analysis method (Sequential Explanatory) where the first stage of research was carried out using quantitative methods to obtain measurable and comparative data. The next stage or second stage is research using qualitative methods to strengthen, prove or disprove the quantitative data obtained in the first stage (Sugiyono, 2020).

The total population was 29 students in the 10th Islamic Communication and Broadcasting class. The sample was selected using a purposive sampling technique. The quantitative data collection tool used a Likert scale for student responses which were then analyzed using independent sample t-test analysis against the post test. Qualitative data was collected from interviews conducted with 2 informants from the experimental sample. The researchers selected 2 people as informants based on criteria and were deemed to have provided sufficient information needed by the researchers.

RESULTS AND DISCUSSION

Carrying out this research, researchers carried out an experimental process by providing inclusive literature which included the availability of reading material that discussed gender. Gender literature may include books, videos, articles, journals, blogs, films, research papers, or other online resources. The next step is to create a discussion group which will support the growth of interest and understanding through the exchange of ideas and experiences.

The discussion activity, which included providing reading material, was carried out over 14 meetings. To achieve effective communication, a group communication pattern is needed to support it to make it easier to understand the message conveyed between the giver and recipient so that it is clearer, more complete, delivery and feedback are balanced (Suprpto, 2019).

It can be said that in the group discussions that were carried out, the group communication pattern that was formed was a free network communication pattern. The free network communication pattern is based on an interaction perspective which emphasizes that the communicator or source responds reciprocally to other communicators. The mechanism of the free network group communication process is that both the communicator and the communicant have the same position (Febrianita & Amalia, 2020).

In another sense, the free network communication pattern is the same as the circular communication pattern, only this pattern is more dynamic and has open channels. This pattern allows every member of the group to communicate with anyone, this pattern is the most flexible pattern because there are no intermediaries who can hinder the flow of information.

The activities carried out in each meeting are: first, the researcher distributes reading material in the form of articles, research papers, films, videos or books, then, the researcher and all discussion members present their understanding of the reading material shared. Second, interactive activities such as questions and answers and sharing experiences. Researchers and all discussion members can ask questions or provide responses to the presentation or message being discussed. Third, carry out evaluation and feedback. Researchers and all discussion members were given the opportunity to provide feedback regarding meeting activities.

Quantitative data findings can be seen from the results of hypothesis analysis based on statistical calculations to draw conclusions about whether the null hypothesis can be rejected or not and it is important to interpret the results contextually and explain the implications of the findings. The use of the independent sample t-test on the post-test aims to determine whether there is a difference in the level of interest and understanding of gender literacy between students who were given treatment and students who were not given treatment. The posttest t-test results calculated using SPSS 26.0 software can be seen in Table 1 below:

Table 1 Independent Samples t-Test Results on Students' Interest and Understanding of Gender

Group	Mean	T test	P
KE	122.66	12.841	0.000
KK	89.16		

Note: TO: Experimental Group; KK: Control Group; T test: Difference in means of two sample groups; P: Probability

The results of the independent sample t-test in Table 1 show that the t-test value is 12,841 with $p = 0.000$ at a significance level of 5%. This means that the t test value is significant, so it can be stated that there is a significant difference between the interest and understanding of students who were given treatment and students who were not given treatment. In connection with this research,

based on hypothesis testing, it shows that efforts to provide inclusive literature access are effective in increasing student interest and understanding.

Based on the t test, it is also known that the average level of interest and understanding of students who were given treatment was 122.66 and the average level of interest and understanding of students who were not given treatment was 89.16. It can be concluded that the average level of interest and understanding of gender literacy among students who were given treatment was higher than students who were not given treatment. This is in accordance with the statement that if the experimental group's score is higher and more significant than the control group, then the treatment has a positive effect (Sugiyono, 2020).

Regarding the treatment provided, namely the implementation of efforts to provide inclusive literature access in increasing student interest and understanding, then in supporting and expanding the quantitative data analysis of qualitative data sourced from interview data collection is also presented. The results are interpreted as follows:

Students' interest in gender literacy

Interest has a big influence on the activities a person carries out, with interest a person will do something with pleasure and willingly. Someone who is not based on interest will feel reluctant to do something, so this shows that interest is an important element in achieving success in carrying out a task or activity (Vidiawati, 2019). Gender literacy interest can be seen from several aspects including: a person's frequency of reading activities, the amount of reading material, situations that encourage a person to read, active participation without coercion, and feelings of enjoyment. From the results of interviews with informants, it is proven that there is an increase in interest in gender literacy, thus this qualitative data strengthens the quantitative data.

Qualitative data that supports and expands this explains that students' interest in gender literacy can be seen from several aspects as follows:

1. Frequency and amount of reading material

The results of the interviews obtained explain that the amount of reading material that informants read has increased and they more often read books or other gender reading materials, both online and offline. This is in accordance with Santoso's (2011) statement, namely that if someone has a large amount of reading material, it shows that someone has a high interest in reading activities.

2. Situations that encourage someone to read

The results of the interview showed that the informants' interest in gender literacy increased because of the comfortable atmosphere and the discussion activity itself. In line with this, such a situation can provide benefits in retaining and also motivating students to continue reading and increase their knowledge more broadly and in depth (Jalaludin, 2021).

3. Active participation without coercion

The interview results obtained showed that the informant was aware of the benefits of reading for himself and was willing to look for references to reading materials regarding gender other than the reading materials provided. A person who is aware of the benefits obtained from reading activities will carry out reading activities voluntarily without any coercion from other parties (Ramandanu, 2019).

4. Feelings of joy

The results of the interview explained that the informant felt happy when reading gender reading material. When someone feels happy exploring gender issues, discussing gender gaps, it indicates that they have an interest and desire to understand.

Understanding student gender literacy

Gender literacy can provide benefits for students in changing society to be more inclusive, fair, and aware of the importance of gender equality. Gender literacy can also be understood as the ability to understand the ins and outs of women's status from negative justifications produced by social culture, reconstructing the reality of gender perspectives and deconstructing established discourses towards women (Darma, Yoce, & Astuti, 2021).

Understanding gender literacy refers to a person's ability to recognize, understand, and criticize roles and norms related to gender in culture and society. This includes an understanding of the concept of gender, gender differences, as well as the social, economic and political impacts of gender inequality. Gender literacy also involves being aware of gender stereotypes, patriarchy, and how these affect an individual's daily life and opportunities.

Scientifically, gender literacy involves analysis of the social construction of gender roles, how gender identity is understood and shaped by society, and how gender inequality appears in various aspects of life. Gender literacy helps us understand why women and men often have different access to education, work, health services, and how policies and social structures reinforce this. Gender literacy enables a person to identify gender discrimination, understand how media and culture influence gender perceptions, and contribute to building a more inclusive and gender-just society.

Based on the results of the interview, it was found that the explanation of the concept of gender that the informant provided could be explained correctly and was able to identify problems that occurred in relations between men and women. The ability to understand concepts, social roles, stereotypes and dynamics that occur in relationships between men and women is an indication of gender literacy with a better understanding (Jiwanda, 2023). Apart from that, this ability to understand forms a critical attitude to abandon gender thoughts or assumptions, especially regarding women (Jiwanda, 2023). Gender literacy provides a clear definition of the difference between the concepts of gender and sex. This helps avoid gendered assumptions.

CONCLUSION

Based on the results of the research findings that have been carried out, the researchers concluded more briefly as follows:

Implementation of efforts to increase interest in gender literacy among students of the Islamic Communication and Broadcasting Study Program is by providing literature on gender which is included in peer discussion groups. Procuring literature means ensuring the availability of reading materials that discuss gender. Gender literature in the form of books, articles or other online resources, by integrating it into discussions, members can develop a deeper, critical and contextual understanding of gender issues. Ease of understanding messages is supported by forming a circular group communication pattern or all-channel network, this allows all discussion members to communicate without obstacles. These efforts support the growth of interest and also increase understanding through the exchange of ideas and experiences.

There is an increase in interest and understanding of gender literacy among students of the Islamic Communication and Broadcasting Study Program. The results of quantitative research show that subjects who were involved in discussion groups and had access to literature had a higher increase in interest and understanding with an average score of 122.66. Meanwhile, the control group who were not involved in the discussion group had more limited interest and understanding with an average score of 89.16. The results of the qualitative data show that interest in gender literacy among students in the experimental group increased as assessed through indicators of the amount and frequency of reading, active participation in reading activities as well as the desire to search for sources of reading material independently, as well as positive feelings, namely joy when reading and discussing, thus motivating to share knowledge with others. They also have a better understanding of the concepts discussed in

the literature. Active participation in discussions allows them to share views, information and deepen mutual understanding.

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