



Action Research: Interactive Whiteboard

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Background and Introduction

As a result of the solicitation of proposals for next generation Tech Rich Classrooms, a number of teachers from throughout the district submitted proposals to implement Interactive Whiteboard Technology. Since their fundamental research questions were similar, and the Tech Committee wanted to determine the effectiveness of the technology across grade levels, it was determined that a “unified” action research project would be conducted. This involved providing one whiteboard to each of a two-person team at North School, South School, Matthew Thornton and the high school, and a three person team at the middle school. In addition, as there was already a pre-existing

whiteboard located with the fourth grade team at South School, the five-member grade level team received a second unit to determine impact across a particular grade level.

After grants were awarded, those receiving funds worked with Sue Ballard and Ben Loi to review their individual proposal questions and to consolidate them into a unified project that posed the following:

Primary Research question/hypothesis:

Does the use of Interactive Whiteboard Technology improve the delivery of instruction (efficiency and efficacy) and result in better student performance?

Underlying question: Will the technology provide

increased opportunities for differentiation related to modalities and the learning needs of SPED students?

Underlying question: Is there a difference in the level of engagement in learning exhibited by students during similar lessons with and without the Interactive White Board?

Underlying question: What is the Total Cost of Ownership for Interactive Whiteboard Technology (including deltas for support, energy, software, hardware and training)?

Underlying question: What is the impact (to a greater or lesser degree) on the utilization of other classroom technologies?

Study Design and Plan of Action

After receiving training in the use of the technology, the teacher participants determined in which of the core content areas to concentrate (and) followed a protocol to use the technology to deliver instruction and addresses selected items found in unit

assessments. In addition, pre and post-student questionnaires and a teacher self-assessment survey was developed and administered. Also, weekly teacher observation journals were kept, three minute walk-throughs and student interviews/focus groups

conducted, and IT direct and energy use reports utilized to gather data. Throughout the project, teachers received additional, scheduled small group training and the opportunity to share progress and relate issues and ways in which the technology has been used in

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Study Design and Plan of Action cont.

their classroom. Through these discussions, teachers shared their experiences and talked about the merits and weaknesses of the technology. The Plan of Action included the following sequence:

- IT/LMT Directors issued RFQ/RFB, for select products & ordered
- Trainer Integrationist developed training plan/timeline
- IT Director facilitated installation
- Lead Teachers met for a training presentation and designed a plan

for using/sharing whiteboards. The group discussed elements of research important to the district in different subject areas.

- Lead Teachers trained other partners/team members in small group training facilitated by District Trainer/Integrationist
- Each team presented content area plans to the Assistant Superintendent/Director of LMT
- Student samples were collected
- Pre-Questionnaires/Self-Assessment Surveys/Observation

Journal Protocol developed and administered

- Teachers implemented the project and conducted unit assessments
- Three-minute walk throughs conducted
- Post-Questionnaires/Self-Assessment Surveys/Observation Journal Protocol developed and administered
- Student samples for compare/contrast collected and analyzed
- Data Analysis and Recommendation

Data Collection

The research team chose to use multiple data collection techniques to capture vital information.

Teachers involved with the study were asked to keep **journals** and enter important observations that they make throughout the course of the study.

Teachers and students were asked to complete **questionnaires** for the study. The questionnaires were administered twice in the Spring (pre& post) and the pre-questionnaire has been

administered again this Fall and the post-questionnaire will be administered in the Spring of 2010

Teachers administered unit **assessments and student work samples** were reviewed in the Spring of 2009. Units assessments and student work review is also occurring throughout the current school year

Also, student **interviews/focus groups** were conducted in November 2009. Students at all grade levels were asked

the same set of questions regarding their experiences with the whiteboards in their classrooms. Follow up focus groups will be conducted in May 2010 to obtain more data.

The research team analyzed **Automated Help Desk Records** determine if there were any trends in servicing the whiteboard technology.

Training and Support

When the study was designed, the research team determined that teachers needed training and support and materials to fully participate.

Teachers were first required to attend a mandatory meeting before they were even able to submit a proposal. Once it was determined to proceed with use of whiteboard technology and a unified study designed, a training

plan was put into place in order to ensure teacher participants had the requisite skill set to be successful. The Trainer/Integrationist arranged for initial training with a certified SmartBoard Trainer and then, throughout the remainder of the study, small group training for elementary and secondary participants occurred on a regular

basis as well as opportunities for the whole group to meet to share ideas and strategies and receive additional training.

Software to support the project was acquired and library media specialists assisted with some of the data gathering such as conducting independent focus group sessions with students.

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Findings

After administering a preliminary questionnaire in the Spring and a post questionnaire at the end of the school year, the research team analyzed results and also reviewed data from unit assessments. Although the initial study period was short, the team determined that the data was **favorable toward the use of interactive whiteboards**.

Upon the opening of the 09-10 school year the preliminary questionnaire was again administered to participating students and interviews with students participating in the study were conducted. When the interviews were completed at all schools, the research team analyzed the data collected from the students and also from teacher journals which were initiated in the Spring and have been ongoing from one school year to the next.

The team determined that there were several common trends worth noting. Students reported the interactive whiteboard:

- Helps them with their grades
- Helps them pay attention
- Provides a more interactive learning environment
- Increases their motivation to participate in learning
- Allows for more collaborative activities
- Fosters better classroom discussions and that these discussions extend to deeper understanding of concepts and knowledge construction
- Is a transparent technology and that they “use it for everything” (i.e. all subjects and classroom tasks) 99% of the day
- Is student-directed and that during an instructional activity, students account for 75% of the use of the unit (i.e. are interactive with it)
- Is not only different from the other most commonly used technology (computers, overheads, TV's), it is superior

The teachers reported:

- The “culture for learning” (classroom environment and student behavior/attitude) is significantly improved
- Class participation is at its highest level
- Students are more invested in and connected to their leaning
- Students are more willing to participate in discussion and to take risks with their peers
- Students are more confident in their ability to explain their reasoning
- Improved opportunity for instantaneous feedback
- They are able to perform multiple task and explain multiple concepts and differentiate using a single technology
- They spend more time on task and instruction versus time needed to set up multiple technologies
- The technology and related software provides a very powerful, positive and compelling impact on challenged learners

“....At the end of the (math) lesson, one of my students shouted, “I finally get it! I finally get it. I didn’t know how to do it before...I get it now. Now I do. I really do.” Then he hugged me. In all my years teaching, I never got that response from a student. This boy has a D average in math and his attention is his main problem. It will be interesting to see if his math average improves....”

Excerpt from Teacher Journal

Surprises and Lessons Learned

Throughout the research study the team ran into several surprises.

In addition to using the technology for instruction and learning activities, the teachers incorporated it into their classroom management and completion of daily tasks such as attendance, lunch counts, etc. They observed that use in this way provided additional opportunities for students to hone their skills and make use of the technology transparent.

Although teacher preparation time was significantly increased, the teacher participants all felt the time invested was worthwhile because of the results and because the ability to save and archive their lessons would pay dividends in the future and ultimately ensure more time to focus on direct instruction.

Variables

The research team has noted several variables that must be taken into account in the context of this study.

First and foremost, unlike previous studies where teacher skill set and ability level and motivation had an impact on the level of technology integration, all of the teachers involved in this study were highly motivated to succeed (they had to endure a rigorous proposal process to become participants) and possessed skills and abilities in using technology beyond the average. It is likely that their intrinsic value for the use of technology to enhance instruction and learning had influence on the outcome.

Another surprise the team encountered during the research was a shift from teacher-directed learning to student-directed learning and the creation of a collaborative culture for learning. The students worked better not only as individuals, but as a group in solving problems and using higher order thinking skills to do so.

Because the design of the study required the resources be shared between and among participating teachers, it was a surprise to learn that not only did the teachers have a hard time explaining to students when the whiteboard had to be sent to another classroom, but the students had a hard time accepting the fact. Both teachers and students felt they lost momentum in terms of teaching and learning when the intervention was removed.

There was technical snafu in the initial administration of the student survey in the Spring and a poorly designed question may have impacted some findings in the Fall administration, although it is the opinion of the research team that the impact was not significant in analyzing the data set.

There was an observed negative effect (by the participants themselves) when the technology intervention was not available in the classroom for a specified period of time because the study design required them to share with at least one other teachers (with one exception at the high school where the sharing occurred during summer school). The effect was

The students also clearly indicated not only a preference for the whiteboard technology but also indicated in strong terms their feeling that it was a far superior tool when compared to the use of other traditional technologies due to its interactive nature.

Teacher participants were highly-motivated and they connected to one another as an informal professional learning community and shared ideas and strategies with enthusiasm.

The technology appears to be especially useful in the content areas of Math and Science

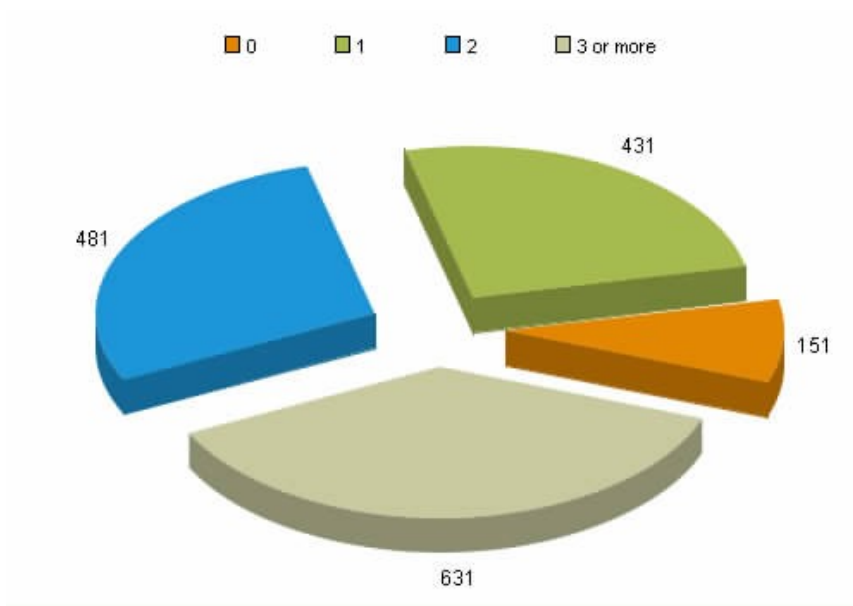
Finally, in reviewing the need for tech support it was clear that the technology is robust and stable and requires much less support than many other types of equipment/software.

acerbated if the students had been introduced to the device and were used to daily access.

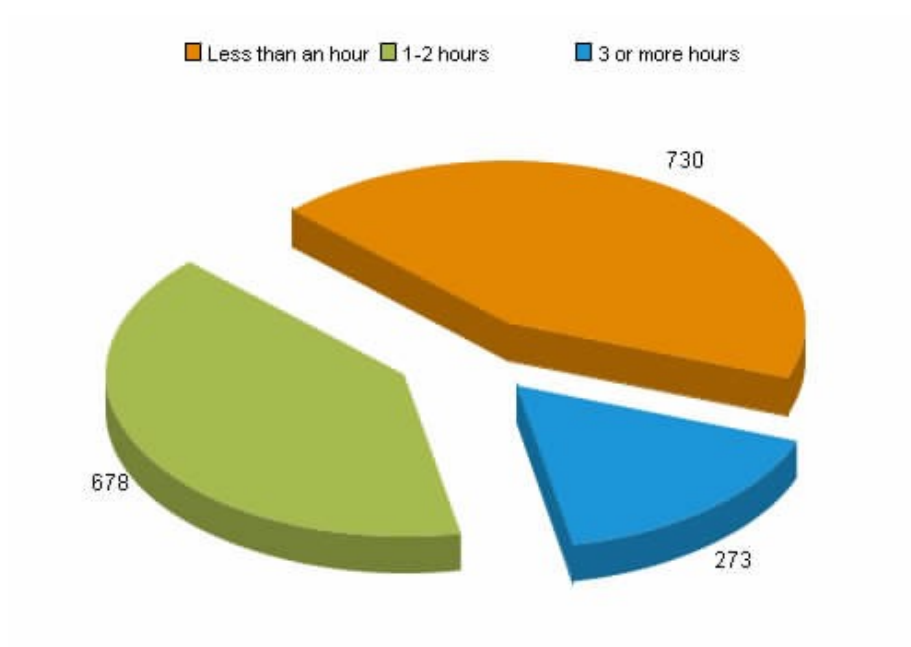
Another variable was the type of computer interface provided to the participating teachers. While some received brand new laptops or netbooks, others were working with recycled (albeit refreshed) older units. Additionally there was some confusion about the acquisition of appropriate peripherals and storage (speakers, mics and thumb drives) that impacted the elementary teachers, though again, not a major variable in the overall results.

Student Data Representations

HOW MANY COMPUTERS DO YOU HAVE AT HOME?



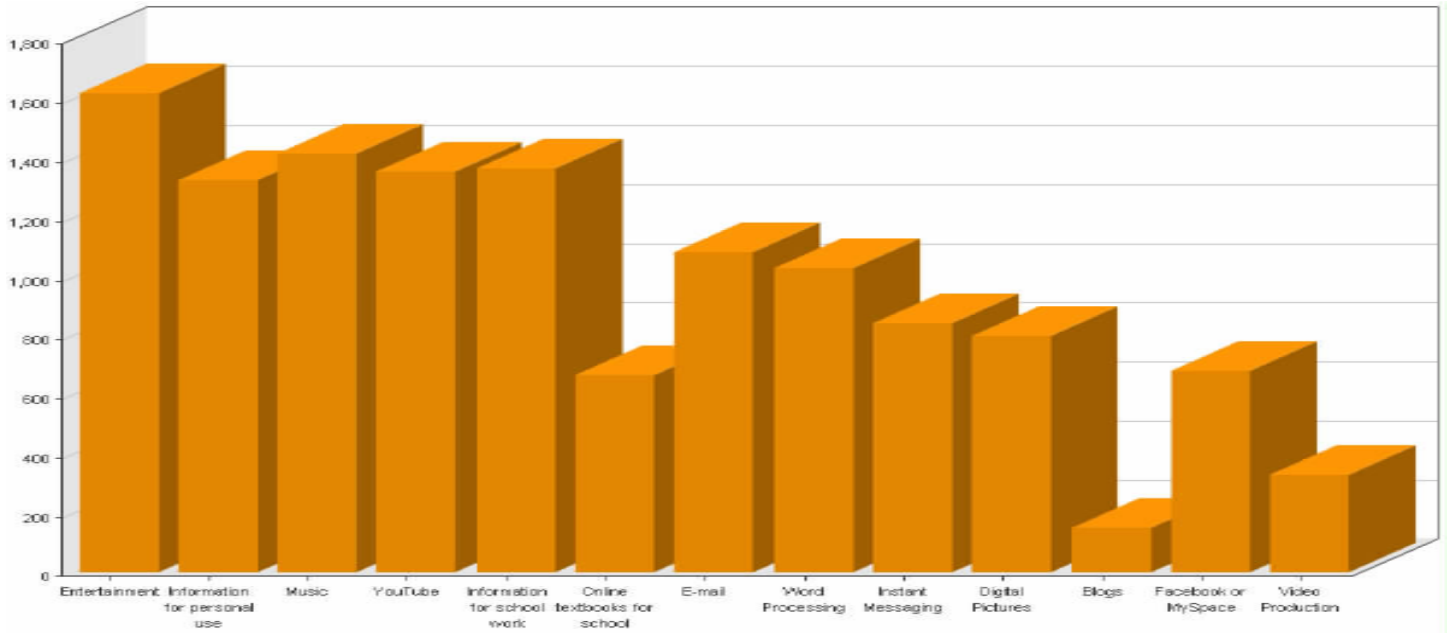
HOW MANY HOURS A DAY DO YOU SPEND ON YOUR COMPUTER?



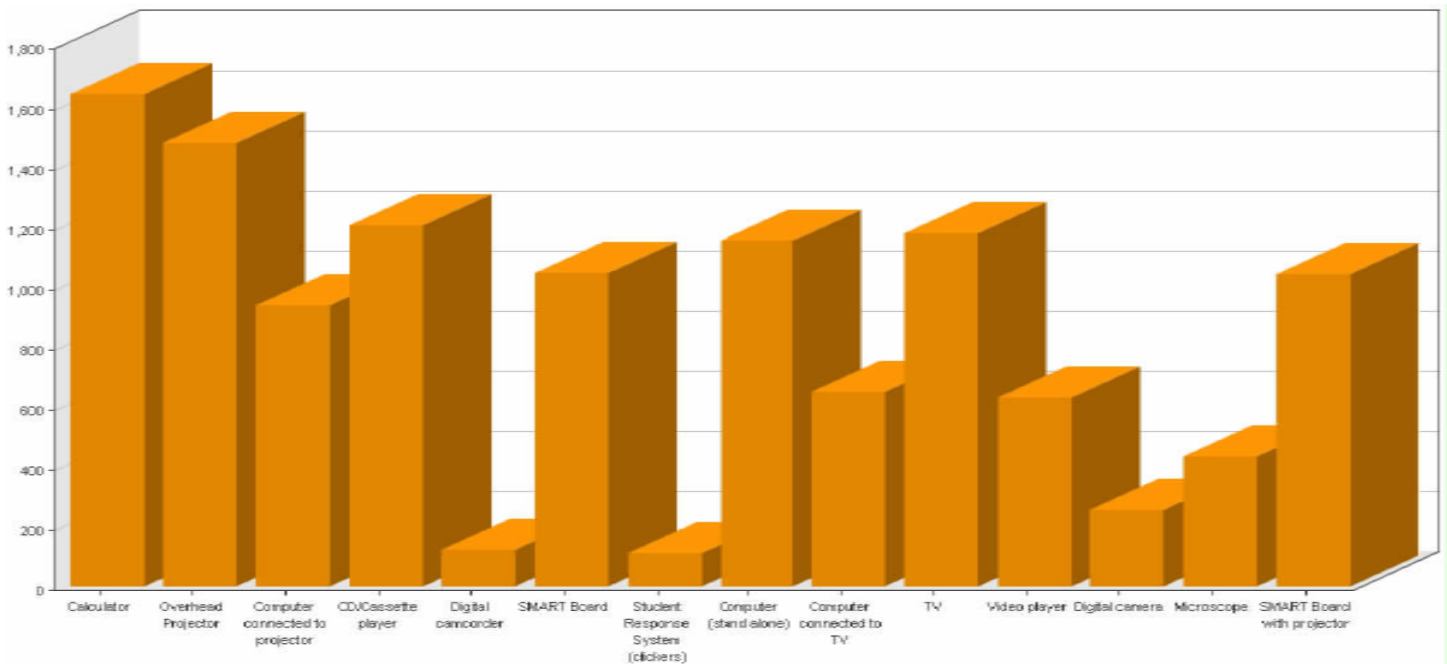
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Student Data Representations

I USE THE COMPUTER FOR:



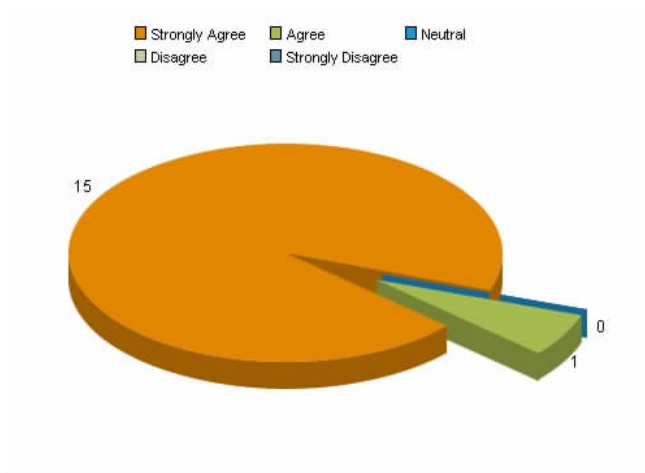
WHAT KINDS OF TECHNOLOGY DOES YOUR TEACHER USE IN THE CLASSROOM:



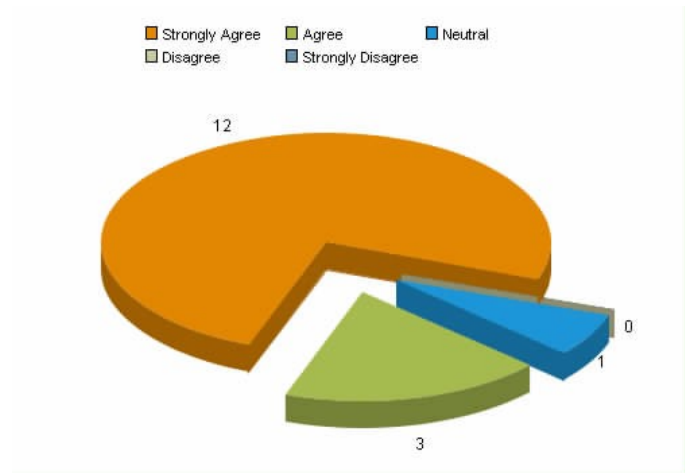
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Teacher Data Representations

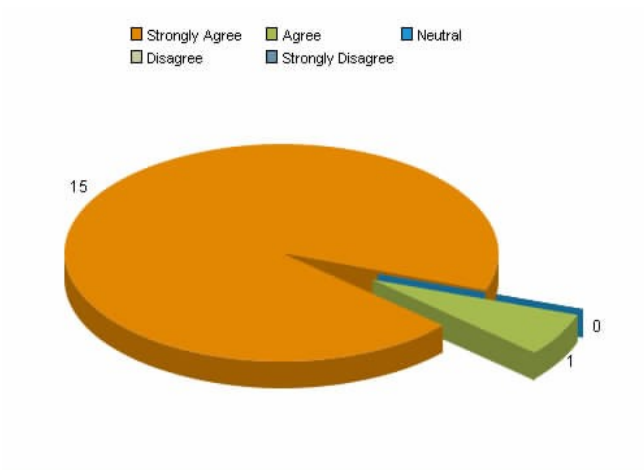
THE USE OF COMPUTER/AV TECHNOLOGY IN THE CLASSROOM CAN IMPROVE STUDENT LEARNING.



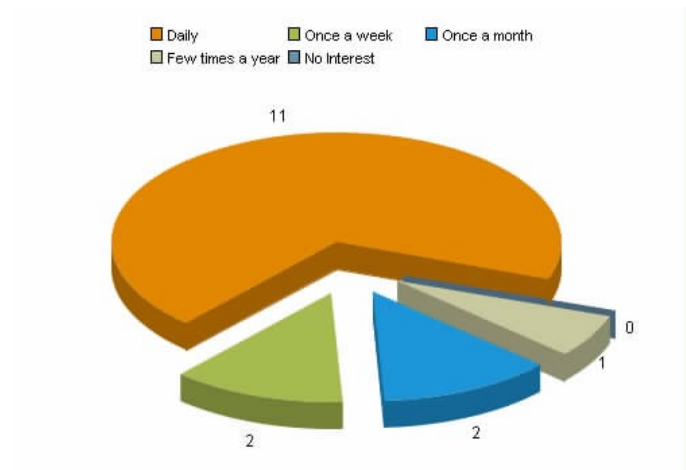
I WOULD LIKE TO USE COMPUTERS/AV WITH MY CLASS MORE OFTEN.



USING COMPUTERS/AV FOR INSTRUCTION INCREASES STUDENT MOTIVATION.



I USE COMPUTER TECHNOLOGY TO FACILITATE THE LEARNING OF SUBJECT MATTER SUCH AS READING, MATH, SOCIAL STUDIES, SCIENCE, MUSIC, ETC.



After several months of research, data collection, and data analysis, the action research team concludes that the data support the use of interactive whiteboards in the classroom environment grade 4-12 and the utilization of this technology has a positive impact on student motivation and achievement as well as a significant impact on instructional design and delivery. As the teachers and students continue to participate in this study, we expect no substantial change in the final results.

It is interesting to note recently published results (November 2009 edition of *Educational Leadership*, the journal of the Association for Supervision and Curriculum Development (ASCD) of a parallel study on the use of whiteboard technology conducted by Robert Marzano, widely regarded and respected as a leading researcher in education, point out:

“...results indicated that, in general, using interactive whiteboards was associated with a 16 percentile point gain in student achievement ...” and “Interactive whiteboards have great potential as a tool to enhance pedagogical practices in the classroom and ultimately improve student achievement. However, simply assuming that using this or any other technological tool can automatically enhance student achievement would be a mistake. As in the case with all powerful tools, teachers must use interactive whiteboards thoughtfully, in accordance with what we know about good classroom practice.”

This more pedagogical and generalizeable study aligns with our own local study and maps well to our conclusion that an important variable in the effective utilization of the technology is the desire of the teacher to implement and use it and that appropriate professional development and other support must be provided throughout in order to sustain the effort and produce positive results.



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Londonderry School District’s Vision

The Londonderry School District will provide appropriate individualized academic, social, emotional and physical learning opportunities in order to establish a dynamic foundation for quality education and continued student growth.

Londonderry School District’s Mission

To provide all students with the vision, skills, and knowledge necessary to maximize their individual potential. Central to this accomplishment is the collaboration among all shareholders and disciplines so that students can become contributing members of society and appreciate that learning is a life-long process.