Groundbreaking Training: Providing teachers with extensive mentor-based technology
integration support.

by
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Groundbreaking Training: Providing teachers with extensive mentor-based technology integration support.

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Chapter 1

Introduction

Today's youth are a product of the digital era, constantly immersed in various forms of technology. School districts are responding by bringing multidimensional and interactive media devices that many students interact with at home into the classroom. By doing this they are beginning to speak the same language as students (Strommen and Lincoln, 1992). However, training teachers how to use such devices is not typically a priority for most districts. It has become common practice in districts to provide limited all day in-service training to provide teachers with the skills necessary to learn a new program, interface, or educational tool. As times have changed, and practices re-examined, districts have looked to opportunities outside of the school day to provide teachers with training to fill the voids resulting from insufficient initial training. As technology begins to ingrain itself as a staple in the day to day operations of many classrooms, it has become more essential to provide training to teachers to effectively implement such tools. To do this, teachers require additional training and support that goes beyond a traditional professional development program.

The Department of Instructional Technology in the Rochester City School District has done exactly that. Through the use of grant funds, the Rochester City School District has designed a state of the art technology integration training program for teachers. The program is called the Model Classroom technology initiative, and it is funded through two main grants: American Recovery and Reinvestment Act (ARRA) and Enhancing Education Through Technology (EETT). The Model Classroom program expands through every building within the district. Each building has at least two model classroom

teachers, with some buildings having as many as eight. The program supplies teachers with a SMART board, laptop, classroom netbook set (to share between two teachers), student response system (to share between two teachers), document camera, and wireless slate. Model Classroom teachers attend a series of five to seven all day in-service training sessions where they learn how to use the technology and explore ways to implement it. The program looks to build on the principles of Technological Pedagogical Content Knowledge (TPACK) and create student centered learning environments through the use of technology-rich classrooms. The idea behind the program is that it not only provides teachers with the tools but also the skills for effectively implementing the technology to positively impact student achievement.

Though the program's in-service training has showed positive results on the effective integration of technology and student achievement, teachers have expressed a need for additional training and support. Most teachers teach by modeling for students, therefore, it makes sense that training programs for teachers should incorporate modeling effective integration. New professional development programs need to provide teachers with the initial training and skills and continue to foster those skills through mentoring and modeling. This research looks to examine the effectiveness of taking the Model Classroom training initiative and providing those teachers with mentor based support throughout the school year. The mentor-training program will provide ongoing training and continual support that will build on teachers' technology skills and provide them with models and resources to effectively implement the technology in the classroom ultimately impacting student achievement.

Definition of terms

As we begin to look at integrating various forms of technology into the classroom it is important to understand the language that is used in the educational technology field. The most commonly used word is an abbreviation ICT, which stands for information and communication technologies. This seems to be the universal phrase when referring to integrating technology into the classroom. Another term used frequently on this topic is professional development, PD. PD refers to enrichment training for teachers in specific areas of interest to educators. Lastly, comprehensive technology use plan (TUP) or a technology integration plan (TIP) are common terms as well. Both plans are designed to provide a blueprint or outline for districts to implement and use the technology in its buildings.

Summary

It has become essential that we transform modern education to coincide with the development of such technologies and teach our children in a language that they not only understand, but which also engages them. The traditional one day training programs no longer will suffice. Teachers need extensive skill training on the technology as well as training on how to best integrate that technology into instruction. Mentor based teacher training programs will provide teachers with the skills, resources, and support that is necessary to effectively integrate technology so that students ultimately benefit.

Chapter 2

Literature Review

Within the last 15 years, research in the field of education has been immersed heavily in ICT integration. Researchers are aware of the technology in schools and the possibilities it provides to students. Research has shown that incorporating technology in the classroom addresses student learning in four major areas: student motivation, engagement, higher order thinking skills, and cooperative learning (Rochelle et al. 2001).

One of the biggest technological advances in education is the use of the computer in the classroom. Computers in the classroom provide the opportunity to have group work centered on research and development, create collaborative learning environments, and encourage students' acquisition of knowledge through discovery all of which promote the use of higher order thinking skills (Cradler et al. 2002).

SMART Technologies revolutionized education even further with the advent of the interactive whiteboard in 1991. Interactive Whiteboard Technology opens up a world of possibilities in the classroom. It provides opportunities to make lessons and presentations interactive, thus increasing student motivation and engagement in the content being presented. It also has hundreds of educational resources that provide unique learning opportunities that would otherwise be impossible to simulate (Bell 2002).

The use of student response systems (SRS) has also become common practice in the classroom. Hall, Thomas, Collier, and Hilgers, in 2005, found that incorporating SRS questioning into lectures increased student motivation, engagement, and learning.

In a comparison of a class taught with the SRS to the same class taught without the SRS, students' grades and active engagement were 30% higher in the SRS class than the traditional lecture class. With this being said, the question is no longer whether technology impacts student learning; but rather, how can we implement the technology so that it can impact student learning?

Research Methods for ICT Integration:

Now that the paradigm has switched to ICT integration, new research addresses the best and most effective ways to integrate the technology into the classroom. Traditionally, training for such programs takes place in a "one size fits all" district training where teachers learn the skills necessary to use the technology (Hinson et al. 2005). As more districts are pushing integration of technology into the classroom, more research is outlining effective ways to integrate the technology and to train teachers to develop their technological aptitude.

Before we can research ways to address how teachers learn best, it is important to understand the factors that affect the ability of teachers to learn. Kopcha (2008) compiled a list of five major barriers that impede teachers' development of their technological skills: time to learn the new technology and prepare instruction that integrates the technology (Bauer and Kenton 2005), beliefs that support the use of technology for teaching (Lim and Khine 2006), access to current and functional technology (Bauer and Kenton 2005; Clark 2006), professional development that goes beyond skill building with the technology (Bradshaw 2002, Koehler and Mishra 2005), and culture that promotes the use and adoption of teaching practices that integrate the

technology (Rochelle et al. 2001). Buckenmeyer (2010) also investigated the factors

that impede teachers' ability to integrate technology and found similar barriers to what

Kopcha found. Buckenmeyer found that relationships between attitude toward

technology, available resources and support, and professional development for

technology integration were necessary for successful ICT integration to take place.

One of the major differences in the research by Buckenmeyer compared to

Kopcha was that Buckenmeyer's research was gathered using quantitative methods,

where Kopcha's was qualitative. Prior research done by the National Center for

Education Statistics 2000 and Hadley and Sheinegold (1993) showed that teachers'

willingness to change by adopting technology is directly related to a combination of

attitude toward technology, professional development, and access to available resources

and support. Buckenmeyer took it one step further utilizing surveys consisting of 75

Likert-type items to gather data on not only the factors that impact teachers' willingness

to integrate technology, but also how much each factor plays a role. Buckenmeyer

found four major factors that positively impact the teachers' ability to integrate

technology in the classroom: increased professional development, additional time and

support, adequate technical assistance, and the teacher's attitude toward technology.

Buckenmeyer's research appears to be very effective in showing the factors that impact

a teacher's ability to integrate technology into the classroom. It remains consistent with

the findings of Kopcha (2008), and Swan and Dixon (2006) but it does not propose a

professional development model that would maximize the effectiveness of ICT

integration.

In contrast, Swan and Dixon (2006) provide such a model. They also established

consistent factors that impact the teacher's willingness to integrate technology:

administrative and teacher attitudes, resistance to change, and confidence with

technology. In addition, they used both quantitative and qualitative methods to

investigate the factors that directly impact how teachers learn technology. They

developed a teacher-training program that consisted of five 1-hour sessions over a

period of three months. Within these sessions, focus groups were used for the first 15

minutes to determine the teachers' technological aptitude and attitude toward

technology. The methods for data collection consisted of Training and Development

Activity Evaluations, Technology Use Logs, and pre-and post-attitudinal scales (Swan

& Dixon 2006). As the results reflect, teachers had concerns about time for planning

and support for integrating technology. Swan and Dixon intended to provide extended

support for teachers participating in the training program through the use of mentors.

Mentors pushed into classrooms, co-taught lessons, and participated in open

conversation with teachers. The data in this study showed that providing teachers with

relevant training and continual support was effective for the benefits of technology in

the classroom to be fully realized.

Hinson, Heroman, and LaPrairie, in 2005, proposed a professional development

plan that incorporated a five-step model for technology integration that aims to address

the common barriers that teachers face when integrating technology into the classroom.

The five steps of Hinson's system include: planning, preparation, instruction, refinement,

and evaluation. This model outlines a process for training teachers over a three year

period regarding how to develop, implement, and sustain technology integration. The

professional development model is designed to mold itself to the individual needs of the district and the teacher through the use of a technology integration plan. Year one of the plan focuses on the planning and preparation for the technology in the buildings. This is a crucial element that may seem minute. Schools need to have rooms prepared and have the proper hardware in place for the technology.

Year two of the model focuses more on the instruction and refinement steps. These steps are where most professional development models fall short. Here, not only are teachers expected to implement the technology effectively into classroom but the district/school must support that technology and promote refinement. They describe this refinement stage as having access to the technological resources and, even more importantly, support for the technology. Hinson states that it is essential to have mentors to provide assistance and feedback for teachers who are integrating the technology into the classroom. Swan and Dixon (2006) also suggest that employing a mentor system to professional development will provide teachers with the "just-in-time" support that they need to integrate technology into their teaching and learning pedagogy. A mentor offers the opportunity to provide teachers with different models for teaching with technology.

One of the major differences between Hinson's work and that of others such as Swan and Dixon and Brinkerhoff is that Hinson proposes the model, but does not support his model with either quantitative or qualitative data to illustrate why the program is successful.

Brinkerhoff 2006 also focused on the issues of professional development as a barrier that teachers face with technology integration. One of the contributing factors to the insufficient PD for teachers is that often it is offered at inconvenient times for the

teachers and it is not specific to the needs of the teacher (Cuban et al. 2001).

Brinkerhoff proposed research to support an extended professional development program that looked to address current issues with teacher training. He designed a professional development program that he coined "The Technology Academy Model." The model is designed as a long-duration program that spanned two academic school years beginning in June of 2003 and ending in June of 2005. The program looked to provide teachers with intensive 15 day summer sessions of training on various technologies: Microsoft Office, Internet resources, digital cameras, video, webpages, and virtual learning environments. In addition to a traditional sit-and-learn training model, the program offered five additional in-service days for teachers to enrich skills learned through the summer sessions. Unlike Hinson, Heroman, and LaPrairie's mentor program, Brinkerhoff's long duration professional development program used quantitative data from computer self-efficacy surveys and technology beliefs and competency surveys to gather data to support the effectiveness of the program. Brinkerhoff also used qualitative data from audiotaped interviews at the closing of the program to measure teachers' perceptions of where they started and where they ended in terms of technological aptitude. The use of both quantitative and qualitative research in this study seems to be extremely effective, and the research found significant evidence that an extended professional development program that offers training and multiple opportunities for enrichment is essential for teachers to integrate technology into the classroom. Brinkerhoff's data was groundbreaking and telling of what is necessary to incorporate into a professional development program for technology integration. What limits his research is the lack of a solution to how to make long

lasting professional development programs efficient for districts to incorporate them into their technology integration plan.

Kopcha (2008) provides a model that is feasible to implement into a technology integration plan, which supports the long-term professional development that Brinkerhoff proposes. Kopcha proposes a "systems-based mentoring model" to support what he calls the four stages of technology integration. The initial aspect of the mentor system is that the mentor is present at the introduction of the technology into the classroom. The presence of the mentor alleviates the stresses of the technology and fosters an environment that embraces the technology (Clark 2006). Once the technology is up and running the focus of the mentor then shifts to fostering the use of the technology in the classroom. It is the mentor's job to teach teachers how to use the technology that incorporates student centered learning (Kopcha 2008). This is the phase that emphasizes the importance of having a mentor for the technology. The mentor has the ability to arrange group meetings with teachers and assist teachers in developing technology-enhanced lessons. This helps to establish a regular support system where teachers have opportunities to collaborate to develop technology-rich lessons. This type of relationship promotes the culture that Rochelle et al. (2001) states is essential for teachers to integrate technology into the classroom. The use of the mentor in this manner provides teachers with essential follow-up support to the use of the technology in the classroom that both Bradshaw (2002) and Buckenmeyer (2010) encourage for successful technology integration.

The Rochester City School District's current training model also follows this trend. Although their Model Classroom training initiative provides extensive training

compared to other models, it still lacks the continual mentor support that is essential to the program's success. Based on teacher survey responses from EETT year one evaluation, the fourth most important issue that teachers identified was that support (staff) was missing or slow to respond to technology issues. This remains consistent with the findings of Buckenmeyer (2010) and Kopcha (2008). From the same survey, teachers listed support for how to integrate the technology, need for demonstrations, and need for a technology contact in each building to assist and support teacher's technology use as essential for their willingness to integrate technology in the classroom (Christman, 2010).

The Model Classroom training initiative's ability to impact student achievement was measured through analysis of student performance on the NYS standardized assessment grades 3-8. Through statistical analysis and T- tests they found a positive impact on student achievement in ELA grades 3-8, especially grade 7 and Science grade 8. However, in Math they found no significant impact. Christman (2010) also analyzed the subgroups of ethnicities impacted by model classroom initiative. They found significant gains in the scores of African American, Asian, and limited English proficient students in Model Classrooms compared to non-technology rich classrooms.

Synthesis:

Not only is it important to know what the barriers are that face teachers when dealing with technology integration in the classroom, but it is also essential to know what are successful practices that encourage teachers to overcome those barriers. Over the past ten years, researchers have embraced the importance of technology in the classroom and its positive effects on student learning. More recently, research has

focused on the particular elements that make the integration of technology successful. Regardless of the abundance or usefulness of the technology, it will not be used if faculty and staff do not possess the skills, knowledge, and attitudes necessary to embed it into everyday instruction (Baylor & Ritchie, 2002). Most of the research focuses on barriers that face school districts when implementing technology into schools, but little research has focused on how teachers best learn to integrate technology into practice (Bransford et al. 1999). Research shows that mentoring programs are essential to bridge the gap between theory and practice. In theory, it makes sense that teachers will learn best when learning from other teachers (Swan & Dixon, 2006). Teachers as trainers are familiar with the day to day problems that teachers face and can tailor training to a modeling style where teachers can learn from seeing and interacting with one another. There are some studies that provide data to support a shift in pedagogy to this style of training, but not nearly enough, the field needs more research in this area. In order for districts to shift their entire focus of professional development there needs to be substantial evidence of its success. I am confident that this way of thinking will begin to take shape over the next few years as integrating technology becomes even more of a staple in public education.

Significant findings within the Rochester City School District support the Model Classroom training and its ability to positively impact student achievement. Based on the results of the teacher technology survey from the EETT year one evaluation and current research in this field mentor based training for technology integration is essential. It is only a matter of time before districts fully invest in it. "If designed and implemented properly, ICT-supported education can promote the acquisition of the

knowledge and skills that will empower students for lifelong learning (Tinio 2003).

This research looks to show the effectiveness of the mentor based training program for

teachers and the teachers' ability to implement the technology as well as improve

student achievement.

Chapter 3

Applications and Evaluations

Overview

The Model Classroom training initiative has taken place over a four-year period

reaching 140 teachers in the Rochester City School District. The program provides

training on equipment and integration of the technology in a series of five to seven

pullout sessions. This year's Model Classroom training consisted of 72 teachers from

both elementary and secondary levels who received the same pullout training sessions,

totaling seven training days. The training was provided by Instructional Technology

mentors who have knowledge and experience working with the different pieces of

technology and software. In addition to pullout trainings, this group also had access to an

Instructional Technology mentor for the duration of the school year. Mentors provided

teachers with the opportunity to work on mastering the skills learned from the pullout

sessions, and integrate them into the different subjects and grade levels. This research

looks to target how providing these teachers with long-term mentor support impacted

their ability to integrate technology from the pullout trainings into their classroom.

Participants

Combinations of factors are considered for how schools are selected to receive

model classrooms for each grant year. The Department of Instructional Technology takes

into account the need of the building for student performance, and the need of the

building for technology when committing Model Classrooms to a school. From the list of

schools to receive Model Classrooms, principals select two teachers to participate in the

program with the understanding that these teachers must attend all training sessions. By

the end of the 2011- 2012 school year every school in the Rochester City School District will have at least two model classrooms. This study examines 72 Model Classroom teachers selected from 17 elementary and secondary schools. All participants received the same training and the same opportunities for mentor support. Mentors were assigned to schools based on location and type of school. Each mentor was assigned five to eight schools, typically half elementary and half secondary reaching between 20 and 40 teachers. From the 72 Model Classroom teachers six volunteered to be observed and compared to five Model Classroom teachers from previous years and four Non-Model Classroom teachers who teach with a SMART board. These comparisons will be used to evaluate the effectiveness of the Model Classroom training program and the additional support of an Instructional Technology mentor.

Procedures

There are two phases to the Model Classroom training initiative that this study will analyze: the initial training on the equipment and the enrichment of that training with the Instructional Technology mentor.

The first phase was to train the teachers on the equipment that they received with the Model Classroom grant. The participants attended six pullout training sessions spanning from September to March. All of the training sessions are designed as full day meetings, three hours in the morning and three hours in the afternoon with one hour for lunch. Teachers were assigned a day to attend for each training week. On that day teachers were divided into two groups, where each group would receive one training in the morning and then switch and receive the other in the afternoon. During the training

sessions teachers received intensive instruction on not only how to use but also ways to integrate the laptop, SMART board, document camera, SMART Interactive Response units, SMART wireless slate, and netbook cart. Teachers were also instructed on various software and Internet resources that seamlessly bind with the equipment to create student centered learning environments in the classroom. The training session overviews are as follows:

Session 1. September 2010: In the first training session teachers were given their teacher laptop in one group and were introduced to the Schooltown virtual learning environment in the other. Laptop training consisted of features of the model laptop that they were given, settings, and setup with the SMART board. In the other group teachers were introduced to Schooltown. It is a web host purchased by the district that provides a platform for creating a virtual classroom where teachers can post assignments, interact with students as well as receive submitted assignments.

Session 2. October 2010: The second session focused on utilizing teacher accounts in Discovery Education and continuing to work in Schooltown. In the Discovery Education session teachers learned how to add students to their classroom, find and add video to their content, and build assignments for their content. The other group began to set up their Schooltown virtual learning environment. Since teachers were familiar with the interface, this training provided them opportunities to create assignments and media to begin to use with their students.

Session 3. October 2010: By this time all the SMART boards had been installed in model classrooms. The third session focused on SMART notebook software. Groups were divided into two based on teacher technology skills so far. One group received basic

SMART notebook skills and learned simple lesson making tips and tricks. The other group moved faster and got into the more advanced skills in SMART notebook. Since groups were separated based on their ability, there was no need for groups to switch.

Session 4. December 2010: Teachers received their SMART Response clickers, document camera, and SMART wireless slate. The first group was basic use, set up, and integration of each piece of equipment. The second group learned about the netbook cart and implementation of the netbook into the classroom. Since the netbook is running a different operating system than most district computers, some of the training focused on features of the Windows 7 system and how to navigate it.

Session 5. January 2011: Teachers had all of the equipment except for the netbook carts. The first group was troubleshooting and tips and tricks for creating lessons in SMART Notebook and great resources on the web for teachers. The second group was an Internet safety workshop. Since students would be on the Internet regularly it was important to address dos and don'ts and management of the devices in the classroom.

Session 6. February 2011: For this session, there was no need to divide into groups and alternate morning and afternoon. It focused on providing teachers with resources and support for integrating the technology into the classroom. In the morning teachers were given helpful tools and time to work and build lessons within SMART notebook software. For part of this session, teachers participated in a focus group where they were given the opportunity to share out their thoughts and feelings on the training and the equipment. In the afternoon, they learned how to implement Internet Workshops into their instruction.

Session 7. March 2011: The final session was referred to as "choose your own adventure training". Teachers were given the opportunity to choose what they wanted to spend their time working on. Each session was two hours in length and teachers were able to build their own schedule of three sessions from: building SMART notebook lessons, using Discovery Education, Schooltown refresher, setting up their teacher website, creating SMART Response activities, and web 2.0 resources.

The second phase of the training was the continual support of the Instructional Technology mentor for integrating the technology into the classroom. The mentor was available for additional training enrichment, questions, technical support, and instructional support. Access to this mentor was open to all in the program; use of the mentor was optional. The mentor's job was to visit schools and work with Model Classroom teachers in small focus groups, one-on-one, support, or even as a co-teacher to integrate the technology into the classroom. Mentors were also available through email and phone for quick trouble shooting issues or questions.

To determine the effectiveness of technology training, and the availability of an Instructional Technology Mentor classroom observations were made. Three different types of teachers were observed: Observations of Model Classroom teachers from this year who had access to an Instructional Technology mentor, Model Classroom teachers from previous years who received the same training but did not have a mentor, and teachers who had at minimum a SMART board but had received no formal training were compared with the rubric.

Instruments

Two instruments were used to evaluate the impact of mentor- based training on teachers' ability to learn and integrate technology. The first instrument was a Model Classroom teacher survey and the second was observations of Model Classroom teachers and Non-Model Classroom teachers.

A. Model Classroom teacher survey: Analysis of Model Classroom Training and Support.

Survey consists of six Likert type questions that focus on the teachers' ability to integrate technology into their classroom at different stages throughout the school year. It aims to highlight the impact of training and the support of a mentor on their use of technology. It also provided teachers with an opportunity to elaborate on any of the individual questions as well as any additional thoughts on the program as a whole. See Appendix A.

B. Characteristics of Technology Integration Stages: Classroom Observations Rubric

I observed 15 teachers, Model Classroom teachers from this year, Model Classroom teachers from previous years, and Non-Model classroom teachers to analyze how they teach and use technology in their classroom. Each observation evaluated teachers on the Characteristics of Technology Integration Stages Rubric. This rubric was generated as a hybrid of Holland (2001) and Moersch (1995) who characterized the stages of technology integration in the classroom. It provides a basis for assigning a teacher a level of technology integration based on their views of technology, types of activities they use technology for, type of thinking that students are expected to do, role

of the teacher in the classroom, who controls learning, and the level of problem solving skills required. Moersch (1995) designed his rubric based on seven stages, Nonuse, Awareness, Exploration, Infusion, Integration, Expansion, and Refinement. Holland (2001) used five stages to define levels of technology integration Nonreadiness, Survival, Mastery, Impact, and Innovation. The classroom observations rubric uses the Nonuse, Infusion and Integration levels from Moersch, and the Survival and Mastery levels from Holland. The conglomeration yields a five level rubric consisting on Nonuse, Survival, Mastery, Infusion, and Integration. See Appendix B.

Chapter 4

Results

From the instruments described above data was gathered from 62 participants. Of the 62 results, 53 survey results were gathered from this year's Model Classroom teachers. Six of those teachers were also observed on their ability to integrate the technology into their classroom. In addition, data was gathered from classroom observations of five of previous years Model Classroom teachers and four Non-Model Classroom teachers.

Data was gathered from the Analysis of Model Classroom Training and Support survey by analyzing the number of responses for each Likert item compared to the total number of submitted surveys. The teachers' perception of their technological proficiency was determined on a rating scale from not proficient at all, level 1, to extremely proficient, level 4, at three key points throughout the school year; before any training, after the pullout training sessions, and at the end of the year after training and support of an Instructional Technology mentor. As seen in graph 1, the results of this question show the impact of training and support on teacher's technological proficiency. At the beginning of the school year there was a heavy emphasis at level 1, 32.7% of teachers and level 2, 48.1% of teachers where only 9.6% of teachers responded to be proficient at a level 3 and 9.6% of teachers at level 4. Substantial gains were made after providing teachers with pullout training sessions. There was a 100 % decrease in the number of teachers at level 1 from before training, 17, to after training, 0. The number of teachers at a level 2 decreased by 72% from 25 teachers to 7. Compared to proficiency before training to after training there was a 500% increase in the number of teachers at level 3,

going from 5 to 30, and a 200% increase in teachers at a level 4 shifting from 5 to 15.

Lastly, when teachers were asked to rate their proficiency with the technology at the end

of the year after training and mentor support the number of level 2's decreased again by

85.5%, leaving only one teacher. Level 3 decreased by 13.3% which was gained at level

4 pushing the number of teachers at a level 4 proficiency to 24 with a 60% increase. One

respondent skipped all three of these questions.

Graph 1: Teacher Technological Proficiency
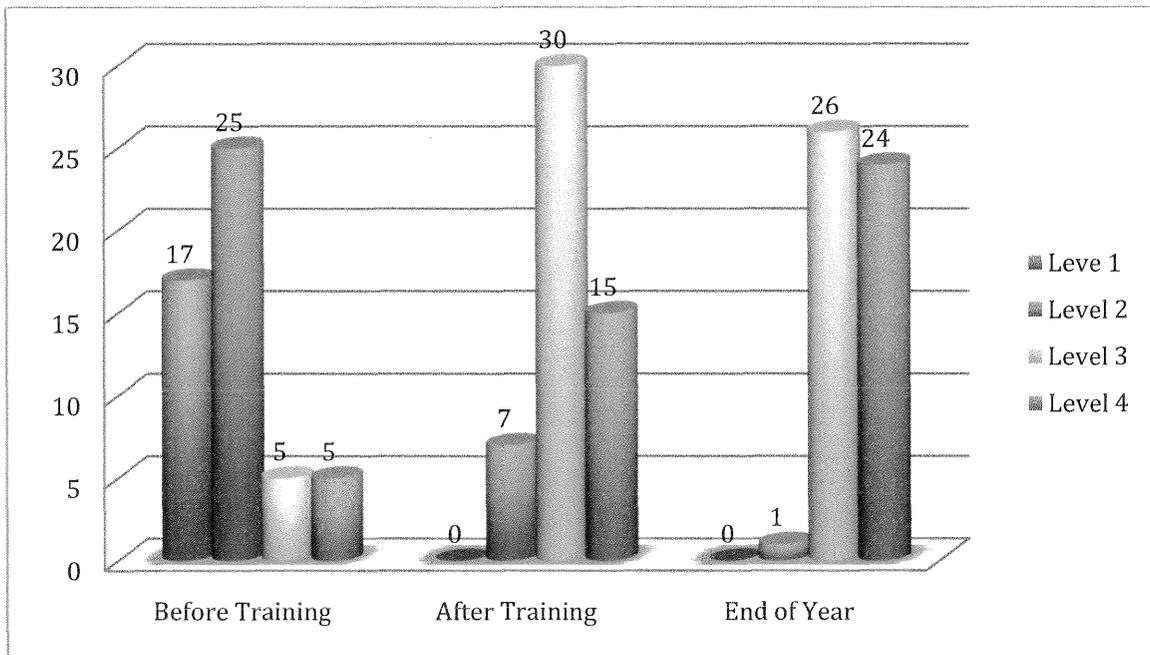
In addition to the positive trend toward level 3 and level 4 after training and with

mentor support, nearly 90% of respondents said that the pullout training sessions

positively impacts their ability to integrate the technology into the classroom. Breaking

this down, 67.3% of respondents said they strongly agree, and 21.2 % of teachers said

they agree. Only 11.5% said they somewhat agree and none said they disagree. One

respondent skipped this question. See graph 2. Teachers who took the time to elaborate

had very positive comments about the impact of training on their teaching. Many of them felt that the trainings provided valuable resources, practical lessons ideas, and great tips. Three respondents said that without the training they would not have the skills, knowledge, or comfort to try to use the technology. See Appendix A.1.

Graph 2: Pullout trainings positively impacted teacher's ability to integrate the technology into the classroom.
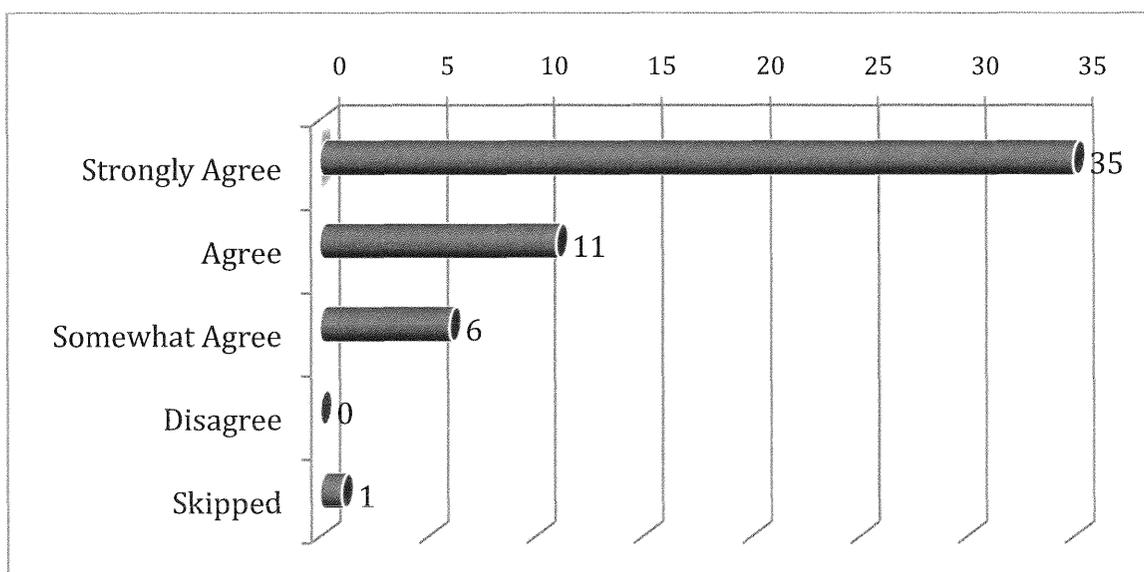
In conjunction with graph 1 and 2, graph 3 elaborates on the ability of the teacher to integrate the technology after the pullout trainings. Out of the total 53 teachers 40 said they use it everyday and 12 said they use it regularly. No teachers responded that they use it a little or that they don't use it at all. One person skipped this question. One teacher made it a point to note that compared to before the training they use the technology in the classroom all the time. See Appendix A.2.

Graph 3. Use of technology in the classroom after pullout trainings
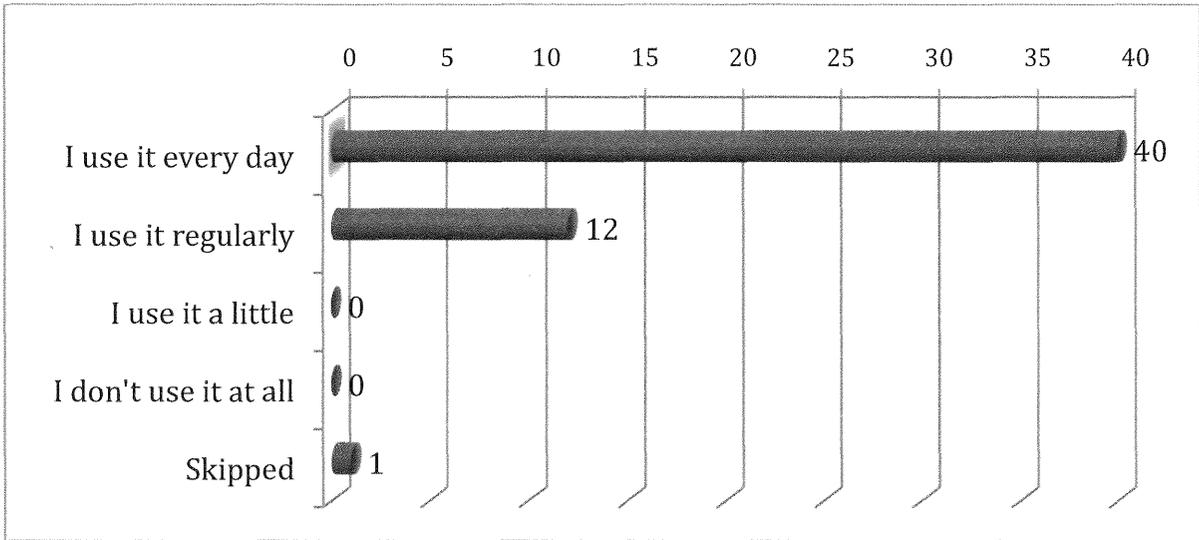
The final question of the survey targeted whether having an Instructional Technology mentor was beneficial. When asked whether the mentor was helpful to them for teaching and integrating the technology 92.5% of respondents said yes and 7.5% of respondents said no. Graph 4. When asked to elaborate on this question 17 respondents made positive comments on being able to receive help, work one-on-one, ask questions, model lessons, and receive feedback. From the overall responses four people elaborated to say they did not know, nor see a mentor in their classroom. See Appendix A.3.

Graph 4. Access to an Instructional Technology mentor was helpful.
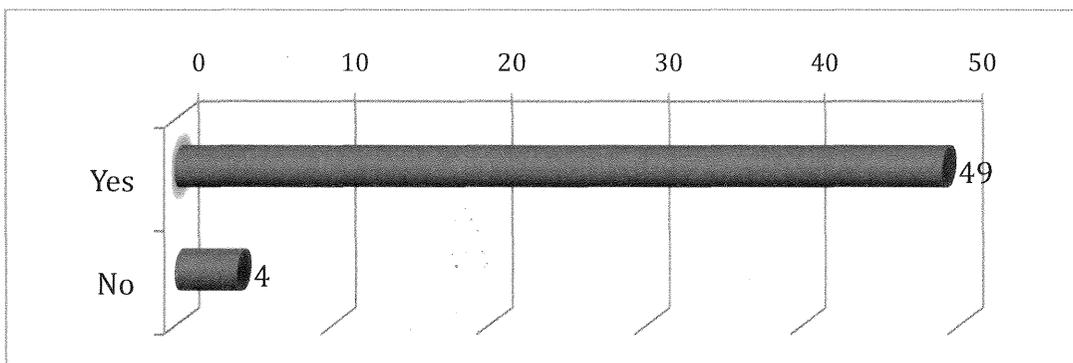
Teachers who said that having an Instructional Technology mentor was beneficial were asked to articulate in what ways the mentor was helpful to them. The four ways that teachers felt having an Instructional Technology mentor was most helpful were technical support 98%, technology resources 79.6%, integration strategies 75.5%, and open discussions 65.3%.

Graph 5. Ways the Instructional Technology mentor was helpful.

Category	Value
Technical support	48
Integration strategies	37
Technology resources	39
Demonstrations of effective integration	29
Modeling exemplars	28
Open discussions	32
Advocating for teachers needs	21
Additional enrichment	24
Pedagogical support	14
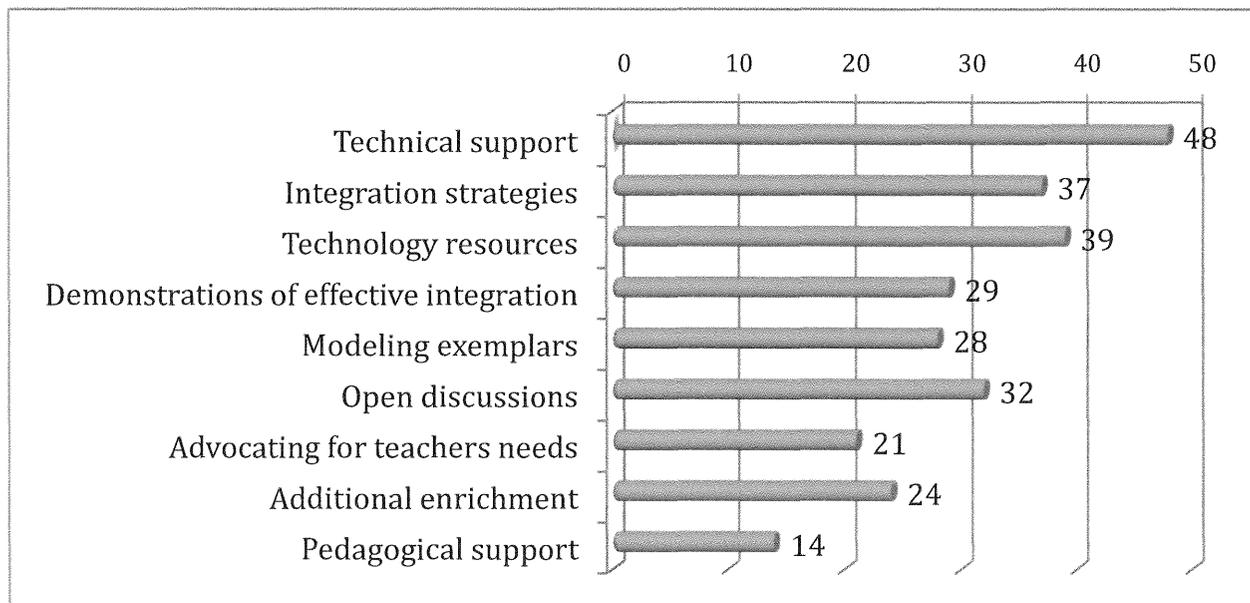
Data gathered from classroom observations demonstrated that Model Classroom training directly impacts the level of integration of the technology into the classroom. Table 1. The average Model Classroom level was 3.1 versus the Non-Model Classroom teachers whose average level of technology integration was 2.7. Compared to Non-Model Classroom teachers, Model Classroom teachers infuse the technology into their instruction where Non-Model classroom teachers have a mastery level listing toward integration. In addition, if we look at Model Classroom teachers from this year compared

to Model Classroom teachers from previous years there is a significant difference in the average level of integration. Model Classroom teachers this year averaged a level of integration of 3.4 putting them almost directly between infusion and integration of the technology where Model Classroom teachers from previous years averaged a level of integration of 2.8 putting them between mastery and infusion, leaning toward infusion. Graph 6.

Table 1. Classroom observations

Model Classroom This year	
Teacher	Level
A	3
B	3.5
C	3.3
D	3.3
E	3.3
F	4
Model Classroom Previous Year	
G	3.3
H	3.2
I	2.5
J	2.7
K	2.2
Non-Model Classroom	
L	3.5
M	3
N	2.3
O	2

Graph 6. Average Level of Technology Integration
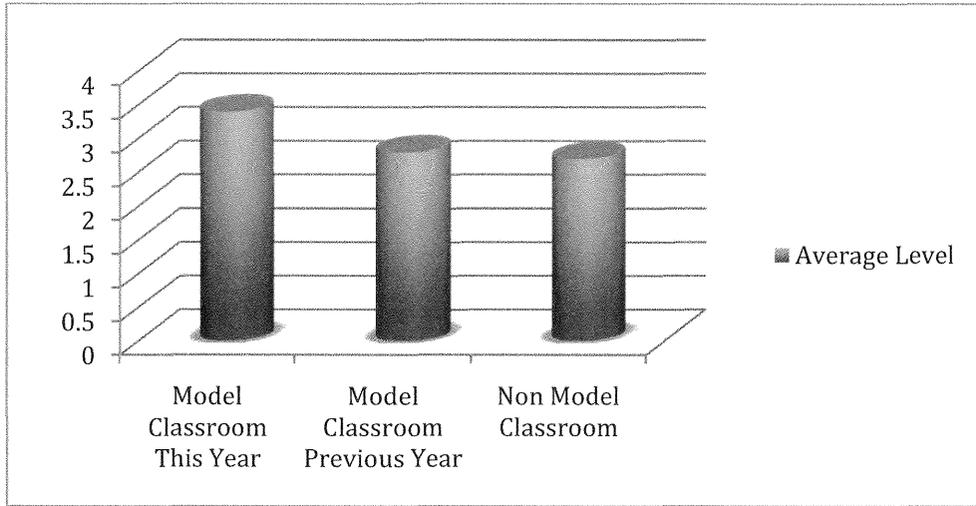
Chapter 5
Discussion:

The Analysis of Model Classroom Training and Support survey provided data from Model Classroom teachers on their perceptions of the impact of the training and of the support for the training. The analysis of this survey showed that the pullout training had a significant positive impact on the teachers' ability to integrate the technology. The change in the number of teachers reporting an integration level of 1 and 2 significantly decreased from before training to after training, with a heavy shift in the data to level 3 and level 4. In addition to the increase in teachers' proficiency to level 3 and 4 after the training teachers reported an even greater increase in proficiency of integration at the end of the year with mentor support. The change in teachers' proficiency from after the training to the end of the year with mentor support was substantial. This demonstrates that extensive training and long-term support for the training is essential for teachers' technological proficiency and integration.

These significant increases in teachers' technological proficiency from training and again from mentor support can be attributed to the overall perceptions of the training and of the support. See Appendix A. Teachers felt that the trainings were essential in transforming their views of technology and significantly improved their comfort level and skill. The trainings provided a solid ground of ideas, skills, and lessons for using and teaching with the technology. Many felt that without that basis they would not have been able to use the technology at all. Post training, three teachers reported that having the technology made it easier for planning and developing interactive lessons and have seen an enormous impact on student engagement and motivation in the classroom. See Appendix A.1 and A.2.

Based on the increase in levels of proficiency from before training, to after training, to the end of the year after training and support, it is clear that teachers felt having a mentor was beneficial to them. This was also seen in question 6 where 92.5% of teachers responded that having access to a mentor was helpful to them. One of the largest reasons that teachers elaborated on was being able to have someone to ask questions to and receive a quick response. These responses are also consistent with the findings that 48 out of 53 teachers felt the most beneficial thing they got from having an assigned mentor was technical support. Two teachers also responded that it was helpful to them to have time to work one-on-one with their mentor on classroom specific tasks. This also demonstrates consistency with the responses that integration strategies and open discussions were specific ways teachers felt their mentor was most helpful. Lastly, teachers reported on having instructional support from mentors. Teachers were thrilled with the resources that the mentors provided that were not necessarily part of the training. They felt that receiving examples, resources, and ideas were invaluable to transforming the classroom environment. See Appendix A.3.

Classroom observations also provided insight into how teachers are using and integrating the technology into their classroom. The Characteristics of Technology Integration Stages Classroom Observation Rubric allowed me to look at specific aspects of how the teacher and the students interact with the technology in the classroom. From the observations it was clear there is a drastic difference between how a Model Classroom teacher uses and integrates the technology versus a Non-Model Classroom teacher.

The characteristics of the rubric that helped to establish where the teachers' level of technology integration fell were how they viewed and used the technology and the types of activities that students completed with the technology. Once these two levels were determined, the other aspects of the rubric naturally fell into place and were somewhat dependent on these characteristics. The most profound difference between a Model Classroom teacher and a Non-Model Classroom teacher was how they used the technology. Model Classroom Teachers fell between using technology as an instructional tool, level 3, and using it as a resource for student learning that will transform education, level 4. In the Model Classrooms, both this year and previous years, the teacher and the students were interacting with the lessons. They were using activities and instructional tools to practice and enrich the lessons and students were engaged and eager to come up to answer a question. In the Non-Model Classrooms, 50% of the teachers were using the technology as an object to present the lesson, level 2, and 50% were using it as an instructional tool, level 3. Typically, the teacher would have notes or graphics that were projected onto the SMART board and they filled in the blanks or answered the questions using the SMART board pens. They used very limited software or activities within SMART notebook to create activities. There was minimal student interaction as well as engagement in the lesson. The role of the teacher and control of learning naturally followed where teachers rated on how they view and use the technology. In the Model Classrooms, the teacher provided structure for activities or was a facilitator for student learning and was mostly in control or gave up most control. In the Non-Model classrooms the teacher was the provider of information and was typically in total control or mostly in control.

The types of thinking and problem solving skills directly followed the types of activities that students participated in in the classroom. It was this characteristic that defined differences between a Model Classroom teachers from this year, a Model Classroom teachers from a previous year, and a Non-Model Classroom teacher. All of the Model Classroom teachers from this year fell on a level 3 or level 4 for the types of activities that students worked on in class. In classroom B and F students were using the netbooks in student centered learning environments. In classroom B students were designing and creating their own menu for a restaurant project. In teacher F's classroom students were researching and presenting on an issue that faces our society. These students had to use the Internet for research and design how they wanted to present their issue using the netbook. See Appendices B.2 and B.6. In two rooms, teacher A and teacher E, students were learning and working on activities using the SMART board. See Appendices B.1 and B.5. In teacher D's room students were using the SMART response clicker to enter in math responses after they solved them as a team. See Appendix B.4. Lastly, in teacher C's room students were using the document camera to display student work and perform peer reviews, followed by, continuing independent work on the netbooks. See Appendix B.3. In these classrooms, 50% of the thinking fell at content knowledge and critical thinking, level 3. In the other 50% of these rooms there was high critical to creative thinking. Therefore, students were using moderate to high levels of problem solving skills.

In previous year's Model Classrooms teachers did mostly drill and practice with some add on activities and computer based instruction, levels 2 and 3. In these rooms students typically followed along a lesson at their seats. Teacher H used video clips and

pictures in her lesson for students to compare and contrast fairytales. See Appendix B.8.

In teacher G's classroom they talked about different species. She used videos, charts, and articles that students had to categorize on the SMART board. Students were eager to come to the board to write in their responses. See Appendix B.7. In the other three classrooms, I, J, and K, the teacher used the board to present the material then had students work at their seats on a task for the remainder of the period. Two teachers rated at a level 2 for content knowledge and critical thinking, two rated at content and some critical thinking, level 3, and only one had critical thinking with some creative thinking, level 4. There was minimal to moderate problem solving skills required in these classrooms. See Appendices B.9, B.10, B.11.

Two of the four Non-Model Classroom teachers, teachers N and O, had the students take notes off the SMART board for half the period, and then students worked independently on practice based on the notes. Students in these rooms accessed content knowledge only and had to use minimal problem solving skills. See Appendix B.14, B.15. Teacher L used video and graphic organizers for students to create parallels between two similar things. The last Non- Model classroom, teacher M, used technology-based student learning centers in class. Students rotated between stations, independent work at the computer, using the clickers at the SMART board, and one was doing a matching activity. Students in both teacher L and M's classrooms accessed critical thinking, level 3 and students used moderate problem solving skills.

Overall, students in Model Classrooms this year participated in a higher percentage of student-centered learning activities than students in previous years Model Classroom and Non-Model Classrooms. Model Classroom teachers who had the support

of a mentor throughout the school year had developed more successful technology-rich

classroom environments that engaged and encouraged students to use higher order

thinking skills and problem solving skills than their old Model Classroom and Non

Model Classroom counter parts. Model Classroom teachers from previous years and Non-

Model Classroom teachers are just beginning to scrap the surface of integrating the

technology in the same manner that Model Classroom teachers from this year are. The

combination of training and extensive long-term support helped to foster these skills and

knowledge for Model Classroom teachers from this year to integrate the technology and

engage students in ways that exceed other teachers' ability to do so without this

combination.

Limitations:

When introducing a large-scale technology integration project such as the Model

Classroom program, one of the biggest issues is installing and delivering the equipment

to the classroom. One of the biggest difficulties that teachers had with the training

program was the time frame in which they received some of the equipment. This was

especially the case with the netbooks. Teachers were taught about web resources such as

Schooltown and Discovery Education in training session 2 and 3 with the goal of using

such resources for implementing the netbooks into their classroom. Teachers did not

receive the netbooks in their room until nearly two thirds of the way through the school

year, between training session 6 and 7. At that point, many felt they needed a training

refresher to re-learn how to use the netbooks in their classroom.

Also, the use of the Instructional Technology Mentor was optional. Mentors made

contact with teachers and stopped into classrooms, but some teachers did not take

advantage of setting up sessions to enrich training or implement the technology with the use of a mentor. Getting teachers to respond to emails and commit to setting up meetings and work sessions was sometimes difficult and often unproductive.

The last limitation has to do with classroom observations. There were a small number of classroom observations compared to the total number of Model Classroom teachers in the district. Similarly, some Non-Model classroom teachers that were observed could have taken professional development classes after or before school on their own time for the SMART board and other technology that was not taken into account when choosing which rooms to observe. Teachers L and M had technology integration levels of most Model Classroom teachers and have not had the same depth of formal training that they had received. Both have taken numerous professional development classes on their own time, which could have helped them to learn positive integration strategies for the technology.

Conclusions:

Teacher J is a Model Classroom teacher from last year who was provided with the training but did not have access to continual support and enrichment from a mentor. After her observation, the first thing she said to me was that the training was essential to learning how to use the technology but she felt that she would have greatly benefited from additional support for creating and implementing the skills in the classroom. The initial training is only a small piece to the puzzle. If teachers don't feel comfortable and knowledgeable about the technology they will not use it. This mentor based technology integration-training program addresses all four of the factors that affect the teachers' ability to integrate technology (Bukenmeyer 2010). It provides teachers with five to

seven training sessions to learn how to use the technology, it gives them time to learn and utilize it, and it lends support for teaching and the technology, all which positively impact the teachers' attitude toward the technology.

The Model Classroom training program with the continual support of an Instructional Technology training mentor is the perfect harmony of professional development and "just-in-time" support that is necessary to keep teachers invested in using and promoting the technology in the classroom (Swan and Dixon 2006). Model Classroom Teachers from the 2010-2011 school year have been provided with tools and support for those tools that give teachers the skills to build and foster student centered learning environments in their classroom. They use technology in their classroom in ways that increase student motivation and engagement that previous Model Classroom Teachers and Non-Model Classroom teachers do not yet have the technological skills, confidence and support to do so. It is apparent that extensive training on how to use and implement the technology in the classroom is essential for teachers as well as immediate access to support for that technology to use it effectively. Teachers wanted and needed immediate technical support as well as integration strategies for the technology that were provided by the Instructional Technology mentor that old Model Classroom teachers did not have access to.

The first day we brought this year's Model Classroom teachers in for session 1 training, teacher F sat in the back and said we'll see how much of a difference the technology makes. She was the standard, and now she is one of most profound and influential model classroom teachers out there. She uses the SMART board, SMART Response clickers, and netbooks every day and all day in her classroom. Every time you

step into her classroom she glows with excitement for what her students are working on and what she has created. Every student is actively engaged and producing high quality work. She now says she would not know what to do without any or all of it. She is a true example of what great things can be achieved in a classroom when the teacher feels empowered, comfortable, and innovative in the classroom. Teachers who received extensive training on how to use and support for effectively integrating the technology have fostered technology rich student centered learning environments in their classrooms that teachers who have not received such training and support don't possess the knowledge and skills to do so.

As districts continue to invest in educational technology and make it an integral part of the classroom they must continue to foster teachers' technological proficiency through extensive training and support for those technologies. The Model Classroom training initiative and mentor support system is the model for how to effectively achieve this.

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Appendix A

Analysis of Model Classroom training and support

Questions 1 – 3: Rate your technological proficiency on a scale of 1 – 4 with 1 being not proficient at all and 4 being extremely proficient.

1. Rate your comfort level with the technology before you attended any department training.

<div align="center">

1   2   3   4

</div>

2. Rate your comfort level with the technology after the pullout training secessions.

<div align="center">

1   2   3   4

</div>

3. Rate your comfort level with the technology at the end of the school year with support of a mentor.

<div align="center">

1   2   3   4

</div>

4. Attending the series of pullout trainings positively impact your ability to integrate the technology in the classroom.

   a. Strongly Agree
   b. Agree
   c. Somewhat Agree
   d. Disagree

   Optional space to elaborate:

5. After the pullout trainings, rate your ability to integrate technology into your Classroom.

    a. I use it every day
    b. I use it regularly
    c. I use it a little
    d. I don't use it at all

Optional space to elaborate:

6. The access to an IT training mentor was helpful to me for using and teaching with technology.
    a. Yes
    b. No

Optional space to elaborate:

If yes:

The IT Training Mentor was helpful in the following ways:
Check all that apply:

☐ Technical support
☐ Integration strategies
☐ Technology resources
☐ Demonstrations of effective integration
☐ Modeling exemplars
☐ Open discussions
☐ Advocating for teachers needs
☐ Additional enrichment
☐ Pedagogical support

Optional space to elaborate:

Appendix A.1

Teacher responses to Question 4: Attending the series of pullout trainings positively impact your ability to integrate the technology in the classroom.

1.It taught me a great deal!

2. There is no substitute for doing, the hands on activities were essential

3. It was difficult to remember what was learned at the trainings because it took so long to receive equipment and access to the different programs, ie. SchoolTown.

4. It was hard for our class to be out together so many times, but by the end we decided it would be best if we went on separate days. However, that gave us less time to collaborate at the meetings. Overall, a positive experience.

5. I was able to bring the information learned at the pull out back into my classroom. Use the technology for several days/weeks, then return for another session and learn a new or enhanced technology technique.

6. Because I value and appreciate the training I received, I challenge myself daily to incorporate technology whenever I feel it will positively benefit my students.

7. As long as we are learning and becoming more efficient with the techniques involved then they are useful.

8. I use our technology daily, all day. It is integrated in any way possible.

9. The trainings were well designed to provide practical lesson ideas.

10. The ideas gained from being with the instructors and other teachers are invaluable.

11. I was provided with great ideas to implement.

12. It helped to be able to use the technology in a setting free of school distractions. It was also really beneficial to get one-on-one help at the trainings.

13. This gives teachers time to work with their co-teacher to plan and search for lessons on the internet.

14. I learned a lot in these sessions. It is very hard to leave my classroom though.

15. Without it I would not have had the courage to try.

16. The little tips and tricks that are shared in the trainings are critical.

17. The technology in my classroom has transformed the way I teach. My students appreciate having the latest and greatest technology when they come to SS class.

18. I was able to use various resources to support the curriculum for my students.

19. I really needed this training to develop my proficiency with the technology and the software.

20. I am able to access the technology with greater comfort, and understand how it can make my lessons more effective.

21. Too much in a large group. My students suffer due to lack of instruction from effective substitutes. I learned so much more having the assistance of a mentor to meet with after school.

Appendix A.2

Teacher responses to Question 5: After the pullout trainings, rate your ability to integrate technology into your Classroom.

1. I share a netbook cart with another teacher, so every other week I put those to use. I use the SMART board every day. Clickers for quizzes at least 3 times a week for practice or official.

2. Compared to before the training, I now use it all the time. From the introduction to the conclusion it is implemented into the classroom.

3. The technology has made planning and integrating technology so much easier. It also makes it easier to make lessons more interactive.

4. I use the SMART board and document camera everyday, the netbooks on average 2-3 times per week, and am trying to use the SMART response more often.

5. I use the laptops about 5-10 days out of the marking period for projects and I use the Smart Response Clickers and the SMART board every day.

6. I use the SMART board all day every day, web-based sites daily, document camera daily, slate and clickers occasionally.

7. I targeted one class in particular and have used the technology on a daily basis across a broad range of uses. I think that it has had an enormous positive impact.

8. Sometimes we were trained on technology that we did not have yet. This was difficult at times.

9. I use the SMART board to teach most of my lessons.

10. After the training I have developed lessons on SMART Notebook, as well as found already created materials to use. I have also created assignments on Discovery and SchoolTown that my students have used.

11. I use my document camera and SMART board everyday. The clickers were beneficial for reviewing for testing.

12. It makes instruction so much easier and students are so much more involved in learning.

13. I use SchoolTown and the netbooks 3-4 times a week. I am pretty comfortable using SMART board.

14. I use a variety, but always the SMART board and document camera.

15. We use it everyday from daily attendance, interactive lessons, Internet research and presentations, and weekly record keeping.

16. I use the SMART Board, clickers, and SMART response clickers all week.

17. I use netbooks, SMART board, document camera.

18. I love the technology and the students are engaged and learning so much about the curriculum and use of technology.

19. Some days we read - this is English after all, however, if we were to get KINDLES for every student, well then, I could absolutely say "I USE IT EVERY DAY!"

20. Many times, I could not use what I had learned in the large session until Pete had time to meet with me in with a small group of teachers at the building level.

Appendix A.3

Teacher responses to Question 6: The access to an IT training mentor was helpful to me for using and teaching with technology.

1. Even though the training is complete for the year, I still call on my mentor anytime I encounter difficulty.

2. Jacquie and Sheldon are the best.

3. Jacquie is AWESOME!!! She is very helpful and has come to our building multiple times.

4. Larisa, my mentor, was very helpful. It was great knowing I could e-mail her with a question or problem and get a quick response back. She made herself available and came in to model a few lessons in my class.

5. I did not hear much from my mentor.

6. I never knew I had a mentor!

7. Jacquie was very accessible and helpful. Her upbeat attitude was catching.

8. Never had a mentor in my classroom to help me with anything.

9. I'm between. I did not always consider this to be a primary resource for trouble shooting. Maybe I should have.....

10. It gave me a person to ask questions and bounce ideas around with. It was definitely important.

11. Any questions I had, both during the training and out, Larisa was there and provided helpful, immediate answers.

12. It was helpful to have Kathleen pop in to see if everything was working okay. Also questions would come up after the training that she was able to help me with.

13. I needed help, and I got it.

14. It was easier to have your questions answered by the same person each time who knows your IT history within your building.

15. Jacquie was always helpful and friendly, I believe she was assigned my school, and I know everyone was impressed with her follow-through and knowledge.

16. Larisa was fabulous

17. She was able to assist me individually and answer any addition questions I had. Also, she provided many review sessions.

18. When troubleshooting doesn't work, having a mentor to help meant more time on task and less time waiting for technology to be fixed. It also helps when someone spends time in my classroom to observe techniques that are customized to me and my classroom.

19. I just wish that after the trainings and once the netbooks actually got to our buildings I could have had support once a week just to check in.

20. I needed the extra help.

21. I was fortunate to have my mentor spend one on one time with me after the training sessions, in order to take the training to the classroom.

Appendix A.4

Teacher responses to Question 7: The IT Training Mentor was helpful in the following ways.

1. I can't say enough about how essential having an IT Training mentor has been. I do not feel I would have felt comfortabe enough implementing all of the new technolgy and using the new equipment without Larisa.

2. Kathleen is very approachable and helpful. She showed me how to get School Town up and running in my class. She is a great asset to your department!

3. Our IT person showed me so many different ways to implement the technology that wasn't shown or that I didn't catch in the PD. Also, he fixes any problems that come up right away and lets me know of any future problems that might happen and how to fix them.

4. again, Larissa was fabulous

5. Allison was presented School Town to all of my students, this made a huge difference. I use school town all the time and my kids love it!

6 Anthony Smith was very helpful in all areas. He made sure that we got what we needed for the classroom in a timely manner. He also assisted in preparing the students for the state assessments using technology.

7. They really helped me to know what to do when I was confused. They provided examples about how to make the learning rich for my students.

Appendix B

Characteristics of Technology Integration Stages

Level	Teacher's View and Use of Technology	Types of Activities	Types of Thinking	Role of Teacher	Control of Learning	Problem Solving Skills Required
0 Nonuse	Passing fad.	None.	None	-	-	None
1 Survival	Can see benefits of technology for personal use.	Administrative activities by teacher.	None; for teacher use only	Sole provider of information.	Teacher in total control	Minimal
2 Mastery	Technology is the object of instruction.	Drill and practice. Isolated add on activities.	Content Knowledge; some critical thinking	Sole provider of information.	Teacher in total control	Minimal
3 Infusion	Technology is an instructional tool.	Computer Assisted Instruction. Using Internet for research.	Content knowledge; some critical thinking	Main source of information. Provides structure for all activities.	Teacher mostly in control	Moderate
4 Integration	Technology is a resource for student learning and has the power to transform education.	Interactive technology based learning environments.	Critical thinking; creative thinking	Facilitator of student learning. Students responsible for own learning.	Teacher gives up most of control	Moderate to high

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3 Infusion	Technology is an instructional tool. ✖	Computer Assisted Instruction. Using Internet for ✖ research.	Content knowledge; some critical thinking ✖	Main source of information. ✖ Provides structure for all activities.	Teacher mostly in control ✖	Moderate ✖
4 Integration	Technology is a resource for student learning and has the power to transform education.	Interactive technology based learning environments.	Critical thinking; creative thinking	Facilitator of student learning. Students responsible for own learning.	Teacher gives up most of control	Moderate to high

Observations: Reviewing Hurricanes. Teachers have created a SMART board lesson to review Hurricanes. In the lesson they had interactive games, students came to the board and sorted the characteristics into the Vortex. Used the vocab words about Hurricanes to create an Anagram on the SMART board, students come to the board and un jumble the vocab words based on the clues. Teachers had added attachments and links into their SMART notebook file for the student crossword puzzle. Class filled in crossword puzzle together. One student came to the board and put the answer up on in Notebook.

Level	Teacher's View and Use of Technology	Types of Activities	Types of Thinking	Role of Teacher	Control of Learning	Problem Solving Skills Required
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4 Integration	Technology is a resource for student learning and has the power to transform education.	Interactive technology based learning environments.	Critical thinking; creative thinking ✖	Facilitator of student learning. Students responsible for own learning. ✖	Teacher gives up most of control ✖	Moderate to high

Observations: Students are designing a menu for a restaurant. She gave students ideas, and had example menus for them to use to reference. Students were also able to use the netbook to look up and design a menu using the Internet. Students really focused on the take and the use of the Internet for their research.

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Observations: Fresh water food chain descriptive writing piece. Teacher used document camera to project student work up on the SMART board. The student who's work it was read the piece out loud for the class. Class went through the rubric for what the descriptive essay should have and student made marks to make changes for when they get back to her computer to make them. Students were able to see what an essay should have and make changes to their own. Once the class went through three essays in groups. Each student went and picked up their netbook and continued work on theirs or made changes based on the discussion.

Level	Teacher's View and Use of Technology	Types of Activities	Types of Thinking	Role of Teacher	Control of Learning	Problem Solving Skills Required
0 Nonuse	Passing fad.	None.	None	-	-	None
1 Survival	Can see benefits of technology for personal use.	Administrative activities by teacher.	None; for teacher use only	Sole provider of information.	Teacher in total control	Minimal
2 Mastery	Technology is the object of instruction.	Drill and practice. Isolated add on activities.	Content Knowledge	Sole provider of information.	Teacher in total control	Minimal
3 Infusion	Technology is an instructional tool. ✖	Computer Assisted Instruction. Using Internet for research. ✖	Content knowledge; some critical thinking	Main source of information. Provides structure for all activities. ✖	Teacher mostly in control ✖	Moderate
4 Integration	Technology is a resource for student learning and has the power to transform education.	Interactive technology based learning environments.	Critical thinking; creative thinking ✖	Facilitator of student learning. Students responsible for own learning.	Teacher gives up most of control	Moderate to high ✖

Observations: Students come into classroom they get their warm up and a SMART Response Clicker. They do the math problems and then enter them in on the clicker so she can see how they answered the questions. She then introduces the math lesson with a "Bridge" and real world examples of slalom and giant slalom to create a Venn Diagram. She has two video clips that the students are supposed to watch and then fill in their Venn Diagram comparing the types of skiing. She proposes a question and a situation to students who work in groups to make predictions about the problem and record them. When the class comes back together, groups share their predictions. Students go through work time exploring the differences between height and length of the Slalom course and exploring the effects of slope.

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4 Integration	Technology is a resource for student learning and has the power to transform ✖ education.	Interactive technology based learning environments.	Critical thinking; creative thinking	Facilitator of student learning. Students responsible for own learning ✖	Teacher gives up most of control	Moderate to high

Observations: Introduction to a weeklong project. Launched project on the SMART board by asking students "What are some community problems?" Students raised their hands and shared what they thought some of the problems are in their community. Student came to the board and wrote their contribution. She put up multiple situations on the SMART board, then students discuss with their partner and come to the board to share their contribution. Students want to contribute to the class discussion and write their thoughts on the SMART board. For the project: Students will come up with problems in their neighborhood and how to prevent and change these problems. They use the netbooks to research different issues and solutions that have been effective in the past and create their own proposal on how to prevent violence. Students will use the netbooks to create a Powerpoint presentation to present their findings and proposed solutions.

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Observations: Issues in society project. Students are working in groups of two or three to research and present issues in our society. Students are using the netbook to research and synthesize issues in today's society. They then have to decide how they want to present their findings and conclusions.

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Observations: Class finishing up a lab. Teacher uses the SMART board to project the lab to go over with the class. They are going to look at how species change. "Notes" are on the SMART board and students following along and write down important pieces of information. As they talk about evolution and characteristics of species teacher records student input on the board. During notes, teacher uses a video clip in SMART notebook to make the connection between the lab and Darwin. Had students come to the board and match up the adaptation with what it allows animals to do. Used Checker tools for students to come up to the board and fill in the blanks about natural selection. Students, who were not engaged in the activity and notes, became engaged when the lesson became interactive and students could come to the board and arrange the sequence of Natural Selection.

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Observations: Teacher put up the "do now" students had 10 minutes to complete morning vocabulary and journal entry. Teacher uses the SMART board with an interactive time and animations to project the Agenda for the day. Class reads an excerpt of modern fairytales. Teacher has links and videos embedded into lesson as students read/ watch/ listen to compare modern fairytales to classic fairytales and fill out a comparison chart.

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Observations: Teacher had notes pre loaded into SMART notebook. Students took notes as teacher did them on the board. Then the teacher had preloaded questions that she displayed on the SMART board and students worked on them at their seat. Then they shared out their responses.

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Observations: Practice on plotting points. Students were given a chart of points for constellations (Ursa Major, Minor, Cassiopeia). Teacher plots points for Cassiopeia as a model on the SMART board using the star pen and plotting the points on the chart. Once students plotted their points they received a practice question to practice the same thing.

Teacher Comments: Wanted to make sure that I knew that she feels stressed with the technology and that she didn't learn it enough. Feels that she would be using the technology even more if she had opportunities for more training.

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Observations: Agenda on the SMART Board. Students use textbook to answer a warm up question when they come in. Teacher using SMART board to put up lesson for the day, they review vocabulary words as a class and make drawings to understand the vocab words better. Class reads an article and highlights examples of successful advertising from 1920's. Teacher records the conversation on the board and makes notes. Teacher then uses the SMART board and internet to show students examples of 1920's advertisements.

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Observations: Class is going through the elements of a fairytale. Teacher shows a trailer for "Another Cinderella Story". Then class uses the SMART board to go through the literary events of the story and the teacher fills in the chart. Students have to write their own fairytale.

Appendix B.13

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Observations: Students come in and get their math minute. Six students are assigned on the board to get on desktops and get on First in Math. The teacher has the agenda on the board and a timer for each activity. Today the class is going through stations. One station is on the computers doing Brain Pop, One station is on Rearranging and graphing equations, and one station is on identifying functions using the clickers. Class goes through the do now together and then a question of the day. Teacher uses interactive tools from the gallery for the question of the day. She has infinite clones and checker tools and students come up to the board to answer the question of the day. Then the class breaks up into their stations and begins work at that station.

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Observations: Teacher puts up notes in SMART notebook and goes through them with the kids. Gives the kids something to work on, circulates and assists them. Then, they go over the work on the SMART board as a class.

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Observations: Teacher uses SMART board to fill in blanks on a guided notes document. Students finish notes, have a work period for the rest of class on practice problems.