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Professional development and technology integration: a case study of teachers using an informating model

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PROFESSIONAL DEVELOPMENT AND TECHNOLOGY INTEGRATION: A CASE STUDY OF TEACHERS USING AN INFORMATING MODEL

Jennifer Mufferi

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ABSTRACT

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PROFESSIONAL DEVELOPMENT AND TECHNOLOGY INTEGRATION:
A CASE STUDY OF TEACHERS USING AN INFORMATING MODEL
2003/04
Dr. Dennis Hurley
Master of Arts in Educational Administration

The purpose of this study was to create professional development and coaching opportunities to help teachers learn how to infuse technology into their classroom using an informating model that resulted in a shift of teachers' attitudes and classroom practice that increased student achievement. The research design was based on a case study using convenience sampling to choose subjects that were readily available. The subjects taught diverse subjects and grades levels within the Attales Middle School. Subjects were interviewed and observed to find out their current use of technology and their preferred mode of instruction. Then subjects took part in professional development and coaching opportunities designed to help them integrate technology using the informating method. Finally subjects were interview and observed to determine if their use of technology and mode of instruction changed. Findings indicated that the professional development, especially coaching, was successful in changing the way teachers used technology to an informating model. Further research showed that when teachers' integrated technology following the informating model the mode of instruction was environmental. In the future the study should be replicated using a larger sample size.

MINI-ABSTRACT

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Chapter 1

Introduction

Focus of Study

The focus of this study was on providing professional development and coaching to help teachers infuse technology using an informating model to increase student achievement.

Purpose of the Study

The purpose of this study was to create professional development and coaching opportunities to help teachers learn how to infuse technology into their classroom using an informating model that resulted in a shift of teachers' attitudes and classroom practice that increased student achievement.

Definitions

Active Learning- Students engaged in the process of building and testing their own mental models from information they acquired (Modell, 1996).

Automating- A method of technology use that preserved the traditional structure of the classroom (Novembe, 2001).

Collaboration- In this study, collaboration was defined as students working with students, teacher working with teachers, and students working with teachers.

Constructivism- A theory of learning based on the ideas of Bruner and Dewey that considered learning an active process in which learners constructed their ideas based on their past or current knowledge.

Curriculum- For the purpose of this study, curriculum was defined as an outline of student learning objectives and activities to meet those objectives.

Informating- A method of technology use that was based on building relationships and solving problems. Students had greater access to information which led to their empowerment (Novembe, 2001).

Integration- For the purpose of this study, integration was defined as the intersection of technological, pedagogical, and content knowledge (Pierson, 2001).

Internet- A computer network that connected computers around the world and was a forum for sharing information and communication.

Job-embedded learning- Learning by doing, reflecting on the experience and then generating and sharing new learning and insights with oneself and others (Wood & McQuarrie, 1999).

Mentor- For the purpose of this study, a mentor was defined as an individual that worked with a teacher to offer support, ideas and feedback.

Modes of Instruction- Referred to the role assumed by the classroom teacher, the kinds and order of activities presented and the specificity and clarity of objectives (Hillocks, 1986).

Self-Efficacy – Comprised beliefs about what one was capable of doing not about whether one knew what to do (Ertmer, Conklin, Lewandowski, 2003).

Limitations of the Study

The study was limited by the selection procedures. A small sample of teachers volunteered from one school to participate in the study. Therefore it was not a sample that was representative of the entire teacher population from multiple school settings.

Specifically those that were resistant to technology had no probability of being represented in the population. In the future, a randomly selected group of teachers from unique school districts should be selected as the sample.

The researcher conducted the professional development and coaching sessions; therefore it was possible that there was bias. In future studies an impartial party could present the profession development and provide the coaching.

Setting of the Study

The study took place at the Emma C. Attales Middle School part of the Absecon Public School District in Absecon, New Jersey. Absecon is a suburban community located just outside Atlantic City in Atlantic County. The 2000 Census reported that Absecon had 7,638 residents at that time. Of those residents 6,363 were white, 459 black, 570 Asian, and 288 were Hispanic. The 2000 Census also showed that 51% of residents were reported to have at least some college education. The Census Bureau reported that the median family income was $61,563 in 2000.

The New Jersey Department of Education reported that in 2002 the cost per pupil was $7,081. Seventy-six percent of that was derived from local taxes while 18% came from the state. Absecon was given the district factor grouping of DE by the NJ Department of Education. This grouping was based on seven indicators that rank school districts from A (lowest socioeconomic districts) to J (highest socioeconomic districts).

The community over the past five years was very supportive of the school district and passed all budgets. The Parent Teacher Organization was active within the school district providing informational meetings and funding. In addition, the Absecon Education Foundation awarded grants to teachers for projects and programs.

The Attales Middle School had a total enrollment of 420 students. The student to teacher ratio was four to one (School Report Card, 2002). Every computer in the school had internet access and there were four students to each computer (School Report Card, 2002).

Organization of the Study

The remainder of the study was organized the following way: chapter two was the literature review, chapter three the design of the study, chapter four the presentation of the research findings, and chapter 5 the conclusion, implications and further study.

Chapter 2

Review of Literature

Introduction

It was impossible to overlook the way computers permeated every aspect of our lives. As computer technology transformed how we lived, it also had the potential to change the way our students learned. Kleiner and Farris (2002) reported for the National Center of Educational Statistics that student use of computers continued to grow, in 1993 60.1 % of students used computers by the year 2001 the percentage jumped to 82.9%. A reported 99% of students had access to the internet, a major jump from 35% only seven year before. Most educational leaders were concerned initially with acquiring technology for their school. Once they had it, leaders needed to shift their concern to how technology was being utilized in classrooms.

Current Uses of Technology

The increased number of computers in classrooms was accompanied by increased research focusing on technology use. These studies suggested that technology was responsible for a change in instruction when really it was the specific application of technology that made the difference (Cradler, Cradler, and Clarke 2003). Instead of only asking how many computers were present, one needed to ask how. How were teachers integrating computers to help their students learn? A study of technology was meaningful when instructional goals were defined and technology application was directed toward these goals (Cradler, Cradler & Clarke 2003). Researchers needed to be

cognizant of education objectives and examine how teachers used technology to meet them.

Researchers were not alone in their limited view of technology. School districts often bowed to societal pressure to fund technology without having a thoughtful plan for implementation (Pierson, 2001). Growing technology budgets allowed administrators to build state of the art computer labs but once built many administrators thought the job was finished. Most districts were preoccupied with the equipment rather than the allocation of funds for the professional development needed to learn how to use it (Mouza, 2003). The next step for administrators should have been assuring that staff was trained and able to integrate the new technology.

In a survey of more than 4,000 teachers, Becker (2001) found that only computer and business teachers reported using the computer on a weekly basis. This reflected that technology was not being integrated into content areas of the curriculum such as science or language arts. In fact, most teachers used technology as a drill and practice tool (Becker 2001). Likewise in a survey of elementary school teachers, McCannon and Crews (2000) found that 78% of respondents used the computer for administrative tasks. They concluded that the computer was not an integral part of student learning. It was not enough for schools to have computers; they needed a vision for implementation and staff prepared to integrate technology in a manner that improved student outcomes.

Recommended Methods of Technology Integration

Ertmer, Conklin and Lewandowski (2003) postulated that teachers' beliefs about their ability to use computer in instruction was key, given the role self-efficacy was supposed to play in determining behavior. Confidence in technology skills increased the

level and success of technology integration in the classroom. Teachers who had high levels of efficacy in teaching with technology were more likely to participate in, work harder, and persist longer in technology related tasks (Ertmer, Conklin, Lewandowski, 2003).

A case study approach was employed to find out how technology use related to general teaching practice. Pierson (2001) found that the term technology integration may be used too freely. The teachers that she studied had varied methods of integration. "Technology in the hands of a merely adequate teacher will lack the experienced and thoughtful motivation necessary to embed it within the context of sound teaching practice" (Pierson, 2001 Conclusion section, para. 1). It was not enough to just use technology it must be used to meet the educational goals set in the curriculum. Teachers who effectively integrated technology tapped an extensive content and pedagogical knowledge in combination with technological knowledge (Pierson, 2001).

Wexler (2000) examined the roles of teachers, students and experts involved in a collaborative electronic learning community. She found that technology used as tool to build collaborative relationships blurred the roles found in a traditional classroom. Power dynamics within a technology integrated classroom changed. Teachers no longer passed the information down to the students (Wexler, 2000). Dweyer (1994) studied the effects of computers and wrote that students' cooperation was more spontaneous than found in traditional classrooms. Technology integration empowered the students and their role in the classroom became more self-determined.

Novembe (2001) designated two types of technology usage in the classroom, automating and informating. With automating the goal was to preserve the current

structure; teachers controlled the information. Informating led to empowerment of the students and technology was used as a tool to meet educational goals. Yong, Pugh and Sheldon (2002) agreed that successful implementation was more likely to occur when teachers viewed technology as a means to an end rather than an end. When students and teachers began to see technology as another tool in the classroom many changes ensued. Novembe (2001) wrote, "There is a fundamental shift of control with informating. Relationships change, schedules change, the use of space changes and most importantly responsibility shifts to the person that is closest to solving the problem" (p. xxi). Informating depended on solving problems and building relationships when using technology. Informating changed the way teachers delivered the curriculum and classroom instruction shifted with the flow of information.

Modes of Instruction

Successful technology integration often meant changing classroom practices and behavior. Technology use did not exist in a vacuum, teaching style had a direct impact on its implementation. Dexter, Anderson and Becker (1999) found that teachers who conducted their classrooms in a teacher-centered way by delivering facts used technology for drill and practice. Conversely, the researchers discovered that teachers in student-centered classrooms used software and information technology that allowed students to become active learners (Dexter, Anderson & Becker1999). In Pierson's (2001) case study, one teacher's highly participatory style modeled with students that she was still learning. This student-centered or constructivist approach to teaching supported the integration of technology following the informating model. Novembe (2001) wrote that automating preserved the status quo while informating shifted control and changed the

way classrooms operated. Knowledge of teachers' classroom practices helped to predict how they integrated technology.

In another study Hillocks (1986) identified four modes of instruction that ranged from the presentation mode which was teacher led, to individual mode in which students only received instruction on an individual level. Using these modes of instruction helped researchers decide what mode of instruction that teachers operated. Teachers in the presentation mode were more likely to integrate technology for drill and practice. As stated earlier, the most successful examples of technology integration were found when computers were used as a tool by empowered learners to meet curricular objectives. This vision of integration closely reflected the environmental mode of instruction. Hillocks (1986) characterized a teacher in the environmental mode as someone that planned activities and selected materials through which students interacted with each other to generate ideas and meet clear classroom objectives. The environmental mode was student-centered and reflected a constructivist learning situation which was shown to increase the value of computer use in the classroom. Gonzales, Pickett, Hupert and Martin (2002) stated that successful reorientation of teachers from direct instruction to constructivist teaching methods that incorporated technology needed to alter the way that teachers thought about educating. In order to maximize the power of technology for students, educators had to change behaviors and practices to parallel the environmental mode of instruction.

Professional Development

Professional development could be utilized to provide support and information to help educators change teaching practices in order to better use technology in their

classrooms. However, the traditional one time training sessions were not effective in preparing teachers to integrate classroom technologies. Mouza (2003) studied teachers participating in technology professional development and concluded that for teachers to successfully integrate technology a well-planned ongoing professional development plan was required. The literature suggested that modeling, active participation, collaboration and reflection were necessary for effective professional development.

Mouza (2003) stated that professional development should be organized around modeling, discussion, brainstorming of ideas, hands on actions and just in time support. Teachers needed to be given clear examples of how technology could be used in the classroom. In order to translate technology integration skills into practice, Ertmer, Conklin, and Lewandowski (2003) found that teachers needed specific ideas about how to use these skills to achieve meaningful learning outcomes. The application of the skills learned worked to turn those skills into practice. One way this was achieved was by using job-embedded professional development. Wood and McQuarrie (1999) indicated that job-embedded learning not only promoted practical learning but it also promoted immediate application of what was learned.

Job-embedded learning also depended on colleagues sharing what they have learned and therefore gaining new understanding (Wood and McQuarrie, 1999). Other researchers also found that collaboration led to successful professional development. Novembe (2001) asserted that for teachers to successfully transform their classroom technology use to an informating model they needed to understand how to move to a team-based environment. Mouza (2003) agreed that this environment is needed to encourage teachers to work together, solve problems and develop practices.

Collaboration provided teachers with new ideas and supported them as they experiment with implementation.

The literature indicated that like collaboration, reflection was an important factor in the success of professional development. Yong, Pugh, Sheldon and Byers (2002) found that implementation was more likely to occur when teachers were highly reflective about their use of technology. Wood and McQuarrie (1999) recommended that teachers keep a reflective log to improve professional practice, to discover what worked and what didn't, to uncover personal strengths, and identify areas for improvement. Dexter, Anderson and Becker (1999) wrote that educators needed opportunities for refection about their role and the computers role in the learning process.

Conclusion

Studies showed that technology was not being used to its full potential within the classroom. "Educators can certainly bolt technology on top of the current curriculum and students can use the computer as $2,000 pencil with which to write a five paragraph essay for a grade" (Novembe, 2001 p. xx). Recent research has provided a picture of what technology integration should look like in the classroom and how teacher practices should evolve. Using what researchers learned about professional development a program was developed to help teachers integrate technology successfully within their programs following a model of informating.

Chapter 3

Design of the Study

General Description of Research Design

The research design was based on a case study of the methods and attitudes of three teachers toward technology integration. Subjects were interviewed and observed to get information about the way they used technology and their customary mode of instruction. Subjects then took part in professional development and coaching to help them integrate technology using an informating method. Post interviews and observations were given to determine if technology use, attitudes toward technology, and mode of instruction changed after professional development and coaching.

Development and Design of the Research Instrumentation

An interview form and observation sheet were created to gather data. The interview consisted of semi-structured open ended questions that allowed subjects to give varied responses (see Appendix A). Questions focused on attitudes and current practices regarding technology use in the classroom. Questions were also designed to determine the subjects preferred mode of instruction.

The observation design included the areas of objectives, materials, activities, teacher or student driven, and type of technology use (see Appendix B). Teacher or student driven was an area to record the observed mode of instruction. Technology use was used to determine if technology was integrated following an informating or automating example.

Description of the Sampling and Sampling Techniques

Convenience sampling was used to choose subjects that were readily available to take part in the study. The subjects were asked to be part of the study and all consented. Subjects taught diverse subjects and grades levels within the Attales Middle School. One subject was a veteran teacher with over 30 years in the profession. The other two subjects were new teachers with less than two years experience. Two of the subjects had advanced coursework. All three subjects took part in school in-services for technology usage but only one had additional technology coursework.

Description of the Data Collection Approach

Data was collected through observations and interviews. Interviews and observations were scheduled at agreed upon times and dates with the subjects. Details about the context of the study that could have an impact on the results were also recorded.

Description of the Data Analysis Plan

Once the data was gathered, it was organized and categorized into meaningful groups. Interpretations were made of interview responses and observed behaviors. Then patterns were identified in order to make generalizations. Finally, a conclusion was made about the effectiveness of professional development and coaching in helping teachers integrate technology using an informating model.

Chapter 4

Presentation of Research Findings

Introduction

The three participants in the study were given an interview (Appendix A) and an observation (Appendix B) before receiving professional development and coaching. They were then given the same interview and observation after professional development and coaching. The pre and post instruments were used to determine if changes in attitudes or behaviors occurred.

The three subjects were asked about their teaching style in the pre interview. Two respondents indicated that structure was important to their teaching. One subject said, "It doesn't have to be quiet to learn." Two teachers discussed the need to be flexible. One said they were flexible but they liked to follow the format of giving a basic introduction, demonstrating, student practice and ending with an assessment. Group work was encouraged by one teacher as well as the idea that there are various ways to solve a problem. Another teacher said that hands-on learning and guided discovery are part of her teaching style.

The next question focused on how the teachers infused technology into their classrooms. All teachers cited that they used the internet for research. Presentation software and word processing software were also used. Two teachers used Microsoft Power Point for students to create products, while another said that she used it to give presentations for her students. Two teachers said they relied on the overhead projectors

as part of their lesson. One teacher also said that she incorporated calculators when teaching math.

Next the subjects were asked how important technology integration was to their classrooms. One teacher said, "Kids today don't just use paper and pencil." Another agreed that technology was important but she said it was difficult to incorporate. Subjects also said that it helps students learn and it's good for keeping students attention. The newest teacher responded, "As a young teacher it is important for me to learn how to use it."

Finally teachers were asked in what ways did they think integrating technology into their classroom was important. Subjects said that it should be used to improve focus, to create student products and research.

Then each subject was observed teaching one lesson before professional development was offered. The first subject conducted a lesson using an overhead projector, calculator and building materials. She asked questions, directed student activities as they went through the science book. Then she explained how they would test a structure to figure out how it would hold up in an earthquake. Student groups used a structure that was already built and tested it. The teacher then asked questions to conclude the lesson.

The next subject used candy bars, pencils, papers and computers. Students were split into groups and the activity was explained. Each group was going to represent one candy bar. They would research and then create ad campaigns to persuade consumers to buy their candy bar. The teacher then provided suggestions and help only when needed. Students could assess any supplies in the room that they need, this included six

computers. Some of the students decided to use the computers to start researching their candy bar. At the end of the lesson the class came back together and the teacher asked the students what they learned.

The final participant in the study taught a lesson using the overhead projector, meter sticks, calculators. In this lesson the students should have been able to identify sections of the meter stick and use a calculator to convert in the metric system. The teacher worked on the overhead and students filled in on worksheets. Students answered questions and completed some practice questions. Students then were partnered up to solve problems on their own these were then reviewed as a group.

Following the pre interviews and observations teachers took part in professional development and one-on-one coaching. Coaching consisted of modeling lessons and conducting observations and helping teachers plan lessons. Five months later the subjects were given the same interview to determine if their attitudes toward technology had changed and if they way they used technology was different.

Teachers were again asked about their teaching style and all teachers agreed they utilized group work in their classrooms. One teacher said, "I set clear objectives and goals and provide guidance when necessary." Another teacher said that she liked to use guided exploration, "Guided exploration also lets the students discover things on their own, I think that skill is important." The third teacher said that she found discovery learning and discussions to be effective tools in the classroom. Hands-on learning and student participation were also cited as part of the subjects teaching styles.

When asked how they infuse technology into their classroom, all three teachers said they use it for research. Distance learning, presentations, and PowerPoint were also

listed as ways the subjects used technology. One teacher said, "I would like to bring technology into the classroom more."

Next subjects were asked how important technology integration is to their classroom. On teacher said, "I believe technology is important to every classroom." Two teachers commented on how present technology is in students' lives. One said, "Students today are so familiar with the computer and their knowledge of program and the internet will only increase." Another teacher said, "Technology is part of the daily lives of students and there is a necessity in the classroom." One teacher said that technology helps with student focus, "It is important so that the children stay focused. They need interesting presentation s in order to keep focus. Technology is very interesting to them."

Finally, the subjects were prompted to tell in what ways integrating technology into their classrooms was important. One teacher said, "Students are empowered, they have a task to complete, a problem to solve and they choose what tools they need to find a solution." Another teacher said, "I think is important for kids to become familiar with technology because it is so readily used in the workplace." The last teacher said, "By integrating technology into my classroom it gives the student another way to learn material from the curriculum."

Post observations were set up with each teacher. The first teacher conducted a lesson in the schools computer lab. The objective of her lesson was to use the internet to learn about the passengers of the Mayflower. She reviewed what they had learned about the settlers and then gave directions. Each student worked to find one passenger on a

primary source internet site and then write a journal entry as if they were that person. The teacher walked around the classroom and gave help as needed.

The second teacher's observation took place in the distance learning lab. The objective was that students would be able to develop persuasive arguments and present them during a debate. Student worked with a class from another school and debated which candy bar was best. Students filled out a wrap-up sheet to identify techniques used and to reflect on what they learned.

The last teacher's observation took place in the computer lab. The objective of her lesson was for student to be able to discover information about energy. She went over directions with students and then students worked at their own pace to answer questions. They watch a movie on the internet, read about energy and took an online quiz. The teacher wrapped up the lesson by asking students to share something they learned.

Conclusion

The pre and post interview responses were compared to draw conclusions about changes attitudes and practices concerning technology. The observations were used to determine the observed mode of instruction and the method of technology inclusion in the classroom. The technology was integrated in either an automating or informating manner. Pre and post observations were used to conclude if the professional development or coaching were successful in helping teachers' integrated technology following an informating model.

Chapter 5

Conclusions, Implications and Further Study

Introduction

The interview responses and observations were used to draw conclusions about the effectiveness of professional development and coaching in helping teachers integrate technology using an informating method. The research instruments also reflected changes in teachers' attitudes about technology and their mode of instruction. Comparisons of pre and post observations and interviews showed that there were changes in teachers' attitudes and behaviors.

The interviews were used as a method to determine if teachers' attitudes and their reported classroom behaviors changed with professional development and coaching. The pre interviews had a common theme of a teacher-centered structure. All three teachers viewed this structure as an important part of their teaching style. Their responses indicated that they disseminated the information, lead the discussions and then students practiced or applied the concepts learned. The structured classroom they spoke about was congruent with a traditional classroom. A classroom with the teacher in charge and controlling the information epitomized the presentation mode of instruction.

This structure shifted dramatically when technology was integrated in the informating manner. This was mirrored in the post interview responses. When asked about teaching style teachers gave responses that included hands on learning, guided exploration and discovery learning. These descriptions were more indicative of a student centered classroom in which students were active learners. A classroom following that

description more closely mirrored the environmental mode of instruction. The environmental mode occurred when technology was integrated using an informating model.

The traditional structure of the classroom could not be maintained when informating because students gained control of the information. Students had access to the information and they became the experts. As the sample teachers integrated technology into their classrooms, their teaching style changed.

The pre and post interviews also showed a change in attitude toward technology integration. The post interviews reflected that teachers found technology had a greater importance after working to implement it into their classrooms. Once teachers began to use technology in the informating method they began to see the impact it made on student learning. During post observations when teachers used technology to infor-mate, students were focused, excited and in control. The teachers in all three cases only acted as a guide when students needed help. Post interview responses revealed that subjects saw the positive effects of informating.

Pre and post observations also showed a change in teachers' modes of instruction. During the pre observation only one teacher incorporated technology in the informating method. The students had computers there if they needed them as a tool to complete their tasks. The observed mode of instruction for this teacher was environmental. The other lessons employed the presentation mode of instruction.

Technology was integrated using informating in all three of the post observations. Consequently, the observed mode of instruction was environmental. Students were informating because they used technology to access primary source, they managed the

information, and they built unique learning relationships with students outside the school. Teachers acted as guides as students managed their own learning. In one class, students were so excited they shared information they found with peers and teachers. Students had access to the information and they disseminated it, students were empowered and control shifted from teacher to student. This shift of control was typical when teachers successfully implemented technology using an informating model.

Overall professional development and coaching were effective in helping teachers use technology in the informating model. The job-embedded nature of the professional development made it convenient for the teachers and allowed them to see the practical application of informating and use it in their classroom. Continued practice and coaching would help make informating the institutional method of technology integration.

Further study could be conducted using a larger sample size from diverse educational institutions. In addition, previous subjects could become coaches for new subjects. It would be impossible for administrators to coach every member of the staff. Peer coaching would be a way to provide job-embedded professional development and improve collegiality.

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Appendix A

Interview Instrument

Interview

Degree Status_____ Additional Technology Coursework_____

Number of years teaching_____ Advanced Coursework_____

Describe your teaching style.

Describe the way you infuse technology into the classroom.

Describe how important technology integration is to your classroom.

In what ways do you think integrating technology into your classroom curriculum is important?

Appendix B

Observation Instrument

Teacher: Date:

Grade: Location:

OBSERVATION

****

Objectives:

Materials:

Activities:

Teacher or student driven:

****

Method of Technology Infusion:

Biographical Data

Name	Jennifer Mufferi
High School	Egg Harbor Township High School Egg Harbor Township, NJ
Undergraduate	Bachelor of Science Elementary Education Drexel University Philadelphia, PA
Graduate	Masters of Arts School Administration Rowan University Glassboro, NJ
Present Occupation	Technology Education Teacher Emma C. Attales Middle School Absecon, NJ