Teaching With the Interactive Whiteboard: An Engaging Way To Provide Instruction

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At Sumrall Elementary School, in Mississippi, many teachers are thrilled with the interactive whiteboard (IWB). "It is very motivating," said one 4th-grade math teacher, who mentioned the benefits of teaching with technology because today's students are so accustomed to technology in their daily lives. Many teachers at this school use the Promethean board, a type of interactive whiteboard, which is becoming very popular in schools across the United States. The vice principal at Sumrall commented that one parent was so impressed with the whiteboard that he offered to buy one for the school so his child could use it.

The use of the whiteboard does in fact seem to engage students for a variety of reasons. One teacher at Sumrall Elementary mentioned that she has tried teaching both with and without it and noticed a positive effect on students when she used it. Teaching with the whiteboard allows teachers to deliver instruction in an alternative format, decreasing monotony for both teachers and students. The interactive whiteboard also allows teachers to connect to the Internet and project images on virtually any topic, a great benefit to visual learners.

Students learn how to use new technology skills or sharpen their existing skills through this new hardware. They seem eager to come up to the front of the class to use the whiteboard. Some teachers encourage students to use a device similar to a mouse that allows them to record their answers without leaving their seats. This allows all students to participate simultaneously and gives teachers immediate feedback about which questions are difficult and which are easy for the class, as well as data about who is answering correctly and incorrectly.

In a reading and English 5th-grade class at Sumrall Elementary, a teacher uses the whiteboard to introduce new vocabulary words and show images on the IWB that match the new words. Later, she flips to a different page on the whiteboard to guide students to do some work involving synonyms and antonyms using the new words. This teacher is very happy with the way the whiteboard engages the class, but notes that it can be misused and needs to be combined with other effective teaching skills. The views that teachers and administrators at Sumrall Elementary have about the whiteboard are similar to what researchers are finding about this technological tool. The purpose of this article is to discuss the benefits and limitations of the interactive whiteboard as a means to promote learning.

Emergence of the Interactive Whiteboard in Educational Settings

The interactive whiteboard generally consists of a computer, a data projector, and an electronic screen (Wood & Ashfield, 2008). The IWB was designed for office settings, and has not been used in schools until recently. In educational settings, it was first used in higher education, and primary schools began to consider its use in the late 1990s (Higgins, Beauchamp, & Miller, 2007). One of the reasons this new technological tool began to be considered for use in educational settings is because it was identified as a way to integrate a wide range of multimedia resources, such as written text, sound, pictures, software packages, video clips, CD-ROMs, Internet images and websites, into classroom instruction (Ekhaml, 2002; Glover & Miller,

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Students at Sumrall Elementary School enjoy using the whiteboard.

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2002). It also provides a synchronous transmission mode, allowing two-way interaction between the student or teacher and the medium, thus enhancing student engagement (Bryant & Hunton, 2000). The board is large and touch-sensitive (Smith, Higgings, Wall, & Miller, 2005); students can write on the board, using fingers, hands, and markers to demonstrate their understanding (Solvie, 2007). It also can be very useful when teaching math as a result of its ability to let the user draw straight lines, circles, triangles, and squares (Gage, 2002).

Many countries, such as the United Kingdom, United States, Australia, and Canada, are enthusiastic about the whiteboard's potential in enhancing teaching and learning; consequently, they are spending millions to buy this technology for their school systems. In 2004, for example, England had already spent 25 million pounds on IWBs (Wood & Ashfield, 2008). England has been experiencing a trend toward whole-class teaching recently, especially in mathematics. Reynolds and Farrell (1996) found that the top-performing countries in mathematics were using a significant amount of direct whole-class teaching. The enthusiasm about IWBs was likely triggered in part by their potential to improve whole-class instruction.

Academic Benefits of Interactive Whiteboards

Many teachers and administrators seem to be enthusiastic about using the whiteboard. One study described how student teachers see the potential importance of using interactive whiteboard technology for children, even when they have limited experience with this technological application themselves (Kennewell & Morgan, 2003). Levy (2002) reported on how the use of whiteboards allows teachers to easily address differentiated learning needs of students. For example, one teacher effectively split the IWB into three screens; each was used to develop a different comprehension level corresponding to students' understanding (Miller & Glover, 2002). The research of Smith et al. (2005) described how the IWB's capacity to flip back to review material helped a primary teacher assist lower ability groups. Bennett and Lockyer (2008) found that the IWB allowed teachers to model Internet research skills and that it led to a reduction in lesson preparation time, while allowing more opportunities for teachers to prepare lessons from home.

In addition to the ways in which interactive whiteboards facilitate lesson planning and differentiated instruction, teachers' and administrators' enthusiasm for this technology is likely also based, in part, on student responses. Research on IWBs has documented how this learning technology often leads to an increase in learners' motivation (Greenwell, 2002; Solvie, 2004; Weimer, 2001) and task engagement (Beeland, 2002; Hodge & Anderson, 2007). Edwards, Hartnell, and Martin (2002) explain that the use of interactive games not only increases students' enjoyment in learning but also typically results in more accurate student responses. One study on math instruction (Clemens, Moore, & Nelson, 2001) concluded that significant academic gains and positive attitudes resulted from using one type of IWB called the SMART board. Marzano (2009) reported in another study that interactive whiteboards led students to a 16 percentile-point gain in student achievement. Knight, Pennant, and Piggott (2005) found that for some children, the interactive whiteboard seems to contribute to increased self-esteem and allows chances for pupils to revisit images of prior learning.

Most of the research that has been done on IWBs focuses on teaching literacy and math, although the interactive whiteboard can be used for all subjects. Solvie (2007) found that continued use of the IWB was especially useful for modeling literacy tasks and noted that it can simplify lesson preparation and navigation to specific parts of a lesson. Forrest (2005) wrote about his experience teaching math with an IWB and how this teaching tool has become indispensable for him. He also described how pupils learn quickly to use the IWB's pen. Using the pen on the IWB offers students the chance to practice and manipulate text. Preston and Mowbray (2008) cite research explaining how interactive whiteboards were used successfully with kindergarten children to enhance student learning in science. IWBs are reported to be a flexible tool for all age groups from kindergarten through higher education (Smith et al., 2005).

Multimodal Teaching and Diversity

Researchers often advocate for the use of teaching styles that match the learning styles of students (Collins & Cook, 2000; Glover & Law, 2002). Many researchers (e.g., Gardner, 1993; Jewitt, 2002; Watson & De Geest, 2005) emphasize the importance of providing instruction by using a variety of modalities. One of the reasons IWBs seem to lead to academic improvement is their ability to provide instruction that appeals to visual, auditory, and tactile learners (Beeland, 2002). Teachers can use pictures or video on the IWB to enhance visual learning. Billard (2002) noted that the IWB's large screen provides a visual framework that matches many children's preferred learning style, that using visual aids on the IWB helped guide children to place events in chronological order, and that this form of instruction also improved students' writing. Poems, songs, music, and speeches can enhance auditory

learning, and the whiteboard is a good forum for encouraging such expression. Permitting students to interact with the board through movement helps meet the needs of tactile learners.

In addition to providing instruction geared toward various learning styles, interactive whiteboards also lend themselves to instruction in each of the various intelligences identified by Howard Gardner (1993): logical-mathematical, linguistic, musical, spatial, bodily kinesthetic, interpersonal, and intrapersonal. Nieto and Bode (2008), researchers on culturally responsive teaching, discuss the likelihood that many members of a given culture will be more advanced in one intelligence over members of a different culture as a result of social, political, and geographic circumstances, making IWBs an appropriate teaching tool for children from diverse cultural backgrounds. Providing instruction through interactive whiteboards that emphasizes many intelligences, rather than just one or two, will likely create a more democratic setting for all students.

Limitations and Concerns

As a result of the boom in technology in the recent past and studies that have shown the value of providing multimodal instruction, such researchers as Higgins, Beauchamp, and Miller (2007) state that the use of IWBs could possibly be "the most significant change in the classroom learning environment in the past decade" (p. 221). However, the enthusiasm that many educators have for this instructional tool needs to be balanced with understanding of its limitations. Educators need to be aware that relatively little research has been done on the interactive whiteboard (Jones, 2004; Marzano, 2009), and that some of the existing research on the value of IWBs is conflicting. Greiffenhagen (2000) states that "their educational potential has yet to be demonstrated" (p. 1) through empirical studies.

Higgins et al. (2007) noted that although teachers and students may be motivated as result of using IWBs, this does not necessarily lead to an increase in student achievement. Additionally, some research indicates that although many educators are enthusiastic, there remains uncertainty "as to whether such enthusiasm is being translated into effective and purposeful practice" (Smith et al., 2005, p. 99). Martin (2007) also speculated as to whether educators were being overzealous about the use of the whiteboard. Based on her research, she concluded that this interactive technology is likely to increase student motivation and involvement, but its impact on learning is less obvious.

For IWBs to be successful in promoting learning and enhancing achievement, teachers need to be trained to both understand the potential that IWBs have for learning, and to provide effective instruction using this new technology. Without such training, "It is unlikely that teachers will either be aware of or be able to exploit the potential affordances of IWBs" (Armstrong et al., 2005, p. 467). Although IWBs can reduce lesson preparation time (Smith et al., 2005), it takes an investment of time for teachers and students to become skillful in using IWBs effectively (Ball, 2003; Glover & Miller, 2001). If the IWB is used as a presentational tool only, the academic gains resulting from interaction will be lost (Armstrong et al., 2005).

Once teachers have received initial training in the use of IWBs, they also must receive ongoing support to maximize their potential. Teachers will need help to find appropriate software and to match it to different types of learning tasks. This requires an investment of both time and money and is often difficult to provide as a result of the rapid pace of technological change (Goodison, 2002). Ongoing technical support also must be provided for teachers, because it "has been shown to be a vital component" in any information and communication technologies network, "yet [such support] appears to be in a state of underdevelopment" (Hall & Higgins, 2005, p. 113).

Conclusion

The interactive whiteboard seems to be generating a great deal of enthusiasm among educators, and for good reason. It appears to motivate and engage students, and these are vital components of teaching and learning. Another aspect of the whiteboard appreciated by students and teachers is its capacity to help teachers deliver instruction in a variety of ways. Although many benefits may be derived from using this technology, teachers need to remember that the whiteboard is only a tool and does not replace good teaching. Its value is dependent upon teachers who are already competent in using effective teaching strategies.

If its use is not based on effective teaching methods or used to promote the interaction it was designed for, the whiteboard will lead to little or no learning. Quashie (2009) stated that "it is possible for the IWB to be used in a way where it is not interactive at all," and that it is the responsibility of teachers "to make their lessons interactive in order to engage and motivate their students" (p. 38). IWBs also may not be the most appropriate tool for teaching all concepts. For example, Martin (2007) reported that using the whiteboard in whole-class writing lessons is not necessarily the best way to teach students to write. Teachers who embrace this technology must judiciously choose when and how to use it to enhance student learning and

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achievement.

The effect of the whiteboard on student learning is difficult to establish, since there are few, if any, rigorous studies on the impact of the IWB on student learning (Smith et al., 2005). Little is known about whether teachers are receiving the training and support they need to maximize the effectiveness of this instructional tool. Further research is needed to understand how this technology, which has garnered such enthusiasm from educators and students alike, actually affects student learning, but its potential does seem promising.

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on a daily basis watching flag football. There is still some fussing and a little rule-bending here and there, but nothing like before. It's amazing what a difference a few rules and an actively engaged teacher can make. Now, not only is football fun to play; it is also a pleasure to watch.

Jambor defines recess as a time for students to spend "time away from the task at hand; an interlude, a change of pace" (as cited in Jarrett et al., 2001). A brief stretch and a water break or a vigorous run around the football field can work wonders for the student whose struggles with reading bring her to tears. That same student can come back from recess rejuvenated and ready to tackle the next task. Educators are taught to look for a child's strengths and weaknesses, and to accentuate the strengths while remediating the weaknesses. Academics are not every child's strength. Play time gives them an opportunity to experience success in a different way, leading to increased self-confidence.

According to Taras (2005), physical activity provides many benefits, including improved circulation, increased blood flow to the brain, and raised levels of endorphins. All of these tend to reduce stress, improve mood, and induce a calming effect, and perhaps they improve academic achievement as well. Eliminating recess from the daily school schedule is a huge mistake. Even if it shortens instructional time slightly, the benefits of play time carry over to the classroom to contribute to student success.

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