

The Impact of the Use of Interactive Whiteboard on Iranian EFL Students' Attitudes toward Lesson Instruction

Ebrahim Bajoolvand¹, Keivan Mahmoodi^{1*}, Karim Vafaeeseresht¹

1. Department of English, Malayer Branch, **Islamic Azad University**, Malayer, Iran.

* Corresponding Author: keivan_mahmoodi@iau-malayer.ac.ir

Abstract

This study aims to investigate the impact of the use of Interactive Whiteboard on Iranian EFL students' attitudes toward lesson instruction. For this purpose, a sample of 30 intact students was selected randomly as an experimental group. All students were female, at the same social class, never experienced overseas trip, and their ages were between 14 and 15. The experimental group participants were taught by the use of Interactive Whiteboard. After six months of instruction, the students were given a questionnaire to see the possible impact of Interactive Whiteboard on the students' attitudes toward lesson instruction. The answers were calculated by the use of SPSS (SPSS Inc., 2009). Group statistic showed higher tendency toward English classes among the participants of the experimental group who used Interactive Whiteboard and the positive impact of Interactive Whiteboard on the students' attitudes.

Keywords: interactive whiteboard, students' attitude

I. INTRODUCTION

In the last 150 years, the phonograph, radio, television, tape recorder, film, and the computer have played their role in language learning. Computer technology incorporates all of the foregoing media, and because it has become so integrated into people's daily lives in different societies. One of the newest and most popular applications of computer in classrooms is interactive whiteboard. Many countries such as United States of America, and United Kingdom made a substantial investment in interactive whiteboard technology. This technology perceived by students and teachers as a positive addition to the classroom learning and teaching environment. Moreover, these days most of educators focus on the interactive aspect of teaching and learning. Actually, when students interact with each other in a learner-centered situation, their confidence and enthusiasm increases, and they can learn better .

By the rapid improvement of technology and wide-range use of it, educators are willing to integrate the process of learning and teaching with these technologies, and most of all with interactive technology. Some new technologies provide situation in which learner from different parts of the world could interact with each other such as culture, some provide situation in which learner interact with each other in class by reducing the impact of teacher in process of learning and let students to take the responsibility of their own learning. On the other hand electronic pages are going to be replaced by traditional ones, and there is a tendency toward them among teenagers. Most teenagers have cell phones, tablets, and the same which can play different electronic programs. They can use them to improve their own learning, but how to use them and what kind of program should be used are still unanswered questions, so there should be plans to get students familiar with these technologies, and use these technologies to motivate and get them involved in a process of learning and teaching. Interactive whiteboard is a kind of technology which helps learners to interact with the content knowledge they are going to learn. This interaction occurs not only among students and materials, but also among students, teacher, and technology. All in all, interactive whiteboard motivates students to take apart in a process of learning by providing interactive situation.

What follows is a brief elaboration on interactive whiteboard, in particular, which seems to help develop a clearer understanding of Interactive whiteboard and its uses.

A. Interactive white board and Engagement

Most people need to reinforce their understandings by asking others questions, thereby making learning an inherently social activity. Current education theories are grounded in the notion of the social learner and position student engagement as a key component of knowledge construction. Social learning led to three dimension , such as: (1) *Constructivism*; relies on the learner to select and transform information, build hypotheses in order to make decisions and ultimately construct meaning, (2) *Whole-class teaching* ;brings the entire class together, focuses their attention and provides structured, teacher-focused group interaction, and (3) *Active learning* learners actively engage in the learning process through reading ,writing, discussion, analysis, synthesis and evaluation, rather than passively absorbing instruction.

A common thread between these three learning theories is the understanding that student engagement is crucial to learning and, as a growing collection of international research proves, interactive whiteboards promote student engagement. 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.

Perhaps one of the biggest challenges of integrating ICT into learning environments is maintaining dynamic interaction with students as they focus on their individual computer screens. Interactive whiteboards promote interaction among the students, the learning materials and the teacher, and enrich ICT by providing a large work space for hands-on work

with multimedia resources. Having a display surface large enough for everyone to see encourages a high level student interaction. A teacher and a student can interact with the interactive whiteboard at the front of the class and the rest of the students remain involved.

As research from the United States, the United Kingdom and Australia indicates, the functionality of the interactive whiteboard and its accompanying software allows for the development of classroom activities that are engaging for students, so they encourage greater focus, participation and interaction, and improve student learning outcomes as a result.

Gerard and Widener (1999) find that “the SMART Board interactive whiteboard supports interaction and conversation in the classroom; it helps with the presentation of new cultural and linguistic elements.”

Solvie (2001) investigated the correlation between the use of an interactive whiteboard as a delivery tool for literacy instruction in a first-grade classroom and student attention to and participation in the literacy lessons. Her research found:

The Interactive Whiteboard was novel and created enthusiasm for learning on the part of the students as evidenced in remarks made during the lessons presented using the Interactive Whiteboard and During individual student interviews.

In 2004, Solvie again focused her research on interactive whiteboards, and in an article originally published in The International Reading Association’s journal, *The Reading Teacher*, she reported, “It engaged my primary students in literacy learning.... I was able to interact with the class, demonstrating, modeling and manipulating what was on the board by touch. I was not confined to, or focused on, a computer that separated me from the class.... Visual display in the form of diagrams, webs and pictures, as well as use of colors and shapes to highlight text, prompted engagement.”

Additional U.S. research focusing on middle-school students and teachers, and their attitudes towards interactive whiteboards indicates a strong preference for the use of interactive whiteboards in the classroom. As Beeland (2002) asks, “Does the use of an interactive whiteboard as an instructional tool affect student engagement? The answer, based on the results of both the surveys and questionnaires, is yes.... The results of the survey indicate that interactive whiteboards can be used in the classroom to increase student engagement during the learning process.”

Interactive whiteboard research is also being conducted in the UK, where Reed (2001) studied students’ initial responses to use of an interactive whiteboard during classes: The immediate advantage of this arrangement compared to seating students at individual workstations has been that websites can be examined as a group activity so that communication between members of the group continues, whether in English or in a foreign language. A further benefit is derived from the fact that several members of the group are not especially computer literate and are daunted by the prospect of seeking out and using websites on their own, particularly interactive sites which require regular responses from them.... It allows members of the group to ask and hear others’ questions and reactions before starting tasks individually.

Other UK researchers have also found correlations between interactive whiteboards and student–teacher engagement. Ball (2003) details the increased potential for teachers to concentrate on student responses during lessons where an interactive whiteboard is used, and Cunningham *et al.* (2003) point to the benefits of the fast-paced, engaging interactive-whiteboard classroom. Edwards *et al.* (2002) highlight the in-class opportunities that the flexibility of interactive whiteboards allows students and teachers, and Latham’s (2002) teacher-focused research finds “two-thirds of the teachers felt that the whiteboard offered strategies for teachers to develop interactive teaching. One-third stated that pupils from all ability groups were now more willing to take part in lessons.” In addition, Cox *et al.* (2003) have concluded that interactive whiteboards allow teachers to gain a deeper understanding of their students’ needs, and students are better able to learn through collaboration with each other.

British Educational Communications and Technologies Association (Becta) funded research from Cogill (2003) supports these claims in a research project focusing on the use of interactive whiteboards in primary schools. According to a primary school teacher participating in the project, student attention and focus on lessons is improved with the introduction of digital images and text on the interactive whiteboards. This teacher adds that students are “just glued the whole time and they do get a lot more from it.”

Australian researchers investigating interactive whiteboards have also found an increased potential for interactive engagement in classrooms where ICT is integrated (Kent, 2003) and indicated that teaching with interactive whiteboards is “more fun, more engaging, more exciting and is impacting on the enjoyment, speed and depth of learning” (Lee and Boyle, 2003).

B. Interactive Whiteboard and Student’s Participation

Past research indicates that students learn more content and faster with technology (Faucet, 2000). One form of technology is the interactive whiteboard. The use of an interactive whiteboard within the classroom can potentially provide positive results in achievement as well as in student participation. The purpose of this study is to focus on the latter. In this study, student participation and attention will be referred to as having the same meaning – active engagement and sustained focus in the lesson.

Research conducted by Averis, Glover, and Miller during a two year period beginning in 2002 focused on student perceptions, attitudes, and attention to the use and nonuse of an interactive whiteboard during instruction. Their findings indicated that in some of the lessons where the teacher shifted from the use of the board to not using it, “pupils’ interest waned and, at times, there were behavioral management issues that were not evident during the lesson” when the interactive whiteboard was being used (Averis, Glover, & Miller, 2004). This same study also addressed the recognition that the interactive whiteboard in itself was a motivating factor solely because of the way in which teachers used it within the lesson. The incorporation of a different type of instructional method led to increased attention from the students. However, teachers also noted that the use of the interactive whiteboard still does not

suggest that “we shall have a lesson where all the pupils are paying attention all the time,” (Averis, Glover & Miller, 2004).

Several studies have been conducted to evaluate the correlation between the use of an interactive whiteboard as a delivery tool for instruction and student participation or engagement in the lesson. One such study, conducted by Solvie in 2001 was conducted in a first grade classroom where student attention was assessed during reading literacy lessons. Analysis of the data revealed there was not a significant difference in student attention when lessons were presented with the whiteboard as compared to student attention to lessons presented without the whiteboard.

A study examining the impact of interactive whiteboards as a resource for teaching and learning in grades six and seven was conducted and found opposing results to Solvie’s study, (Latham, 2002). One of the focuses of Latham’s research was to identify the impact of the interactive whiteboard on the quality of teaching and learning for all pupils involved. The results indicated that the use of interactive whiteboards as a resource was effective in providing potential for all pupils to be actively involved in teaching and learning. It was also discovered that the interactive whiteboard provided “potential for teachers to structure and manage interactive teaching and learning, with improved levels of concentration and fewer distractions,” (Latham, 2002).

An eighth grade American history teacher, Weimer, conducted a study where the focus was on the motivational factor of the use of SMART boards in his classroom. The SMART boards are a brand of the interactive whiteboard, similar to the Active Board. The qualitative analysis of his research indicated that the students who participated in his study were highly motivated by the use of the SMART board during instruction (Weimer, 2001). In addition to Weimer’s study, Miller also comments on how the interactive whiteboard contributes as a motivating factor in the classroom. He indicated that research highlights that the whiteboard serves as an intrinsic stimulation that presents content in a different way that ensures understanding and retention, (Averis, Glover, & Miller, 2004)

Beeland (2002) conducted a research study to examine “the effect of the use of interactive whiteboards as an instructional tool on student engagement. Specifically, the desire was to see if student engagement in the learning process is increased while using an interactive whiteboard to deliver instruction”. Beeland’s purpose for researching and methodology are the building blocks behind the research conducted in my classroom. Student responses to his surveys and questionnaires indicated the positive impact that the interactive whiteboard has on student participation and involvement in the classroom during instruction. In Beeland’s research, when asked, “Does the use of a whiteboard in the classroom help you to be able to pay better attention? Why or why not?” all but one of the students said yes. One student even commented, “It makes me pay attention to the teacher more. When the teacher just stands up there and talks, I get easily distracted” (Beeland, 2002).

Bell provides a baker’s dozen reasons why the interactive white board is an effective tool to use in teaching. During her doctoral studies the interactive whiteboard became her focus and like many other researchers before her, “study showed statistically significant improvement in student attitudes towards both using computers in instruction and towards

writing instruction,” (Bell, 2002, p. 1). Bell also notes that the interactive whiteboard is a colorful tool and that research indicates that students respond to displays where color is employed, and marking can be customized both in the pen and in the highlighter features to display a number of different colors.

Increasing student participation in the learning process are essential and key benefits. Research indicates that these benefits are present in the use of the interactive white board when used during instruction. Since the interactive whiteboard has the ability to interact with the computer, websites and videos are streamed onto the board and create visual presentations. The opportunity for students to physically interact with the board exists, allowing an increased engagement with the learning material. According to Kennewell (2001) this increases motivation and provides learning gains. Studies also report that since the interactive whiteboards have the capacity to post and present student work, discussions can be conducted and the focus on student created material keeps the class on task, (BECTA, 2003). Overall, the research supports the use of an interactive whiteboard to increase student participation in the classroom.

C. Interactive Whiteboard and Motivation

Interactive whiteboards positively affected a student’s motivation to learn. Higgins and Hall (2005) note in their article that: “children of the 21st century have been part of multi-media world from birth and as a result are comfortable with such technologies”. In addition to this finding, Smith, Wiggins, Wall, & Miller (2005) note that the pupils “zest for learning is enhanced by the element of surprise that IWB can bring to a lesson as it leaves students wondering what will happen next”. With these features, most any topic can become an engaging and attention-grabbing lesson.

There was one study to the contrary though. This particular study written by Solvie (2001) found that there was not a significant difference in student attention and motivation when using an interactive whiteboard as opposed to when one was not used. However in the majority of research, having Interactive whiteboards are beneficial to motivating students to learn though this does not occur simply by having an Interactive whiteboard in the classroom. Rather increased motivation comes from giving students opportunities to interact with the whiteboard. Furthermore, Smith, Higgins, Wall, and Miller (2005) all found that motivation was tied to ability and age. While data on this finding is inconclusive, these points among other remain important focus points for the Interactive whiteboard research process.

Interactive whiteboards definitely have a positive influence on student motivation to learn. However, it is only when students are given the opportunity to interact with the board that true increases in motivation can be measured. To illustrate this point, I note a study conducted by Miller and Glover (2004). In their study, Miller and Glover found that when teachers use Interactive whiteboards as a “glorified dry erase board” or as a projector screen, students lacked attentiveness and motivation. However, when students were given the opportunity to physically move objects around on the board, student attentiveness and motivation greatly increased. Smith, Higgins, Wall, & Miller (2005) support these findings in

their article as they state, “Students enjoy interacting physically with the board, manipulating text and images”. Through allowing students to have increased time to interact with the board, the classroom becomes less teacher-directed as the teacher must now facilitate instead of lecture (Hall and Higgins, 2005). In effect, this concept may be harder for some teachers to follow through with. However, when it is done, major gains in student learning and motivation are made.

Overall, Interactive whiteboards seem to, in most cases, lead to increased student motivation and engagement. Although, some of the research suggests that Interactive whiteboards are more successful with elementary age students than with middle and high school students. In support of this, one article stated that “teenagers may not be as eager to leave their seats as young pupils” (Smith, Higgins, Wall, and Miller, 2005).

While two major points related to student motivation and learning were discussed above, several additional points prove to be positive reasons for using interactive whiteboards to increase student motivation to learn the new technology. First of all, as Hall and Higgins (2005) note in their article, Interactive whiteboards contributes to making lessons “more enjoyable and fun,” which in turn can increase motivation greatly. Secondly, there are times in which teachers may (with student permission) display a student work for constructive criticism, which can be a major motivator to those students who need that extra push to perform to their highest potential (Higgins, Smith & Wall, 2005). Thirdly, Starkman (2006) finds that Interactive whiteboards are “a conduit to the curriculum”. No matter the type of lesson or subject area, the Interactive whiteboard can prove to be a valuable tool to help ensure all areas of curriculum are presented in an engaging and motivating way. Lastly and perhaps most importantly is a comment recorded by Smith, Higgins, Wall, and Miller (2005) in which a teacher interviewee notes that her students enjoy the visuals used to explain some topics? She goes further to say the students seem to have these images burned into their brain after finishing a lesson, thus providing a visual that students can recall for a school project. In addition to the visuals, oral skills can be improved as students explain the pictures/diagrams noted on the screen. As you can see, there are many, many reasons to purchase interactive whiteboards, all of which go hand in hand to increase student motivation.

D. Research Question

Based on the effort of this study to seek the impact of the IWBs on the students’ attitudes and affect the following question will raise.

1. Does interactive whiteboard have an effect on the students’ attitudes toward English classes?

II. METHODOLOGY

A. Participants

For the purpose of the study, 30 senior high school students from two public high schools in Khoramabad were selected randomly as an experimental group of the study. There were 2 classes involved in the study. All students were female, at the same social class, never experienced overseas trip, and their ages were between 14 and 15. The groups were selected randomly. In this study, experimental groups attended English class 3 hours per week, and received 6 months of instruction. During the course, the students received instruction by using the interactive whiteboard and the lessons are taught by the use of interactive whiteboard.

B. Measuring Instrument

For the purpose of this study, a questionnaire provided by the researcher which its validity was confirmed before was given to each student in the experimental group. The researcher use SPSS (SPSS Inc., 2009) to calculate the group statistic and ensure the possible effect of Interactive whiteboard on students' attitudes toward lesson instruction.

C. Training Instruments

For the purpose of this study some materials were used. These include Interactive whiteboard, pre-programmed materials, and some researcher's made materials.

Interactive whiteboard was a white sheet that was hanged before the class and connected to the computer and reflect programs, pictures, movies, and slides which were projected by the computer. This kind of IWB was a basic kind of IWB which was not touch sensitive but was common in use in most schools in Lorestan province and other parts of Iran.

Pre-programmed materials were those materials, which were designed by EFL experts and were provided by the Ministry of Education and contained programs and materials for each grade and were ranked to each lesson.

Researcher's made materials were those materials which were provided by the researcher and contained pictures, movies, PDF and PPT slides and word documents to fulfill the shortcoming of the previous materials were mentioned above or make them fit to the class situation.

D. Design and Procedure

In this study 30 senior high school students from two public high schools were selected randomly as an experimental group of the study. There were 2 classes involved in the study. In each class the students are assigned into groups. The students in these two classes were provided by the lessons which were taught by the use of interactive whiteboard. Students could manipulate the objects and materials were shown by the use of interactive

whiteboard and even they could have comment on their peers' work. The teacher provided the situation that, the students could have negotiation over the lesson provide by the use of interactive whiteboard and help them if it was necessary. Students could have information gap during the lesson and each volunteer group could write their own understanding on the interactive whiteboard. After the course the students were provided a questionnaire to see their attitudes toward the previous course and its instruction.

III. RESULTS & DISCUSSION

As stated previously the researcher applied the questionnaire to see the frequencies of the answers students gave to each question. A response of 1 indicates that the student strongly disagrees with the statement, 2 signify disagreement, 3 agreements, and 4 strongly agree. (see figure 1)

Figure 1

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. I enjoy learning when the teacher uses an Active Board.	1	2	3	4
2. I like receiving instruction when the teacher uses an Active Board	1	2	3	4
3. Using an Active Board makes me nervous.	1	2	3	4
4. I concentrate better in class when an Active Board is used to deliver instruction	1	2	3	4
5. I know that using technology gives me opportunities to learn many new things.	1	2	3	4
6. Using an Active Board is very frustrating	1	2	3	4
7. I enjoy using the Active Board.	1	2	3	4
8. I believe that the more often teachers use Active boards, the more I will enjoy school.	1	2	3	4
9. I believe that it is important for me to learn how to use an Active Board.	1	2	3	4
10. I feel comfortable using an Active Board.	1	2	3	4
11. I enjoy lessons on the Active Board.	1	2	3	4
12. I think that it takes a longer amount of time to learn when my teacher uses an Active Board.	1	2	3	4
13. I will be able to get a good job if I learn how to use technology.	1	2	3	4
14. I can learn many things when my teacher uses an Active Board.	1	2	3	4

The average answer to each question on the questionnaire was calculated to determine the class mean to each question. The class means to each question which is near 3 showed the overall agreement to that question, and the class mean to each question which is near 2 showed the overall disagreement to that question. (See Table 1)

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
question1	30	2	4	3.27	.583
question2	30	3	4	3.57	.504
question3	30	1	3	1.73	.691
question4	30	1	4	3.13	.776
question5	30	1	4	3.37	.850
question6	30	1	4	1.67	.844
question7	30	2	4	3.07	.583
question8	30	1	4	3.47	.681
question9	30	2	4	3.37	.615
question10	30	2	4	3.27	.583
question11	30	2	4	3.20	.551
question12	30	1	3	1.73	.691
question13	30	1	4	3.30	.988
question14	30	2	4	3.40	.563
Valid N (listwise)	30				

For sure, the frequencies of answers to each question were calculated (see Appendix A). As the result showed, those statements which showed positive attitude toward IWBs got the mean near 3 and those which showed negative attitude toward IWBs got the mean near 2. Moreover the frequencies of all answers to each question showed the positive attitudes toward IWBs.

IV. CONCLUSION

As mentioned before, Interactive whiteboards affect learning in several ways including, promoting enthusiasm for learning and motivating students (see, for example, Miller *et al.*, 2005; Blanton & Helms-Breazeale, 2000; Bush *et al.*, 2004; Cooper, 2003;

Greenwell, 2002; Lathman, 2002), and raising the level of student's engagement in classroom (see, for example, Kent, 2003; Lee & Boyle, 2003). IWBs support many different learning styles and are in variety of learning environments (see, for example, Salintri, Smith & Clovis, 2002; Jamerson, 2002; Cooper and Clark, 2003; Beeland, 2002; Cunningham *et al.*, 2003). It can be said that, IWBs can indeed provide a multitude of rich learning opportunities for students, from demonstration to jeopardy-type games and everything in between. When students' participation is encouraged; the sky is the limit in terms of students learning potential. IWBs take learning to a whole new dimension, beyond teacher-centered lectures to teacher facilitated explorations, utilizing sight, sound, and touch. In effect, interactive whiteboards can move students from being one-dimensional thinkers to well-rounded critical thinkers. As was mentioned previously, the majority of research supported the positive effect of IWBs on student's attention, motivation, and participation. In contrary, the particular study written by Solvie (2001), found that there was not a significant difference in students attention and motivation when using an interactive whiteboard as opposed to when one was not used. All in all, in this study, the researcher wanted to see the impact of IWBs on EFL students' affect. As clearly shown before, the students have positive attitude toward IWBs and want to have IWBs in their own classes and like those instructions which were accompanied by the interactive whiteboard.

A. Research Implications

Several pedagogical implications emerged from the results of the present study, namely: 1- integrating the lesson instructions with interactive IWBs, 2- using digital technologies such as smart phones to motivate students use technology most, 3- helping students to use the interactive whiteboard in a relax and warm environment, 4- help them to do the practice in their own groups and correct each other, 5- letting them play useful games with interactive whiteboard to magnify their own learning. 6- encouraging group learning and working in pairs, and 7- using computer as a medium of instruction.

B. Suggestions for Further Research

- 1- Much empirical research is needed to ensure the positive effect of Interactive Whiteboards on EFL students' attitudes toward lesson instruction.
- 2- Further investigation is needed to ensure the possible effect of IWBs on EFL students' affect and attitudes with different background knowledge about computer and its uses.
- 3- Similar studies are critically needed in other parts of Iran to see whether the results will be the same as or different from the results of the present study.

REFERENCES

- Averis, D., Glover, D., & Miller, D. (2004). Motivation: the contribution of interactive whiteboards to teaching and learning in mathematics. Retrieved October 7, 2006, from <http://cerme4.crm.es/Papers%20definitius/9/Miller-Glover-Averis.pdf>.
- Ball, B. (2003). *Teaching and learning mathematics with an interactive whiteboard*. Micromath (Spring), 4–7.
- British Educational Communications and Technology Agency (2003). What the research says about interactive whiteboards. Retrieved on November 13, 2007 from http://www.becta.org.uk/page_documents/research/wtrs_whiteboards.pdf
- Bell, M. A. (2002). Why use an interactive whiteboard? A baker's dozen reasons! Teachers.Net Gazette, 3 (1), Retrieved on October 31, 2007 from <http://teachers.net/gazette/JAN02/mabell.html>
- Beeland Jr., W.D. (2002). *Student Engagement, Visual Learning and Technology: Can Interactive Whiteboards Help?* Retrieved March 23, 2004, from http://chiron.valdosta.edu/are/Artmascript/vol1no1/beeland_am.pdf.
- Blanton, B. & Helms-Breazeale, R. (2000). Gains in Self-Efficacy: Using SMART Board Interactive Whiteboard Technology in Special Education Classrooms. Retrieved March 23, 2004, from www.smarterkids.org/research/paper2.asp.
- Bush, N., Priest, J., Coe, R., Evershed, B. (2004). *An Exploration of the Use of ICT at the Millennium Primary School, Greenwich*. Retrieved March 23, 2004, from www.becta.co.uk/page_documents/research/greenwich_mps_report.pdf.
- Cogill, J. (2003). *How Is the Interactive Whiteboard Being used in Primary School and How Does This Affect Teachers and Teaching?* Becta Research Bursary. Retrieved Dec. 12, 2005, from www.virtuallearning.org.uk/whiteboards/IFS_interactive_whiteboards_in_the_primary_school.pdf.
- Cooper, B. (2003). *The Significance of Affective Issues in Successful Learning with ICT for Year One and Two Pupils and Their Teachers: The Final Outcomes of the ICT and the Whole Child Project*. NIMIS and Whole Child Project, Leeds University: (Publication forthcoming).
- Cooper, S. & Clark, S. (2003). *Showing, Telling, Sharing: Florida School for the Deaf and Blind*. Retrieved March 23, 2004, from <http://edcompass.smarttech.com/en/casestudies/fsdb.aspx>.
- Cox, M., Webb, M., Abbott, C., Blakeley, B., Beauchamp, T., & Rhodes, R. (2003). ICT and Pedagogy: *A Review of the Research Literature*. Retrieved March 23, 2004, from http://www.becta.org.uk/page_documents/research/ict_pedagogy_summary.pdf.
- Davis, F. B. (1944). Fundamental factors of comprehension of reading. *Psychometrika*, 9, 185- 197.

- Cunningham, M., Kerr, K., McEune, R., Smith, P., & Harris, S. (2003). *Laptops for Teachers: An Evaluation of the First of the Initiative*. Retrieved March 23, 2004, from www.becta.org.uk/page_documents/research/lft_evaluation.pdf.
- Edwards, J., Hartnell, M., & Martin, R. (2002). *interactive whiteboards: Some lessons for the classroom*. *Micromath* (Summer), 30–33.
- Faucett, G. (2000). Do students learn better with technology? It depends on how you define learning! *Learning and Technology*. Retrieved October 31, 2007 from http://lfff.ieee.org/learn_tech/issues/october2000/index.html#students
- Gerard, F., & Widener, J. (1999). *A SMARTer Way to Teach Foreign Language: The SMART Board Interactive Whiteboard as a Language Learning Tool*. Retrieved March 23, 2004, from <http://edcompass.smarttech.com/en/learning/research/SBforeignlanguageclass.pdf>.
- Glover, D., Miller, D., & Averis, D. (2003). *The Impact of Interactive Whiteboards on Classroom Practice: Examples Drawn from the Teachings of Mathematics in Secondary Schools in England*. Paper presented at The Mathematics Education into the 21st Century Project Proceedings of the International Conference of the Decidable and the Undecidable in Mathematics Education, in Brno, Czech Republic, September 19–25, 2003.
- Greenwell, L. (2002). *Physical Education: An Interactive Approach*. Retrieved March 23, 2004, from www.sportsteacher.co.uk/features/editorial/pe.html
- Hall, I., Higgins, S. (2005). Primary school students' perceptions of interactive whiteboards. *Journal of Computer Assisted Learning*, 21, p. 102-117. Retrieved October 8, 2006, from www.galileo.usg.edu.
- Jamerson, J. (2002). *Helping All Children Learn: Action Research Project*. Retrieved March 23, 2004, from www.smarterkids.org/research/paper15.asp.
- Kent, P. (2003). *e-Teaching – The Elusive Promise*. Retrieved March 23, 2004, from <http://edcompass.smarttech.com/en/learning/research/pdf/kent1.pdf>.
- Kennewell, S. (2001). Interactive whiteboards – yet another solution looking for a problem to solve? *Information Technology in Teacher Education*, 39, 3-6.
- Latham, P. (2002). *Teaching and Learning Primary Mathematics: The Impact of Interactive Whiteboards*. Retrieved March 23, 2004, from www.beam.co.uk/pdfs/RES03.pdf.
- Lee, M., & Boyle, M. (2003). *The Educational Effects and Implications of the Interactive Whiteboard Strategy of Richardson Primary School: A Brief Review*. Retrieved March 23, 2004, from www.richardsonps.act.edu.au/RichardsonReview_Grey.pdf.
- Miller, D., Averis, D., Door, V. & Glover, D. (2005b). *How Can the Use of an Interactive Whiteboard Enhance the Nature of Teaching and Learning in Secondary Mathematics and Modern Foreign Languages?* Becta ICT Research Bursary 2003–04 Final Report. Retrieved Dec. 12, 2004, from www.becta.org.uk/page_documents/research/bursaries05/interactive_whiteboard.pdf.

- Miller, D., Glover, D. & Averis, D. (2003). *Exposure – The Introduction of Interactive Whiteboard Technology to Secondary School Mathematics Teachers in Training*. Paper presented at CERME3: Third Conference of the European Society for Research in Mathematics Education, in Bellaria, Italy, February 28–March 3, 2003.
- Miller, D., Glover, D., & Averis, D. (2005). *Developing pedagogic skills for the use of the interactive whiteboard in mathematics*. British Educational Research Association, Glamorgan.
- Miller, D., Glover, D., & Averis, D. (2005a). *Developing pedagogic skills for the use of the interactive whiteboard in mathematics*. British Educational Research Association, Glamorgan.
- Reed, S. (2001). *Integrating an Interactive Whiteboard into the Language Classroom*. Retrieved March 23, 2004, from <http://ferl.becta.org.uk/display.cfm?resid=1569&printable=1>.
- Salintri, G., Smith, K. & Clovis, C. (2002). *The Aural Enabler: Creating a Way for Special Needs Kids to Participate in the Classroom Lesson*. Retrieved March 3, 2004, from www.smarterkids.org/research/paper12.asp.
- Smith, H. J., Higgins, S., Wall, K., & Miller, J. (2005). *Interactive whiteboards: Boon or bandwagon? A critical review of the literature*. *Journal of Computer Assisted Learning*, 21(2), 91–101.
- Solvie, P.A. (2001). *The Digital Whiteboards as a Tool in Increasing Student Attention During Early Literacy Instruction*. Retrieved March 23, 2004, from www.smarterkids.org/research/paper13.asp.
- Solvie, P.A. (2004). *The digital whiteboard: A tool in early literacy instruction*. *Reading Teacher*, 57(5), 484–7.
- SPSS Inc. (2009). *PASW Statistics 18 for Windows*. Chicago: SPSS Inc.
- Starkmann, N. (2006). *The wonders of interactive whiteboards*. *T.H.E. Journal*, 33(10), p. 36-38. Retrieved October 5, 2006, from www.galileo.usg.edu.
- Weimer, M.J. (2001). *The influence of technology such as a SMART board interactive whiteboard on student motivation in the classroom*. Retrieved on October 31, 2007 from <http://smarterkids.org/research/paper7.asp>

Appendix A

question1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	disagree	2	6.7	6.7	6.7
	agree	18	60.0	60.0	66.7
	stronglyagree	10	33.3	33.3	100.0
	Total	30	100.0	100.0	

question2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	agree	13	43.3	43.3	43.3
	stronglyagree	17	56.7	56.7	100.0
	Total	30	100.0	100.0	

question3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	stronglydisagree	12	40.0	40.0	40.0
	disagree	14	46.7	46.7	86.7
	agree	4	13.3	13.3	100.0
	Total	30	100.0	100.0	

question4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	stronglydisagree	1	3.3	3.3	3.3
	disagree	4	13.3	13.3	16.7
	agree	15	50.0	50.0	66.7
	stronglyagree	10	33.3	33.3	100.0
	Total	30	100.0	100.0	

question5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	stronglydisagree	2	6.7	6.7	6.7
	disagree	1	3.3	3.3	10.0
	agree	11	36.7	36.7	46.7
	stronglyagree	16	53.3	53.3	100.0
	Total	30	100.0	100.0	

question6

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid stronglydisagree	16	53.3	53.3	53.3
disagree	9	30.0	30.0	83.3
agree	4	13.3	13.3	96.7
stronglyagree	1	3.3	3.3	100.0
Total	30	100.0	100.0	

question7

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid disagree	4	13.3	13.3	13.3
agree	20	66.7	66.7	80.0
stronglyagree	6	20.0	20.0	100.0
Total	30	100.0	100.0	

question8

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid stronglydisagree	1	3.3	3.3	3.3
agree	13	43.3	43.3	46.7
stronglyagree	16	53.3	53.3	100.0
Total	30	100.0	100.0	

question9

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid disagree	2	6.7	6.7	6.7
agree	15	50.0	50.0	56.7
stronglyagree	13	43.3	43.3	100.0
Total	30	100.0	100.0	

questin10

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid disagree	2	6.7	6.7	6.7
agree	18	60.0	60.0	66.7
stronglyagree	10	33.3	33.3	100.0
Total	30	100.0	100.0	

question11

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid disagree	2	6.7	6.7	6.7
agree	20	66.7	66.7	73.3
stronglyagree	8	26.7	26.7	100.0
Total	30	100.0	100.0	

question12

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid stronglydisagree	12	40.0	40.0	40.0
disagree	14	46.7	46.7	86.7
agree	4	13.3	13.3	100.0
Total	30	100.0	100.0	

question13

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid stronglydisagree	3	10.0	10.0	10.0
disagree	2	6.7	6.7	16.7
agree	8	26.7	26.7	43.3
stronglyagree	17	56.7	56.7	100.0
Total	30	100.0	100.0	

question14

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid disagree	1	3.3	3.3	3.3
agree	16	53.3	53.3	56.7
stronglyagree	13	43.3	43.3	100.0
Total	30	100.0	100.0	