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AUTHOR Russell, Sandra M.
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ABSTRACT

This practicum was developed to increase the use of instructional technology as a teaching strategy among elementary classroom teachers by implementing a series of inservice workshops and mentoring programs. Workshops designed with teacher input were developed and presented to the staff where the writer worked. Interviews were conducted individually with staff members and mentoring teachers. Instruments were developed to be utilized for noting and analyzing activities and workshop attendance. Model lessons were presented for the teachers. Guidelines were provided for use with new faculty members. Analysis of the data revealed that teachers were more willing to integrate technology into their regular language curriculum and were better prepared to use technology as a teaching strategy. The lesson plans and materials which were left at the school served as both guidelines and references. Two figures show the frequency of use and the number of teachers integrating technology. Appendices include the teacher survey; application record; face to face teacher form; agendas for workshops; workshop attendance; troubleshooting manual; and 1996 training plan. (Author/AEF)

Helping Teachers to Actively Choose to Integrate Technology in the Required Language Arts Curriculum Through Staff Development and Mentoring

by

Sandra M. Russell

Cluster 57

A Practicum Report Presented to the Ed.D. Program in Child and Youth Studies in Partial Fulfillment of the Requirements for the Degree of Doctor of Education

Nova Southeastern University

1996

PRACTICUM APPROVAL SHEET

This practicum took place as described.

Verifier:

Peter J. Walling, Ed. D.

Regional Director
Title

Robbinsville, NJ

6/20/96
Date

This practicum report was submitted by Sandra M. Russell under the direction of the adviser listed below. It was submitted to the Ed. D. Program in Child and Youth Studies and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University.

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William Anderson, Ph.D. Adviser

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ABSTRACT

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CHAPTER I

INTRODUCTION

Description of Community

The city in which this practicum took place was in the Northeast part of the country. The population was approximately 55,000. This district was part of the state's "Urban 30 Systems," which as the name implies, was an urban center made up of primarily low socio-economic families from minority groups. The school in which the project was set was a year round school.

The school population was relatively stable, with most of the children in this particular school coming from families who lived in houses rather than apartments or public housing. The mean income of the area was still below the regional average, however.

This 15 year old K-5 facility was an example of open-space design. It was one of 18 elementary schools in the district. The population of this school stood at 574 students and it was demographically representative of the district. Out of a total enrollment of 12,655 students, the Afro-American population was 70%, while Hispanics numbered 19%, and Asians 1%. The remaining 10% was all others.

A detailed curriculum for all academic areas met the state standards. There was evidence that the school had budgeted funds for instructional technology, although there was less evidence in the classrooms than in the written reports.

The principal of the school stated that he was committed to the belief that children enrolled in his school are unique individuals who have different strengths, skills and needs and who grow at different rates. The staff of both novice and experienced teachers seemed dedicated to providing an education which was both culturally and academically interesting and challenging to the students.

The community was comprised primarily of working lower-middle to middle income families employed by the state or in service jobs throughout the region. The multicultural, multiethnic school was located in a neighborhood adjacent to a park and appeared to be well maintained.

As with so many urban areas in the Northeast, this city had experienced enormous cultural, and economic changes in the recent past. At one time the area was a manufacturing hub, providing finished goods and raw materials for the nation and the world. As the industrial focus of the nation changed, so did the focus of the region. At the time of this study the area was primarily a region of high technology, business, and service industries. Proximity to the state capital also impacted on the employment opportunities for the local population.

Writer's Work Setting and Role

The author was a consultant for an educational software company which wrote programs for interactive television

available both at home and at school. It was her job to instruct school personnel and parents in the use and navigation of the hardware and the software which the company provided.

The consultant was not responsible for teaching individual lessons, nor training the staff to teach the district's curricula. It was her responsibility to provide training opportunities and materials which represented the corporation for which she worked. Her job description stated she will observe and work with teachers using the corporation's software.

The school in which the practicum was set is one of nine elementary schools in the public school district. It is located in an Afro-American community. The student population had been increasing since the school went to a year-round schedule

Prior to her role as a consultant the writer was a reading specialist and supervisor. During her teaching years she taught English, and was a specialist teacher of reading in Chapter One and compensatory education. She was also responsible for

writing the reading/language arts curriculum for a district in which she worked. This practicum was addressed from the point of view of an educational consultant.

As a consultant, the writer was responsible for inservice teacher training. The general functions of this position were the development, implementation, and monitoring of technology as an instructional tool. Specifically, her focus was to help create an environment where the company's technology became a part of the learning process. However, she believed she could expand her role to help teachers integrate this and other technology in a stress-free environment which would lead to motivation and achievement for individual students with unique learning styles.

Her own education includes a bachelors degree in Education and a masters degree in Special Education. Additional endorsements include those of reading specialist, supervisor, and principal.

CHAPTER II

STUDY OF THE PROBLEM

Problem Description

There was a forced separation between technology and specific content areas in elementary classrooms. A survey of teachers in the school (see Appendix A) demonstrated they were not comfortable integrating technology into the overall curriculum. Thirty five of the 55 certificated and non-certificated members of the faculty felt that instructing children in the uses of the hardware was time consuming and took away from the actual prescribed materials required by the District.

The school in which the practicum was set had purchased instructional technology to be used as a means of motivating students and individualizing instruction. The teachers had

training and practice with specific hardware, and courseware. The training had been provided across the board to all teachers in the school. Suggestions and guidelines for the process of incorporating this technology were provided. However, the use of computers was not regulated by policy, and was left to the discretion of the teacher.

It was the consultant's belief that staff and students were interested in using computers to enhance learning. However, the computers were used as electronic worksheets or interest centers, rather than for gathering and managing information. They were used as stand-alone machines, without a network configuration. Sixteen teachers said that in addition to their use as an electronic worksheet, they were also used as a reward for accomplishing various classroom assignments. Eleven teachers stated children went to "Computer Class" in the "Computer Lab" for experiences with technology.

These observations were made when the consultant visited the school as part of a demonstration team exhibiting

new instructional technology. A survey of the 55 staff members validated the observation that they are not comfortable integrating technology into the overall curriculum. During the visitation time, this writer also spoke with the building principal, the computer/technology coordinator and several classroom teachers all of whom verified that computers were primarily used in isolation from other aspects of the curriculum.

The principal also shared information about inservice sessions held during the past two years. It was noted that when technology training was available, it emphasized the hardware, and/or the software, but not the integration of computers as a learning tool.

As recorded in the Observation Log, six teachers in the school stated as a problem that the computers in classrooms were not networked. The observations indicate that of 55 computers in the building, 37 were either in a computer lab or the 5th grade ILS labs, automatically separating them from

true integration. Finally, there is a consensus that even through the children seemed interested in computers, they used them for games or for drill and practice.

In informal discussions with the children in the first through fifth grades, they reported they don't actively participate in unstructured involvement with computers for information gathering and application. Even though teachers rely on computers for administrative information throughout the school, there was no push to advance the uses of technology in the classroom.

There appeared to be a strong emphasis on the individual components of instructional technology, while at the same time there was insufficient emphasis on professional development.

Problem Documentation

Following three days of observation and discussion during a demonstration period in July of 1995, the writer recorded that only 3 out of 27 teachers had consistently tried

to integrate technology into the general curriculum. The interviews with teachers also indicated that while the 5th grade computers were configured as individual learning stations, they were skills oriented. Neither they nor other sets were connected to any local or wide area networks. The machines were stand-alone machines which were used as "special" incentives to complete assignments or to provide practice in a specific skill.

While visiting the school on several occasions, it was the consultant's observation that several computers were unplugged, or turned to the wall. There was one notation of a child wheeling a computer to another classroom for use on a specific writing project, because the writing class had only two computers.

During school visits it was recorded in both the consultant's log and Application Chart (see Appendix B) that out of five second grade classrooms, two were not using computers during math class and in the others they were being

used by individual students to perform drills in subtraction or addition.

One 4th grade language arts class was preparing a writing assignment for publication using the two computers in the classroom. The teacher had also made arrangements with another teacher to borrow an additional machine.

Notes on visits to the first grade classrooms indicate that while there were centers in four classrooms, the computer was not available to the children in this year-round class. The teacher stated that as the year progressed she hoped to allow the students to practice addition facts or Piaget tasks on the two machines available to her.

During the observation period the consultant noted (see Appendix B) all the technology which was utilized. She specifically noted the activities of one first grade class in the computer lab. The observation reflects the use of a math game intended to increase speed and accuracy of the children solving one and two digit addition examples. Initially the children

were motivated by the game, but as the period continued several children asked permission to change disks or change to another activity in either math or reading. The teacher served as a monitor in the class, encouraging the children to use their fingers to draw stick figures in order to arrive at the correct answer. There was no way of knowing whether this was the same objective being taught in the classroom. A discussion with the computer teacher later revealed that it was in keeping with the curriculum, and was therefore an appropriate activity for the children.

In discussions with the building principal, concerns were expressed that the full potential of the technology was being lost. In our plans for training, he specifically stated that he wanted integration possibilities stressed. Specific demonstrations of ways to use the technology as a tool, rather than an end in itself were requested.

Causative Analysis

There was insufficient time to teach all that was necessary in a curriculum. The computer was seen by a majority of teachers on this faculty as another intrusion to the instructional process. In addition to the Language Arts/Reading and Mathematics requirements, there were social studies and science objectives to be met. Beyond this there were Substance Awareness Classes, special areas, visitors, assemblies, fire drills, and other intrusions. The teachers were interested in using the computer but did not have the confidence to use it as an instructional tool, fearing it took even more time from the academics which needed to be taught.

The fear of taking real time away from direct instruction, as well as an emphasis on the benefits of either the hardware or the software as an entity, was a contributor to the problem. Nearly all of the teachers needed to see that the power of the computer to help children communicate, share ideas,

investigate possibilities and respond to ideas was really the strength of technology. Ideas about successful ways to use technology to manage information would help teachers incorporate it in all aspects of the instructional day.

While there were many teachers who had successfully integrated computers into their teaching plans, there were too many who had not. The typical teacher (Fawson, & Smellie, 1990) remained a dispenser of information to relatively passive learners.

A third cause of the problem was that in this school there was a need for a stronger program of professional development for all staff members. An analysis of the training schedule and agenda for the school years 1993-1994 and 1994-1995 indicated that training concentrated on the product and not on application of the material for teaching. Teachers attended district sponsored classes in the use of word processing and spread sheet programs, but purchase orders for software indicated titles which were subject matter specific. Presently,

computer literacy among the teachers, though improving is not widespread. Frustration in learning how to use the computers caused some teachers to give up at the early stages of adoption. There was little or no evidence in the training schedule that workshops had stressed innovative ways of instructing students.

Finally, even in an age when children used technology regularly, and when world-wide instantaneous electronic communication was globally available, most of the teachers in this school had a negative attitude toward technology. Technology in this school, as in many schools in the State was generally unavailable and undependable. More computers needed to be available for teachers to use. Machines must be reliable, so a regular maintenance and upgrading schedule should be in place at the district level.

Teachers had been exposed to technological breakthroughs before. These had often resulted in disappointment, (Hannafin & Savenye, 1993) disillusionment,

and abandonment. Historically, teachers had been blamed for the failure of most innovations. Today, there is some belief that the importance of the teacher's role in a classroom with technology had been underestimated. Very little effort had been make to support teachers who tried to implement new technologies.

Relationship of the Problem to the Literature

Education has seen a series of technological innovation in this century. The change as America continues into the information age is more evident in other aspects of life than it is in education. Hannafin and Savenye (1993), David (1991), and Sheingold (1991) wrote that instructional technology's failure centers around the teacher who is often unable to adapt his/her teaching style to maximize the potential of technological innovation.

According to David, even with innovation and access to new knowledge, schools did not build into the daily job of teaching the necessary authority and flexibility, or time to learn

about new techniques involving technology. The behaviors of teachers were a reflection of society's expectations (Luehrmann, 1985) that they "control the class". Technology was seen as a step away from this model.

Gardner (1991) wrote that the apprenticeship model that was used to educate children is no longer a viable model. The teacher must analyze the uniqueness of the individual (Ingram, 1994), learn to determine what is most useful and worthwhile to be taught, and then motivate and inspire the students to work at the task of learning.

Resistance to school computer use (Ognibene & Skeele, 1990; David, 1991) resulted from the quality of experiences educators had. Technology asked teachers and administrators to undertake tasks that were new and complex. It signaled change both in the organization and the classroom. The problem-solving opportunities and formation of new roles and relationships in the classroom were not always welcome. The active, problem based learning did not simplify teaching. Teachers did not have

ready access to the latest technology nor sufficient time and support to make it work.

Sheingold (1991), Hannafin and Savenye (1993), and Ingram (1994) wrote that in terms of the critical need for students to learn how to think, and apply knowledge to solve problems, classrooms were not functioning. The complexity of computer activities and applications vary greatly. There were some applications of the computer which were widely used because they did not affect traditional classroom relationships. On the other hand, open-ended problem solving activities did change the basic student-teacher relationship.

Kaiser and Sevilla (1995) reported that there was planning for a variety of instructional strategies including technologies, but core-curricular integration was not stressed. During the last two decades, computers had revolutionized (Ingram, 1994) most major industries and organizations except for education. It was important to note that according to Resta (1992) many minority students entered higher education with

less expertise and experience in using computers than other students. The lack of access to computers in urban schools was widening. But even more noticeable were the conditions under which teachers incorporated the technology. In an effort to improve performance on standardized tests, poor and minority students were more likely to spend computer time on rote learning, and less likely to be asked or expected to make judgments, draw inferences or engage in critical thinking or problem solving with computers.

Technologies (Dede, 1992) which swamp students in information were not being used to help them master thinking skills for assimilating this data. Rarely did each American teacher have a computer at his/her desk. It was so rare for students to have their own, that if they did the school received national media attention.

Bagley and Hunter (1992) reported the current uses of technology in the school curriculum. Along with Strommen and Lincoln (1992), Jacobs, (1988), Knapp, Shields and Turnbull

(1994) as well as Kahn and Reigeluth (1993) all reported that computers were used for drill and practice and tutorial activities, but not for application of knowledge. Furthermore, the elementary curriculum itself was not designed as a system, but rather a series of separate components. Similarly the technological changes which swept through society at large, had left the education system essentially unchanged.

The rift between the use of technology in the society at large and its use in schools had negative effects on the students. The systemic lack of awareness of the appropriate uses of technology in our schools today was well documented (Strommen & Lincoln, 1992; David 1991; Dede, 1992). Because of the limited budgets and limited expertise of educators and administrators, students had traditionally been the last to benefit from technology. Further, there was the tendency in education to treat all electronic media as add-ons.

Curriculum materials, delivery systems, and learning environments (Muffoletto, 1994) always overtly referred to

integrated worlds, while covertly retaining their individual importance. Ingram (1994) wrote that state mandates which regulate schools have changed little in recent decades. Relatively few schools pursued information on the effects of technology on student performance, especially the influence of multimedia interactive instruction.

There was a need (Resta, 1992) for inservice training for teachers in schools serving minority students. The present curriculum was not influenced by new information technology. Training of preserve and inservice teachers on new state of the art technology was given low priority. There was insufficient preparation in the integration of networked computers, hypermedia, interactive computers, or multimedia computer applications.

As they were being used, computers tended to increase (Peck & Dorricott, 1994) rather than decrease teachers' work loads. A typical classroom plan with students using computers as a separate activity (Pearlman, 1989) did not encourage a

sense of curriculum integration. Furthermore the lack of organizational, theoretical and practical consensus inhibited the successful integration of technology to educational objectives.

Chapter III

ANTICIPATED OUTCOMES AND EVALUATION INSTRUMENTS

Goals and Expectations

The following goal and outcomes were projected for this practicum. Teachers will integrate technology into all aspects of the K-5 curriculum. It is anticipated that by the end of this implementation period teachers in the school will begin to integrate technology into their weekly lesson plans. Classroom teachers in the targeted population also will demonstrate an improvement in their understanding of and confidence in working with interactive technology.

Expected Outcomes

After 8 months of inservice training and modeling activities, the teachers who complete this program were

expected to demonstrate the following behaviors: (1) 18 out of 27 regular classroom teachers, will integrate technology as part of their regular lesson plans for their classroom curriculum. (2) These same teachers will demonstrate an improvement in their understanding of and confidence in working with interactive technology as measured by at least a 25% increase in the times technology is planned as an active part of a lesson. (3) These teachers will report a 25% increase in the use of technology to focus on the individual needs of students by using media presentations for whole group instruction, enrichment projects or remedial activities adjusted to individual needs as self reported by the end of the implementation period. (4) Three out of 18 teachers will design and present at least three technology-driven lessons based on using available hardware and software. (5) The K-5 teachers will rate their level of success in using various available instructional technologies. It is anticipated that there will be a 25% increase in teachers reporting the successful use of technology between the

beginning and end of the implementation. (6) Three members of the faculty will demonstrate their confidence and proficiency by volunteering to be mentors to their colleagues and new teachers, as needed. (7) Three teachers will submit requests for additional multimedia computers as part of their annual budget. Increases will be measured from information gathered during the observation period and compared to behavior during implementation.

Measurement of Outcomes

The consultant evaluated the program by systematically observing and recording the number of times teachers incorporated technology as a teaching tool in their lesson plans. For outcome one an Application Chart (see Appendix B) was kept and the results tabulated at the end of the practicum to determine whether teachers increased their use of technology from current sporadic inclusion to an average of 3 lessons per week at the end of the practicum. This chart seemed to be an

efficient means of quantifying which teachers integrated technology and the kinds of technology they chose as a teaching strategy. The teachers were identified by initials only.

Outcome two was evaluated by interviewing teachers using the Face-to-Face Interview Questionnaire (see Appendix C) when they completed a unit and recording their impressions about the technology they used. Open-ended questions were asked, and each teacher was allowed to discuss the experiences he/she chose for the lesson. Because the writer is not in a supervisory capacity at the school, the interview was not expected to achieve any prescribed standards, but observed attitudes and behaviors were noted. There were discussions involving the relationship of traditional technology to curriculum materials, identifying basic advantages and disadvantages of the technology, recognizing some standards which were easily met using technology, and adapting instruction to individual learning styles.

Outcomes three and four were measured by examining teachers' plans and by viewing their presentations. The consultant and teachers discussed the individual goals for each student, and teachers self reported how well they met those aims during the lesson. There was special emphasis on how the technology was able to help the individual teachers in their efforts to structure lessons to meet the needs of all students.

Outcome five was measured by examining the results of the teacher survey (Appendix A) before and during implementation. An analysis of answers to questions 20, and 21-28 seemed to represented the teachers' feelings toward technology. In order for the consultant to determine the teachers' comfort level, it was necessary to know which activities and materials were favored by most teachers. There were questions on the survey designed to gave insight into the staff's reaction to various materials.

Outcome six was measured by counting the number of teachers who enlisted as mentors to other teachers. As mentors

they would have the responsibility to continue the work begun during this first year of the program.

Outcome seven was measured by examining the purchase orders for the teachers involved in the project and comparing them to last year's orders. By diverting additional budget funds toward the purchase of technology, teachers reiterated their commitment to change the way learning occurred in their classrooms.

The consultant also used the results of the Visitation Log to evaluate outcome two as suggested by Sheingold (1991) and David (1991). These experts suggested planning for students daily use of technology in learning, in collaborative projects, and in application and problem solving activities.

As the consultant, the writer used the entries in the Visitation Log to note any unexpected events. It was anticipated that not every teacher experienced enough positive results to warrant changing his/her teaching style. On the other hand, some breakthroughs were important enough to

note in the log. Several writers (Sheingold, 1991; David, 1991) suggested that if teachers and students were given sufficient experiences with technology there would be an increase in their problem solving activities as well as creative application of courseware. The log provided a written representation of the specific number of teachers incorporating technology with current curriculum. The exact materials selected were recorded as well as how many children were actively involved with the process. The results of the observations were summarized at the end of the implementation period and used to compose the final report.

The log and anecdotal records were maintained as a means of analyzing behaviors recorded during implementation. Comparisons of pre-implementation uses of technology with its uses at the end were prepared.

The results were presented both as narrative accounts of change and as quantified evidence of change. Any self-reported and observed increase in the use of technology at the

end of the practicum were charted and displayed a as bar graph.

CHAPTER IV

SOLUTION STRATEGY

Discussion and Evaluation of Possible Solutions

There is a forced separation between technology and other curriculum areas. Teachers were interested in utilizing technology in their classrooms, but were hesitant to actually use it as routinely as other teaching tools. At this school, it was the responsibility of the computer teacher to instruct the students in the operation and application of computers. Because there was a program being taught independently, and because there was little additional time during the day for the classroom teachers to practice computer skills, the use of computers to enhance the regular curriculum seldom happened.

Even though teachers were encouraged by both the principal and the school district administration to place emphasis on computing as a means to apply knowledge, the children usually used only prepackaged games or electronic worksheets. The students missed opportunities (Ingram, 1994) to develop their own creative ways to apply what they were learning, and they sometimes failed to master another means of communication. Likewise, they were missing the pleasure of constructing new knowledge from what they were being taught.

Ingram (1994) designed a theoretical model for inservice teachers involved with planning, implementing, and evaluating technology in their classrooms to improve the quantity and quality of learning by elementary students. She wrote that one of the primary factors that caused teachers to change their instructional behaviors was evidence that the specific change resulted in significant learning gains for students. Other factors she identified are confidence that the teacher's role under the

proposed change continued to be irreplaceable, and that the learning environment values and rewards change. The participation by teachers in developing the method of training in the use of new instructional techniques also seemed to encourage adopting educational technology. Additionally she noted, when teachers believed in the idea that computers made their jobs easier and more satisfying, it usually fostered a willingness to change their instructional behaviors.

When teachers themselves became intimately involved in the design of workshops, courses and inservice programs, Ingram (1994) and Wright and Campbell (1987) wrote that the curriculum changes were more acceptable. If emphasis was placed on using technology in ways that enhanced the role of the human teacher, some of the apprehension toward technology waned. By using a dual instructional approach of teaching via technology to augment instruction, and then training teachers to use these techniques the same way their students do, restructuring occurred. In her methodological

guidelines for the design of an Educational Technology curriculum, Ingram (1994) emphasized that theoretical and research-based study needed to be combined with the hands-on use of computers and related technologies.

In North Carolina, a model presented by Riedl and Carroll (1993) recognized that technologies comprised not just the content of the training, but the tools through which learning took place. Their goal was to explore ways in which a combination of communications capabilities were effectively utilized in learning settings. The model was built on a linkage between an elementary school and a high school. The high school students did not teach the lessons, but learned to look critically at the experimenters' methodology to help the younger students gain greater insight about their studies. The teachers worked as team to build an enhanced learning environment for both sets of students.

Inservice training used to focus on the equipment. In this configuration, training opportunities (Riedl & Carroll) for

teachers at each site were designed by a lead teacher who had release time to plan lessons with the teachers and to provide on-site project support. Currently the training focuses more on use of technology in the learning settings and less on the specifics of how the equipment works.

Peer teacher models, which reflected a teacher's readiness to assume more ownership of professional growth, were suggested by Kaiser and Sevilla (1995). Peer coaching as a staff development technique was simply one teacher observing another and talking about what was seen. It was their belief that peer coaching reduced teacher isolation, allowing experienced successful teachers to share their expertise with other teachers. The peer coaching model in curriculum development stressed technology incorporation and cross-curricular integration.

Dede (1992) and Dwyer (1994) proposed incorporating hypermedia to enable knowledge construction by learners, and using visualization and virtual communities to support

collaborative inquiry. Resta (1992), and David (1991) also concurred that computers must be used as cognitive enhancers, and personal learning tools. Presently students were likely to spend computer time on practice learning, and were less likely to be asked to make judgments, draw inferences or engage in critical thinking or problem solving with computers.

In developing educational designs for today's students, Strommen and Lincoln (1992) advocated not just simply thinking up clever ways to use computers in traditional courses, but rather to suggest principled changes in the curriculum, and effective uses of it in a theory of cognitive growth and learning. They advocated a constructivist philosophy that encouraged play and experimentation as important forms of learning. They believed that these were powerful forces in the development of the individual mind, which lead to additional discovery.

Through collaborative and cooperative learning the benefits of children working with other children helped

students (Strommen & Lincoln, 1992: Dwyer, 1994) to reflect on and elaborate on their own ideas as well as the ideas of their peers. Educational practices that followed from this focus were designed to facilitate children's learning by nurturing their own active cognitive abilities.

But before change can take place, Strommen and Lincoln (1992) noted, there must be a system awareness of the appropriate uses of technology. Teachers must be provided with the time and support to explore technology on their own. Administrators must provide the time and space for teachers to have the opportunity to learn as well as to teach. To do this, teachers must be treated as the professionals they are. Their own creativity is a powerful force for positive education change, but it can thrive only when it is allowed to flourish and is supported by strong instructional commitments.

The Apple Classrooms of Tomorrow (ACOT) (Dwyer, 1994) experimented with week-long and month-long institutes, where teams of teachers worked in their classrooms with

mentors to develop models of curriculum, pedagogy, alternative assessment, and technology integration. In these classrooms, new instructional practices and new ideas about assessment were documented. The teachers planned to be a collaborator and sometimes learner in an interactive setting where technology was used to broaden communication, collaboration, information access, and expression.

The ACOT program advanced the idea that to be beneficial, instructional technology must be both human and technological. System support took two directions. The first was to support teachers through significant instructional shifts, and the second to provide a program of staff development.

By allowing students to interact (Peck & Dorricott, 1994; David, 1991; Muir, 1994) with technology in meaningful ways for significant periods of time, educators individualized instruction. Restructuring the role of the teacher to facilitator created an environment for experimentation and learning. Electronic media had the capacity to bring experiences and

information to the students, but both teachers and students must feel comfortable with the tools of the information age.

Teachers used technology to individualize instruction, or to create simulations through which students discover relationships and construct new knowledge. Computer-based technologies enabled the teachers to generate individualized communications to parents, create lesson plans and select instructional materials from resource databases.

David suggested a model where teachers stopped teaching students isolated facts and rote learning, and taught them to apply skills, understand concepts and solve problems. In her professional development program, she demonstrated how to make current strategies more efficient through use of big-screen video monitors instead of chalkboards, and used a HyperCard database to prepare for a field trip.

To the same end, Muir (1994) put computer projects at the core of the curriculum. Computer applications were taught from within the core curriculum, instead of being broken into

subject based areas. The computer projects were supported by teachers' own ideas. No longer was the computer specialist only focused on the computer part and the classroom teacher only on the curriculum part. There was a team effort to ensure that the projects were curriculum-based and that students had enough time to complete the projects. The computers were used for writing stories with word processors, and illustrating science diagrams with draw and paint utilities. Very little educational software was used as compared to tool software. As a result of these interactive projects, students demonstrated more enthusiasm about research, and computers made a valuable contribution to the educational process.

In a journal article, Sheingold (1991) also proposed a model using software tools, such as word processors and graphing programs, to help students organize and structure complex tasks. In a classroom where students engaged in learning subject materials that were integrally related, they achieved more. Students' tasks did not have one right answer,

and problems did not have only one route to a solution. Students engaged in work that had an understandable purpose.

Her design involved teacher technology rooms where teachers had access to technology for their own work and for collaborative projects. There were special spaces where students worked on technology intensive projects. The students' work was then presented in electronic displays in classrooms and public spaces.

Finally, David (1991) reported on a school that redesigned its curriculum around a process in which there were new roles and relationships in the classroom, where teachers were colleagues and decision makers, and where there were problem solving opportunities.

Description of Selected Solution

Few teachers actually used technology as a tool to enhance learning. Based on observation, little emphasis was placed on integration of technology to the overall curriculum.

Teachers needed hands-on, non-threatening experiences with technology. In a project designed by the Rochester City School District, the University of Rochester, the Rochester Museum and Science Center, and the Center for Technology in Education at Bank Street College, Sheingold (1991) reported that teachers focused on interdisciplinary projects which incorporated subject-matter curriculum and the relationship to the local community. The teachers agreed to use the technology themselves as a teaching tool and to work more as guides and mentors, rather than experts.

The emphasis in this solution is on technology as a tool for learning, not an end in itself. Teachers needed the support of administrators, computer professionals, and staff members who were utilizing computers in meaningful projects. Teachers who were proficient with technology volunteered to act as teacher mentors, creating their own lessons and sharing these methods and materials with new teachers. These new teachers were then invited to take part in new technology projects.

David (1991) wrote that when occasions became available teacher-leaders needed to be encouraged to move from the status quo to a serious change effort. There is also the need for them to have the flexibility and authority to create different environments. Similarly, teachers needed access to knowledge. They needed to develop the skills to do things differently. A training component needed to be built into the job. That meant a culture shift which acknowledged that rapid change and the explosion of information required continuous learning on everyone's part. Finally, teachers required time to learn new skills, as well as new roles and responsibilities.

Elementary teachers received specific model lessons and workshop training (Dwyer, 1994) through planned lessons in which technology was a learning tool. The technology was a catalyst for change because it provided an occasion for change. The major infusion of hardware and software forced a rethinking of traditional practice. Workshops emphasized information management rather than right and wrong answers.

Teachers had the opportunity to act as colleagues and decision makers. The sessions also offered opportunities for problem solving applications. Finally, new roles and relationships in the classroom were emphasized as part of the discussions.

The consultant presented a series of workshops (Ingram, 1994; Strommen, & Lincoln, 1992; Sheingold, 1991) to classroom teachers, modeling presentations which were either remedial or enrichment adjusted to the individual needs of each student. The agendas (see Appendix D) for the workshops included these topics. An attendance sheet (see Appendix E) was kept to monitor the presence of teachers at the workshops. Many of the topics selected and developed by the writer were adapted from the Sheingold (1991) model. This was done because of the realization that learning must be considered purposeful to the learner.

To facilitate inclusion of technology as a tool, this consultant and the computer teacher prepared a catalogue of available technology in the school and distributed it at the

beginning of the project. Ingram (1994), and Kaiser and Sevilla (1995) stressed that ease of use and satisfaction fostered a willingness to move toward an inclusion model.

The specialist was also available to help teachers arrange their classrooms to utilize the available machines. There were many materials available in electronic format, but sometimes the machines or the discs themselves were not readily available or easy to use. The hardware and software recommended for classrooms were those related directly to the workshops. They were familiar to the teachers and easy to access. They were also complementary to the curriculum.

The writer instituted regular workshop sessions dealing exclusively with integrating technology with the specific reading programs (Bagley, & Hunter, 1992) used at the school to demonstrate the effectiveness of such a teaching style. She also left reading materials and specific activities for the teachers to help plan weekly lessons, allowing them to expand and explore the original lesson.

There were regularly planned and presented workshops (Muir, 1994; Thompson, 1989) which dealt specifically with application software as an avenue to integrated curriculum and learning. Teacher training programs (Sherry, 1992) conducted by the consultant emphasized integration of specific courseware into classroom lessons and assignments designed to individual needs of students. By working with the principal and district personnel, the consultant planned time to work with teachers helping them to master the skills that were needed to maximize the effectiveness of their technology purchases.

Adequate software and print materials were provided by the writer so all teachers were able to review and incorporate suggestions from the model lessons. The teachers were able to duplicate and expand upon the lessons. By demonstrating basic concepts in many environments, and by allowing them to experience a variety of media, the motivation would remain high among cooperating faculty members.

To encourage students to use technology, both teachers and students had a variety of hands-on experiences (Dede, 1992; Bagley, & Hunter, 1992) with all current technology available at the school. Software in the classrooms was representative of innovative materials specifically designed to motivate and engage students in the language arts curriculum. The high quality software and print material allowed teachers to group children as they were usually grouped, but at the same time allowed children to work together at the machines.

The writer worked with the school's computer specialist to prepare print materials which encouraged self confidence on the part of the teachers and interest by the students. Although the appropriate software was beginning to appear, there was not much motivation for the educators to adopt and develop the most appropriate uses for the new technology. This link listed the newest technologies available to the teachers as well as resources within the school's computer labs or library which otherwise might have been overlooked.

Based on the data, (Muffoletto, 1994; Dede, 1992; Sheingold, 1992) the writer created activities conducive to motivating teachers to include technology as a learning strategy, appeal to multiple learning styles, and increase application and transfer of knowledge. Most of these activities were based on objectives listed in the district language arts curriculum, state standards and specific objectives of the software publishers. As Gardner suggested (1983) if we wish to expand the attitude toward human achievement beyond notions of IQ there has to be a recognition of many talents and many ways of learning.

A troubleshooting manual (see Appendix F) for mentor volunteers was developed and made available to help identify hardware problems in the least amount of time. This was done because teachers ignore technology (Hannafin, & Savenye, 1993) which is not dependable or reliable. By de-mystifying the hardware teachers took ownership of it.

The writer distributed a plan for integration of technology as a teaching tool and emphasized using technology (Hannifin & Savenye, 1993) in ways that enhanced the role of the teacher as a guide and mentor. Included in the plan was a list of trade books which directly relate to the curriculum being studied. Also provided was a list of exceptional software applications (Hannafin & Savenye, 1993; Knapp, Shields, & Turnbull, 1994) that capitalized on the computer's ability to create high-level interactive learning environments. Among these were Lightspan, the Jasper Series, and the Geometric Supposer Series.

Meaning-oriented strategies using the computer (Knapp, Shields, & Turnbull, 1994) were highlighted in the guide. Ways to extend the information that children composed were provided in examples such as stories, reports, essays, or other forms of text. By doing this, the ways in which children expressed their thoughts were emphasized.

Instructional strategies (Sheingold, 1991; David, 1991) which were known to achieve some degree of success were listed with references to available sources. Meaning-oriented approaches through demonstration lessons, team teaching and provision for new materials to extend the repertoires of classroom teachers were included. Students exposed to instruction emphasizing meaning were likely to demonstrate a greater grasp of advanced skills, therefore information on these types of activities was included.

The teachers had an opportunity to plan and present lessons following the model lessons in the workshop. By working with tool software and simulations, inservice teachers experienced learning and problem solving in non-threatening situations. These workshops had as their goal categorizing and defining different types of computer uses in the classroom. The first workshop focused on exploring the language and discussing possible learning outcomes from these explorations. Additional workshops with other discovery oriented computer

learning environments focused on defining goals and objectives for the class. Teachers suggested ways that may help improve teacher problem-solving skills, and how these skills were specific to their curriculum. At the end, teachers prepared their own plans to use a discovery learning environment with their students. The plan included goals, objectives and methods of teaching a particular skill.

There was a full series of tutorial materials (see Appendix G) left at the school to assist the teacher-mentors continue the plan with teachers new to the program and the school. Kaiser and Sevilla (1995) recommended that teachers take over their own programs as a means of developing professionalism and advancing the ideas of restructuring.

Finally, with the participants permission, the writer displayed their lessons to teachers in other district schools, providing a sense of achievement and professionalism.

Report of Action Taken

The writer began this practicum in October of 1995. She

felt that the most appropriate solution was a program which reflected the model and philosophy presented by Ingram (1994). This practicum solution consisted of utilizing inservice teacher training time and voluntary after school time, to work with the target population for 32 weeks. Additionally, materials related to the inservices were left with the site leader to encourage integration and exploration of effective teaching models.

Before the workshop sessions began, the teachers were given a needs assessment to complete. It was the writer's plan to create and distribute this pre-implementation questionnaire in order to assess the teachers' comfort level with technology. This information was important when planning the workshop sessions, because it was intended to reveal attitudes toward technology as well as specific information about skill levels. The writer tabulated and assessed teachers' responses to the surveys and planned appropriate workshops and leave-behind materials. During subsequent weeks she met with volunteer

teachers to arrange technology (computers, overhead projectors, video players, and interactive cable sets) in centers in the classrooms. Initially the consultant modeled lesson plans for the teachers, encouraging experimentation with new ideas based on the lesson presented. It was at the end of the first month that the consultant met with volunteer teachers to plan a series of workshops based on the responses to the survey and the specific requests of the teachers. Along with the computer specialist, and participating teachers, the writer organized the schedule for workshops, consultations, and model lessons. The writer and the computer specialist selected and met separately with volunteer mentors.

As the weeks progressed a variety of methods were suggested and materials were introduced and left for the teachers to explore and incorporate in daily plans. As the teachers became more familiar with the hardware and software (Hurst, 1994) a few began to freely experiment with integration of the technology.

During the second month of practicum the training workshops began. The Language Arts activities were presented to the K-2 teachers by the curriculum specialist and media/technology specialist. This workshop focused on specific strengths of available instructional technology (Strommen & Lincoln, 1992: Hurst: 1994) in each classroom. Three pieces of technology, overhead projectors, video players, and interactive cable TV sets, were demonstrated and each was used as an instructional strategy to teach an objective. By the end of the workshop several participants took part in the discussion of how the technology was used to enhance the Language Arts/ Reading Curriculum. As with each workshop, there was a time to begin constructing lesson plans which could be incorporated during the next week.

The aspects of the program which involved the total integration of programming to the existing curriculum, with neither consultant guidance nor administrative support, seemed to be the most difficult for the greatest number of

teachers. In the beginning, the high degree of help, and new software added to the interest in technology. The teachers were shown the possible uses of new technology (Hancock & Betts, 1994) and were encouraged to integrate it into lessons. Because of the novelty of the materials and the relationship to the specialists activities, there was an initial increase in the actual use of the technology. It became painfully evident within the first weeks of the semester however, that the technology was not being integrated as a tool, but rather used as either a reward or punishment for "real" work. The teachers still considered technology something that a specialist was to "do". In too many classrooms it remained the add on; chalkboard and ditto sheets remained the primary performance task.

It was the writer's observation that the technology centers were being underutilized and technology was sliding back to its "add-on-frill" status. Informal conferences were held with the teachers. In addition, the consultant arranged a

meeting with the principal and media specialist. A request was also made to be part of the next regularly scheduled faculty meeting. Following these steps, and a mini-workshop by the writer and the site leader, the teachers agreed to work according the original plan.

During this time the consultant concentrated on language arts in selected K-2 classrooms with key personnel. Model sample lessons were presented. Teachers were asked to follow-up the workshop with their own lessons (David, 1991: Riedl & Carroll, 1993: Thompson, 1989) utilizing available technology. The last part of the workshop provided time for the teachers to prepare a plan utilizing the available technology in their classrooms and their current curriculum. The consultant also arranged to present a model lesson in two classrooms.

During observation periods in this early stage it was noted that there was a wide gap among teachers regarding the use of computers as a tool for learning. The consultant worked

with teachers (Thompson, 1989) on an individual basis to increase their comfort level with technology. As teachers became more relaxed with the technology in their rooms, they independently explored the possibilities and potential each one offered.

Very early in the project, it was apparent that some teachers were far more comfortable with technology than others. While most were slowly exploring and experimenting, a few teachers began to act as models by incorporating activities suggested by the consultant. These teachers also began to share activities they had developed with other teachers.

During the third month of the practicum, the consultant began to work with selected third and fourth grade teachers using available technology and curriculum materials. The K-2 teachers continued to use materials introduced in the previous weeks. During informal and formal meetings the teachers and consultant developed creative ways to incorporate technology as a teaching strategy. The teachers received handouts relative

to best practice, opportunities to search for information on the internet, and troubleshooting experience with the technology. The consultant also conducted informal interviews with teachers to gauge increased use of instructional technology.

It was also during the third month of the practicum that administrators and students were interviewed to determine how technology had affected their perceptions of classroom activities.

At the mid-point of the program, sessions were held to record teachers' suggestions, comments and recommendations for the rest of the program. Special emphasis was placed on how teacher mentors (Thompson, 1989: Riedl & Carroll, 1993) could be utilized. Lists of activities for alternative assessment and presentation of student work were distributed. Finally, in an attempt to change the way teachers present information, catalogues of the latest multimedia computers, fax-modems, CD-ROMs, laser disc players, laser printers, and large monitors were circulated among the staff.

Beginning in month five, the consultant and curriculum specialist began to plan and observe lessons by volunteer-mentors. The teachers and mentors were encouraged to incorporate at least 3 lessons per week using high-tech materials for motivation, inclusion, and homework assignments. The specific training with interactive media as a teaching tool, related to new language arts materials and materials made available for the children to use at home. The teachers continued to engage in activities introduced in preceding weeks. They received consultation services, print materials, book lists, correlations, and scope and sequence materials related to curriculum and technology.

In the remaining months of the practicum, regular classroom teachers provided students with opportunities to use technology to gain knowledge. The consultant worked with the teachers to select a variety of technologies to integrate (Hochman, Maurer & Roebuck, 1993) with the regular elementary curriculum. Students were encouraged to suggest

creative ways to use technology to demonstrate their proficiency not only in language arts, but in mathematics as well.

The final month of implementation followed the proposed plan. Teachers' lesson plans were evaluated to establish their feeling of ease with technology as measured by an increased use in presentations, and by their willingness to mentor other teachers about creative technology in their lessons. Many interesting uses of technology were identified reflecting the teachers personal teaching style. Technology was used other than as a means of drill and practice, or reward and punishment. The selection of materials to encourage application of skills was increased. The lecture presentation was replaced by interactive material. Software was left within reach of the children and they were able to select among them during the day. The software and hardware catalogues were in evidence at budget time.

The mentoring component (Guthrie & Richardson, 1995) of the implementation built on skills from session one and included handouts and specific suggestions to encourage participation in the project. In the workshop sessions, teachers had an opportunity for hands-on experience with technology, and district curricula. They were able to expand upon commercially available materials already in their classrooms as well as concepts developed by their peers.

Based on observations, informal interviews and journal notes, the initial reluctance to go forward with full inclusion of technology seemed to diminish by the end of the implementation period. An examination of planbooks showed the inclusion of suggestions made by the consultant. The observation and interviews indicated that they were utilizing new materials, creating new approaches to both presentation and assessment, and using the strategies during the times when the consultant was not at the school.

Chapter V

RESULTS, DISCUSSIONS, AND RECOMMENDATIONS

Results

There is a forced separation between technology and specific content areas in elementary classrooms. Because there seemed to be less confidence among teachers in the area of instructional technology as compared to other presentation styles, strategies were selected to encourage the integration of technology into the regular instructional program. Activities selected from the model proposed by Strommen and Lincoln (1992), Sheingold (1991), and Ingram (1994) were designed to give teachers successful experiences with technology.

As stated in Chapter Three, there were seven anticipated outcomes of the implementation. The first outcome was that 18 out of 27 teachers in the selected group would integrate

technology as part of their regular lesson plans for their classroom curriculum. During the implementation, the author observed at the school an average of 12 hours per month. Every attempt was made to be in classrooms during the main language arts instructional time. The observations were also timed to coincide with a time when teachers would be engaged in instruction, as opposed to testing, or conferencing. For outcome one, an Application Chart was kept and the results were tabulated at the end of implementation. Notes were also kept in the Visitation Log.

A comparison of the observation periods prior to implementation to those during the implementation indicated that the number of teachers in the target population who included technology as part of their lesson plan generally increased as the project continued. There was an anomaly during the second month when teachers were reluctant to make use of the available technology which had been placed in their classrooms. Figure 1 demonstrates an overall increase in

the number of teachers incorporating technology during the implementation time. In the original observation periods instructional technology was used only sporadically by most teachers. That number increased to a mode of 16.75 by the end of implementation. This outcome was achieved in that by the end of the project period beginning on October 31, 1995, and ending on June 30, 1996, more than 21 teachers were using technology as part of their regular weekly lesson plans. This represented a dramatic increase in the number of teachers regularly using instructional technology.

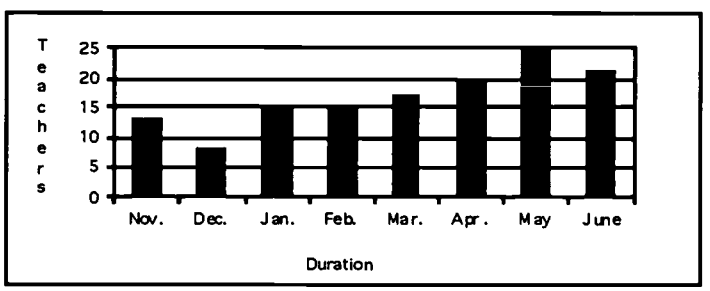

Figure 1
Frequency of Use

The second outcome was that these teachers would demonstrate an improvement in their understanding of and

confidence in working with interactive technology as measured by at least a 25% increase in the times technology was planned as an active part of a lesson.

At the end of each unit of study, the teachers were asked questions from the Face-to-Face Teacher Interview Form. Their responses, along with anecdotal information from observations were compiled and a comparison made between the results from the interviews, observations, and lesson plans.

According to the results of the teacher survey distributed at the beginning of the practicum, only 20 teachers felt comfortable using educational hardware and software as a means to reach district academic goals. By the end of implementation 25 teachers reported that they were comfortable using interactive technology as a teaching tool. They demonstrated this confidence by indicating the use of the technology in their plans and discussing the children's use of it during class time. This outcome was met.

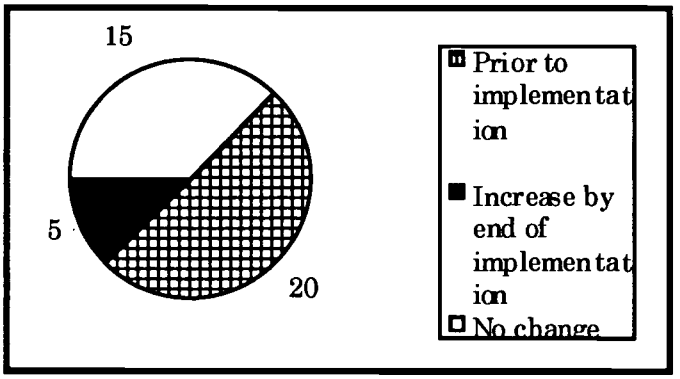

Figure 2
 # Of Teachers Using Integrated Technology

Outcome three was that teachers would self-report a 25% increase in the use of technology to focus on the individual needs of students by using media presentations for whole group instruction, enrichment projects, or remedial activities adjusted to individual needs. It was measured by analyzing the self reported use of technology. Twenty teachers who seemed comfortable using technology to achieve district goals also felt comfortable using technology to individualize instruction. They seemed to be consistent in their responses that the interactive technology motivated the students assigned to it. Those who used the technology regularly reported that it allowed them to customize some aspects of their small group

and individual instruction design. By the end of implementation five additional teachers reported using interactive technology as part of the lesson to individualize instruction over the eight month period. Overall the increase of 25% was met.

The increase was not across the board, however. At the end of implementation many of the other teachers who reported that use technology as a reward, still reported they preferrred to use it that way. Observations indicate that a few of these teachers had attempted to incorporate using it as a strategy. Others reported they had difficulty matching the programming objectives with district objectives. Those teachers who reported the least use of technology were those whose planbooks indicated little center work or small group instruction. The majority of the staff reported they used the programming to provide basic skill instruction and reinforcement for the students, but not as a regular instructional strategy. The staff also reported that they were

comfortable allowing students to work in these centers, thus allowing the teacher to respond to the needs of individual students. An additional 10 teachers also reported they would be willing to practice with the technology over summer vacation, and begin again in September.

Thirty five teachers who at the beginning of the project were not comfortable integrating technology into their programs reported that technology made their jobs more difficult. They commented that the time spent preparing to use the technology was inversely proportional to the desired learning result. From this group only five teachers reported a higher comfort level with technology by the end of the implementation.

The self-reported activities for individualization ranged from allowing children to use the technology at the end of another activity, to peer tutoring and student-led cooperative activities designed by the teacher. In their reporting, the

teachers also noted that it was easier to use technology when an instructional aide was in the room.

Outcome four was that 3 out of 18 teachers would design their own technology-driven presentations based on using available hardware and software. The outcome was measured by viewing the number of presentations. This outcome was met. Three second grade teachers worked independently and collaboratively to design a language arts/ natural science unit based on their study of the rain forest. The language arts unit involved the use of the interactive software and a set top converter. The follow-up lessons, reinforcing materials, and performance practice tasks were generally covered and presented on the overhead projector rather than the blackboard. The children were shown materials taped from cable and PBS programs. Finally this entire unit was integrated to both math and social studies by planning charts and graphs of information gathered throughout the unit.

This outcome exceeded expectations because a fourth second grade teacher prepared math lessons teaching symmetry and patterns through technology. The lesson integrated math, art, and language arts. By using trade books about shapes and patterns, specific software on symmetry and patterns, and the math text book, the teacher was able to effectively demonstrate the interrelatedness of subject matter. She reported that the children responded well to the unit and that she was preparing to present the lessons at a professional workshop.

Outcome five was that the K-5 teachers would rate the various available instructional technologies in the school and their level of success in using them. An anticipated 25% increase was hoped for between the beginning and the end of implementation. An analysis of the Teacher Survey (Appendix A) at the beginning of the implementation revealed that only 15 teachers felt successful using technology regularly to enhance their regular curriculum requirements.

This outcome was achieved. By the end of the practicum, the number of teachers who reported they felt comfortable using technology regularly rose to 21. These teachers were reporting the use of overhead projectors, TV/VCR's, and computers as part of the technology used. According to the results of the survey 20 teachers regularly used a computer in class at the end of the program. Twenty used TV/VCR's and one reported the regular use of a videodisk. The teachers who used technology also reported that they felt it was easy to coordinate the educational technology programming with classroom lessons. In the main these were also the teachers who attended all four workshops and worked with the consultant and each other to integrate technology into the daily classroom routine.

Outcome six was that three members of the faculty would demonstrate their confidence and proficiency by acting as mentors for their colleagues and new teachers, as needed. This outcome was not met. By the end of implementation only

two teachers offered to mentor new and returning teachers during the next school year. The teachers reported other personal and professional commitments which would hinder their effectiveness. The two teachers who offered to mentor the others were two who had also enrolled in an instructional technology course at a local college. The consultant worked with them to design a needs assessment tool and a template for workshops and presentations.

Outcome seven was that three teachers would submit requests for additional multimedia computers as part of their annual budget. The outcome was measured from information gathered from notes in the visitation journal and discussions with teachers. Additionally, the consultant examined the purchase orders submitted at budget time.

This outcome was not met. Teachers were told prior to submitting annual budgets that the cost of multimedia computers would not be approved. They were informed by the administration, however, that they could pool resources for

technology or submit special orders to the Board of Education. No teachers requested these computers.

Discussion

By examining the Application Chart (see Appendix B) during the implementation period the writer found that by the end 18 of the 27 regular classroom teachers attempted to integrate technology as a teaching tool in their prescribed curriculum. These teachers were consistent in their attendance at workshops and meetings. The attendance records (Appendix E) indicated their excellent participation. They were consistence in the way they carried the presentation material back to their classes. The visitation log also confirms meetings and discusses with these teachers.

A summary of the results of this practicum indicated that outcomes 1 through 5 were met by the end of the implementation. By developing a positive attitude toward the technology and instructing teachers in its potential, the writer

was able to increase the interest in and time reserved for this new presentation strategy.

The technologies most often used were interactive television hardware and software, overhead projectors, and computer programs which addressed specific skill reinforcement. Teachers in the upper elementary grades reported that their students enjoyed writing and editing stories on the word processors. The students in the primary grades also enjoyed playing "learning games" on the computers. Specific math drill and practice software was still a favorite at the end of implementation, but a commonly used language arts drill and practice electronic worksheet was not used at all by many teachers.

The hardware and software in the project represented both leading edge and conventional products. Initially when teachers discussed available media, they relied on the consultant's suggestions. By the end of implementation, they were discussing choices with the teacher-mentor and each

other to determine software which best supported their curriculum, as well as each one's personal teaching style.

The author also noted that besides accomplishing most of the expected outcomes, the teachers began to think in terms of available technologies. They questioned the advisability of incorporating various products in future plans. They identified tools which could aid in recordkeeping and progress tracking. They shared ideas about specific software tools which motivated students. They expressed excitement about their students achievement. The teachers and the consultant agreed that there was an increase in students willingness to work cooperatively, to develop social skills, linguistic skills and creative expression. An increase in self-esteem was also observed in some children who had previously been unwilling to express their ideas in more traditional off-line ways.

The net result of having only two teachers mentor new staff members will still result in a continuation of a peer

tutoring model, and teacher awareness of the potential of technology as a teaching tool.

At the beginning of implementation, the teachers agreed to work with the consultant and the specialist. It was noted after the first observation that one classroom which had been arranged with the teacher's assistance, and equipped to gain the children's interest, had been rearranged to a more conventional design. The equipment was covered or unplugged until center time or free choice time, or a time after all "real" work was completed. The children were allowed to use the materials only when the consultant was present, or during special teacher-directed time. Journal notes also reveal that on subsequent visits to other classrooms, the children had not been allowed to use the technology since the original installation.

Following a conference with the principal, consultant, media specialist, teachers and paraprofessionals, where the original model was again presented, all agreed go forward with

the original design. The children would be instructed in whole and small groups, using district objectives, while follow-up, reinforcement, and enrichment activities would be completed on the interactive technology available both at home and in school. By Winter Recess usage had increased. The teachers reported to be more comfortable with the new machines in the room.

It is the writer's conclusion that staff development and continued support by the consultant will resolve the forced separation between technology and other subject matter in the elementary classrooms in this school. The writer is pleased with the results, because the staff itself has begun to take ownership of the model and is planning to continue to use the materials next year.

Recommendations

The writer recommends three innovations based on her observations at the school and research compiled for this practicum. It is first recommended that a specific block of time

be allocated to staff development in instructional technology before the beginning of the school year, thus allowing teachers to practice during vacation. There should also be dedicated training days during the school year devoted exclusively to the discussion of integration technology and student learning.

At the beginning of each teaching term, the relationship among all implementation strategies needs to be carefully planned by the teacher and specialists. At the school a specific time for teachers to share information about new activities, software, hardware, and skills which are developmentally appropriate needs to be allocated. Only those strategies which are known to be successful should be reinforced.

The second component of the practicum was to build an awareness on the part of teachers of the importance of using technology as an instructional strategy. Technology should not be an add-on, nor should it be only a course of study for gifted students. The motivational aspect of technology is unchallenged, yet teachers avoid incorporating it. The

interaction between student and curriculum is crucial. The teachers in this project are still reticent to follow through on some of the strategies and exploration activities which were part of this practicum. A second recommendation would be that a longer period of inservice training with administration commitment to release time be allocated. Staffs require hands-on practice with specific software to generate a sense of mastery of the process and the importance of inclusion of instructional technology as a means of improving student performance.

Through conversation and an atmosphere of support, teachers can feel safe to take professional risks to improve the education of their students. These teachers will be able to create new units incorporating multimedia presentation. They would encourage students to seek new sources of information, both on-line and off-line. Performance tasks in curriculum could be redefined to meet national standards emphasizing the incorporation of technology.

The final recommendation is that a system be initiated which gives teachers information about instructional technologies. Along with that must be communication among them about the newest technologies available for classroom use. The district technology specialist would keep classroom teachers apprised of current trends in technology. The specialist, and the consultant will work together to dispense information to the staff about new instructional strategies involving technology. Mini-lessons will be included in faculty meetings, printed on the school web site, and circulated though inter-office communications. Publications need to be available in the professional section of the school library. The consultant must continue to provide up-to-date information to teachers on a regular basis. Training sessions for the upcoming school year should be planned before teachers leave for vacation ,and should be constructed around the expressed needs of the faculty.

Dissemination

The solution strategy was shared with all the teachers at the school. Each teacher was given a copy of the technology plan and the calendar plan the consultant and the specialist had devised. The teachers seemed pleased to have these ideas to enhance their teaching repertoires. At the end of the project, the consultant, principal, and the teacher-mentors met with the staff and share the information gathered during the project.

A file of materials for use by teachers was left at the school. The specialist's lesson plans for appropriate modeling were included in the file. Teachers will be able use the file and lesson plans as a basis for their own lessons in the future.

The research, results and applications of the practicum will be incorporated into all presentations and demonstrations given by this consultant and other consultants in her corporation. Because this program incorporates solid teaching techniques, the consultants will be made aware of, and utilize

its contents. These are professional educators who have the potential to change attitudes toward integration of instructional technology.

The writer will present the findings of this practicum to other schools within the district, to encourage them to move forward in bringing technology to the classroom.

Proposals based on this project will be submitted to an on-line teacher training program. If accepted, the "Technology Summer" for teachers will allow the writer to take part in an on-line forum discussing ways to encourage teachers to bring technology into their classrooms.

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APPENDIX A

TEACHER SURVEY

APPENDIX A

TEACHER SURVEY

This evaluation is being used to determine your comfort level with instructional technology. I am interested in your true feelings about the effect of new instructional technology on your teaching styles. Please take a few minutes to complete this questionnaire since doing so will help me to develop successful workshops which specifically meet the needs of this faculty. Please be as honest and accurate as possible.

Thank you for your assistance.

Circle the number that represents your level of agreement.

1= Strongly Disagree 2= Disagree 3= Neutral

4= Agree 5= Strongly Agree

1. Overall, technology is an effective instructional tool.	1	2	3	4	5
2. I would like to see new instructional technology used	1	2	3	4	5
3. Instructional technology is an important part of my program.	1	2	3	4	5
4. I would like my students to spend more time using instructional technology to enhance their learning.	1	2	3	4	5

Circle the number that represents your level of agreement.

1= Strongly Disagree 2= Disagree 3= Neutral

4= Agree 5= Strongly Agree

5. The skills that my students develop from instructional instructional technology help them with their classwork.	1	2	3	4	5
6. The training I receive on the computers and other technology enable me to make effective use of the curriculum.	1	2	3	4	5
7. I consider the software that accompanies most programs to be high quality.	1	2	3	4	5
8. Instructional technology has been effective in helping me meet the Language Arts objectives I set for my students.	1	2	3	4	5
9. Instructional technology has been effective in helping me meet the Mathematics objectives I set for my students.	1	2	3	4	5
10. It is easy to coordinate the educational technology curriculum based programming with classroom lessons.	1	2	3	4	5
11. My students usually choose which technology activity they use.	1	2	3	4	5
12. The principal is actively involved in instructional technology based programming decisions.	1	2	3	4	5
13. I have enough time to preview high tech curriculum based programming materials.	1	2	3	4	5
14. I have enough time to prepare assignments related to instructional technology curriculum based programming.	1	2	3	4	5
15. I have had sufficient training and practice with specific hardware and courseware purchased by the district.	1	2	3	4	5
16. I have received sufficient training in designing and incorporating technology into the required curriculum.	1	2	3	4	5
17. By incorporating technological curriculum based programming I have more time to attend to the individual needs of my students.	1	2	3	4	5
18. Using the technology programming has caused me to					

modify my classroom instruction. 1 2 3 4 5

19 My students enjoy using technology curriculum based programming. 1 2 3 4 5

20. I am comfortable using technology to enhance my regular curriculum requirements. 1 2 3 4 5

Circle the best answer.

21. I use a computer at home.

Never Sometimes Always

22. I use a computer in my classroom.

Never Sometimes Always

23. I use a television in my classroom.

Never Sometimes Always

24. I use a CD-ROM in my classroom.

Never Sometimes Always

25. I use a videodisk in my classroom.

Never Sometimes Always

26. I uses video games in my classroom.

Never Sometimes Always

27. I have the opportunity to use Local Area Networked computers rather than stand alone electronic practice pages.

Never Sometimes Always

28. I give assignments that require students to use the television.

Weekly Monthly Occasionally

APPENDIX B

APPLICATION RECORD

APPENDIX B

APPLICATION RECORD

Name	Television or VCR	Audio Tapes	Interactive Television	Computers	Other

APPENDIX C

FACE-TO-FACE TEACHER INTERVIEW FORM

APPENDIX C

FACE-TO-FACE TEACHER INTERVIEW FORM

Grade Taught _____

No. in Class _____

1. Has the use of instructional technology curriculum based programming made a difference in how you spend time teaching concepts and problem solving as well as in providing basic skills in your classroom? Please explain.
2. What do you like most about using high tech instructional materials in your class?
3. What do you like least about using high tech instructional materials in your class?
4. Discuss how technology in the classroom helped you with whole class instruction, small group instruction, individualized instruction, and other instructional strategies used.
5. What do you think about the match between current means of assessment and the use of instructional technology?
6. Discuss how you feel about the match between current means of assessment and the use of authentic assessment with regards to instructional technology?
7. Would you be willing to help other teachers adapt instruction technology to enhance their teaching strategies?
8. Identify the technologies and programming with which you were most comfortable.

9. Discuss the specific ways in which you think technology has improved the way to teach Language Arts and Mathematics

10. Discuss any specific ways you think technology has hinder the way Language Arts and Mathematics are taught.

11. Identify specific ways you give assignments requiring the use of technology.

12. Would you like to use the Internet along with your students? Explain why and how you would use it. What kink of training would you and your class require?

14. Are you interested in learning more efficient and effective means of incorporating hardware and courseware into daily lessons?

14. Besides using courseware as electronic worksheets, how else do you utilize instructional technology?

15. How do you utilize the computer lab in the school? Can you identify ways that you can use it strengthen instructional strategies?

13. Are there other areas which you want to comment?

APPENDIX D

AGENDAS FOR WORKSHOPS 1 THROUGH 4

APPENDIX D

WORKSHOP #!

Use of Specific Hardware
and
Integration of Courseware

Agenda

Goal

To develop an understanding of the variety of ways instruction technology can be integrated with required * K-2 language Arts curriculum.

Objectives

By the end of the workshop each participant will identify specific instructional hardware and its specific strengths and weaknesses.
By the end of the workshop each participant will identify the related courseware to each machine.
By the end of the workshop each participant will be able to run one type of courseware on a specific hardware piece.
By the end of the workshop each participant will have taken part in the discussion of how these machines are related to the Language Arts Curriculum.

1. Introduction to available instructional technology in the school.

2. Demonstration and practice booting up specific courseware.
3 Practice running one piece of courseware on one specific machine.
4. Model Language Arts lesson will be presented using available technology of videodisk, interactive television, computers, and audiotapes as well as required curriculum materials.
5. Discussion of additional methods utilizing integration of technology and standard curriculum materials. An Action Plan will be designed by each participant for use before the next workshop.

* This workshop is planned for teachers of grades 3-4, and 5 on future dates to be determined by the Site Based Management and the administration.

Appendix D

Workshop #2

Planning and Preparing for
21st. Century Schools

Agenda

Goal

To develop an awareness of the importance of planning and preparing lessons where technology and currently used curriculum materials are integrated.

Objectives

By the end of the workshop each participant in grades K-5 will have prepared a sample lesson using technology demonstrated in the past workshops and integrating new materials in their lessons. The presenter will encourage using notes from earlier sessions. Participants will be encouraged to work collaborative to design lessons which many be shared.

1. Present a review of model lessons and discuss any attempts at integration or creative ways participants have used technology over the past several weeks.
2. Arrange teachers in groups around the technology they want to

plan for. Teachers will begin to write their plans.

3. Participants will present those parts of the lessons which specifically require the operation and inclusion of educational technology.
4. Following presentation the participants will regroup for a brief analysis of the lessons.

APPENDIX D

WORKSHOP #3

WHERE DO I GET THIS GREAT TECHNOLOGY?

AGENDA

Goal

To develop an awareness of the newest advances in technology and how they work to engage and motivate students.

Objectives

By the end of the workshop the participants will have previews and documented at least four pieces of new courseware.

1. Provide catalogues of latest multimedia computers, fax-modems, CD-ROMs, laser disc players, laser printers and large monitors.
2. Preview software and CD's which compliment the materials currently required by the District.
3. Participants will practice operating the sample technology.
4. Participants will design lessons plans utilizing the demonstrated technologies and share their plans with their colleagues. Time will be spent in small groups critiquing the plans.

APPENDIX D

WORKSHOP #4

DID I REALLY LEARN SOMETHING NEW?

Agenda

Goal

To review all information and techniques demonstrated in Workshops 1-3. To allow participants the opportunity to practice on advanced applications of hardware and software. To allow time to formulate a schedule for mentoring.

Objectives

By the end of the workshop the participants will have practiced on new hardware and software and concentrated on their place in the instructional process.

1. Discuss research and journal articles which advocate and suggest new models for application and integration of technology.
2. To have time to schedule training for mentor volunteers and the "students".
3. Participants will practice operating advanced technology.
4. Participants will design lessons to use when they work with interested colleagues. Time will be spent in small groups

discussing how more teachers can be encouraged to work with fellow teachers to restructure teaching to include technology. This also means changing the teacher's role from information giver to guide and facilitator.

1. Present a review of model lessons and discuss any successful mentoring methods based on the latest research. Local union regulations or Site Based Management will also be discussed.
2. Arrange teachers in groups around sample technology they want to review or plan lessons around.
3. Teachers will work in groups to develop a sample lesson for mentoring.
4. Participants will present those parts of the lessons which are specifically aimed at the group of new teachers scheduled for technology workshops.
5. Following presentation the participants will regroup for a brief analysis of the lessons.

APPENDIX E

WORKSHOP ATTENDANCE RECORD

APPENDIX E

WORKSHOP ATTENDANCE RECORD				
NAME	Work-shop 1	Work-shop 2	Work-shop 3	Work-shop 4

APPENDIX F

TROUBLESHOOTING MANUAL

APPENDIX F

TROUBLESHOOTING MANUAL

SET-TOP OPERATION - CLASSROOM

1. Turn on TV.
2. Turn on CD-ROM driver.
3. Turn on set-top box.

TO CHANGE CDs:

1. Press button on front of CD-ROM driver until drawer slides out. (If unit has been in operation, it may be necessary to turn off driver first, then turn it back on.)

2. Insert CD (pictures up), gently slide drawer back in place, and either re-boot set-top or turn it on at this time.

NAVIGATION IN PROGRAMMING:

- Shakabra - active click in Language Arts (MARS)
- Infinity - active click in Mathematics (Googol)
- MARS-ma-tron - will return to service menu
- Arrows - left arrow takes back 1 screen or to previous menu; right arrow moves forward.

TROUBLESHOOTING:

*Work together! Other teachers and students will help!
1. Turn off all equipment and start again.
2. Check cables and connections for loose or disconnected cables.
3. Make sure TV channel is on 03.

4. Try INPUT button on TV monitor.
5. Watch "ON" lights for indication of problem. Is it likely the CD driver or the set-top?
6. Switch one piece of equipment at a time with another that is working properly. Does the problem remain at the same station, or does it move to the new station?
7. Call Sandra. State the problem and all the steps you took to resolve it.

1-800-987-7726 X 1067

APPENDIX G

1995-1996 TRAINING PLAN

APPENDIX G

1995-1996 TRAINING PLAN

I. Peer Trainer Model

A. One or two key people at each site: technology or media specialist, assistant principal, lead teacher, etc.

1. Responsible for general knowledge of all programming and hardware issues

2. Work with entire staff to continue infusion of instructional technology into site curriculum

3. Train new teachers at site

B. One teacher representative from each grade

1. Responsible for providing programming information appropriate for grade level to all other grade level teachers

2. Responsible for tracking hardware and CDs provided to classrooms

3. Provide training for teachers unable to attend sessions or those who are new to the school

II. Length of Training Sessions

A. Curriculum - 1 1/2 days (1/2 day session = 2 1/2 hours)

1. 1/2 day for the Language Arts and a similar one for

Math at each developmental age level, appropriate applications, and classroom technology use issues

2. Key people for site should attend all sessions; teacher representatives might attend only the appropriate grade level.

Tech

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