2001

Increasing computer instruction within the classroom

Rebecca Lerane Hollis

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INCREASING COMPUTER INSTRUCTION
WITHIN THE CLASSROOM

A Project
Presented to the
Faculty of
California State University,
San Bernardino

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Education:
Instructional Technology

by
Rebecca Lerane Hollis
June 2001
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ABSTRACT

The original purpose of this study was to examine teacher attitudes towards inclusion of technology into instruction. Teacher attitudes were examined via a survey and teacher needs were considered. The goal was to understand why technology is not being utilized to its fullest despite its availability in the classroom. However, because of survey findings and information found through research, I identified software needs and developed graphic organizers as a result. My objective was to create some high level thinking, easy to use computerized graphic organizers which utilized the multimedia program Hyperstudio and the word processing program AppleWorks. These graphic organizers were fieldtested and a formative survey was administered to a group of elementary teachers. The graphic organizers appeared to be well received by the educators as a potentially useful tool that matches state standards which could be used to improve student literacy in the classroom.
ACKNOWLEDGMENTS

I wish to thank my husband Dennis, my children David, Daniel and Bethany, and my parents for their love, support and patience through the completion of this project. Their encouragement has been invaluable. I would also like to thank Dr. James Monaghan and Dr. Rowena Santiago for their expert help and guidance in completing this project.
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CHAPTER ONE
INTRODUCTION

The twenty-first century demands citizens who are both capable readers and technologically literate. The CEO Forum reports "More than ever before, employers in all industries are demanding that their employees have basic technology skills and skills enabled by the use of technology" (1999, p.7). It is essential that today's educator maximize the potential of technology to improve instruction of basic skills within the classroom. Researcher Silvin-Kachala found that students in technology-rich environments experience positive effects on achievement in all major areas, showed increased achievement in preschool through higher education, improved attitudes toward learning, and improved self-concepts when computers were used for instruction (as cited in Schacter, 99). Teachers must optimize their use of this powerful tool within the classroom.

In addition to the inclusion of technology within curriculum, the teaching of basic skills, especially those related to reading, are a major issue for today's schools. Standards and state testing drive the curriculum. Teachers are constantly searching for ways to improve reading comprehension. Students need to learn to think as they read for maximum understanding. Pearson and Johnson state that "comprehension can be viewed as an active process in which readers interpret the text in accordance with what they already know and build bridges between prior knowledge and new information" (as cited in Kirylo and Millet, 2000, p. 180). A useful tool in promoting improved reading
comprehension is a graphic organizer. Kirylo and Millet note that the outcome of the utilization of graphic organizers is the engagement of student interaction where learning becomes meaningful (2000). Several studies have found that students recall more ideas or perform better on factual tests if presented a graphic organizer than if they read only the test (Robinson, 1998). Graphic organizers are a powerful way to increase reading comprehension.

Statement of the Problem

Schools are spending increasing amounts of money on computers and technology. The ratio of the number of computers to students continues to drop “but all too often, principals soon discover new computers collecting dust in many classrooms” (Benson, 1997, p. 17). The technology used in schools is limited, uneven, and nowhere near meeting the promise offered by technology (Fulton, 1997). It has been my observation that many teachers are not fully utilizing computers in their instructional practices. In countless classrooms, computers are being used only for computer aided instruction such as drill of basic facts. Teachers continue to teach as they were taught, and as a result technology “remains conceptualized as an add-on luxury rather than integral to achieving educational outcomes” (Hope, 1997, p. 2). It is my experience that high-level thinking, meaningful projects are not implemented often enough despite the availability of equipment. According to Yelland “in many cases computers are being used to perpetuate the mundane, rather than act as a catalyst for innovation in pedagogy and learning” (1999, p. 39). This can prevent students from being
able to use the computer as a tool for connecting meaningful learning with prior knowledge. Some teachers do not even use computers at all as part of their instruction.

As an educator, I have questioned the cause of this under-use of such an educationally valuable resource such as computers? Is the computer just something else that the teacher must find time for in an already too crowded academic day? Many teachers do not see the computer as an essential part of their academic program. As Hope (1997) points out, teachers may reason "why trade time-tested and proven methods for alternatives that have not proven to be superior to what teachers presently do to accomplish tasks and meet student objectives?" (p. 3). I wanted to know whether a teacher’s technological attitudes affect the integration of technology into the curriculum? What will it take to change the attitude of a teacher positively towards computers so that they become more of an essential part of instruction? Also, after analyzing the results of a survey examining teacher attitudes towards technology, I questioned whether graphic organizer reading software that is easy to use, addresses the standards, utilizes high level thinking skills, and appeals to students could motivate a teacher to enhance the use of the computer within their reading instruction.

Need for the Project

Research indicates that many teachers do not have a good attitude towards incorporating technology into their instruction. Lichtman found that educators exhibited less favorable attitudes towards computers than did the general public (Dupagne & Krendl, 1992). There are a variety of issues
that affect teachers' opinions concerning using technology in the classroom. Researchers Laffey and Musser (1998) found that in addition to anxiety, comfort with traditional approaches, perceived relevance or usefulness, expectation or likelihood for usage, and interference with the teacher-student relationship are cited as reasons that more technology is not incorporated into classroom and instruction. Other reasons contributing towards instructors' negative technology attitudes include lack of training, lack of time, shortages of equipment, and not enough relevant software. In responding to this problem, I wanted to question teachers who work locally in the Inland Empire of Southern California to see if they too shared some of the views of their counterparts from other parts of the country. Do they find that the same issues hamper their inclusion of technology into the curriculum, or are they dealing with other situations? I found it necessary to address the causes of a problem before I could possibly propose any solution.

In addition to examining educator attitudes through a survey, I wanted to address one of the possible issues that contribute to a teacher’s reluctance to use the computer. Teachers are overwhelmed with the necessity of instructing students, delivering the curriculum, meeting state standards, and preparing children to pass state standardized tests. In research, teachers have expressed feeling burdened with their current teaching and planning responsibilities and allude to the numerous demands of their work day, including their participation in "competing" school improvement plans. Even though teachers often realize the value of technology, they
felt that they did not have enough time to learn, keep up with, and plan the use of new software and new applications (Strudler, 1996). I also observed that there is an abundance of easy-to-use drill software which incorporates low-level thinking activities that serve as remediation of basic skills for students. However, because much of this software does not directly address the curriculum, it can be assumed that teachers may use it and technology as just another extra classroom activity. It takes time and effort to seek out software that meets specific curricular needs. This is extra time that the majority of today's teachers just do not have. "It's very hard to find exactly the right piece of software that will work reliably, not lose students' interest, and...meet the requirements of the curriculum," says Larry Cuban, an education professor at Stanford University (as cited in Fatemi, 1999, p. 2). The results of my survey raised some further questions. What if some software were developed so that it addressed the major curricular and standards issue of reading comprehension, was easy to use, enjoyable for students because it incorporated multimedia, and it addressed high-level thinking activities? Would this software be more likely to be used in the classroom? Would teachers find it easier to use? Could this software prompt a teacher to consider using more technology and improve educator attitudes?

Project Overview

The purpose of this project was to better understand teacher attitudes towards technology. I began by surveying a
group of local elementary teachers as to their attitudes towards the integration of technology within their classrooms. Teachers were asked about their personal feelings towards computers, their computer competency, their inclusion of technology into the curriculum, and generally how they view themselves as technology teachers. In addition, I looked at their access to hardware and software that they use within their classrooms, and their views concerning it. I also asked educators about their use and attitudes towards computer activities that incorporate high-level thinking activities.

The intention of this survey was to get an accurate understanding of the factors that influenced how a group of teachers use technology.

The second part of this project was a response to the survey results. I came up with the idea of developing and fieldtesting some reading graphic organizers that incorporate multimedia and higher-level thinking activities after considering teacher need. My goal was to design some software utilizing Hyperstudio and the word processing software AppleWorks that could motivate students while at the same time providing thought-provoking reading comprehension activities. I designed the activities to be easy-to-use and to appeal to students of all academic abilities within the classroom. These graphic organizer activities were intended to utilize several student learning modalities while at the same time moving students beyond the simple drill and practice or recall that composes the contents of much of today’s software. My intention was that once students and teachers experience using this type of multimedia composing
software that they will want to try it with other components of the curriculum. I had several teachers fieldtest the graphic organizers in order to evaluate the software, ascertain whether the activities really could work for them, and if they would be likely to use it regularly as part of their classroom reading activities in the future. My goal through the entire project was to move a group of teachers one step closer to greater integration of technology within their classrooms.
CHAPTER TWO
THE SURVEY

Survey Methodology

Twenty elementary teachers from kindergarten through fifth grade from an elementary school in the Inland Empire of Southern California served as subjects in this survey. The surveys were completed anonymously. The survey school is located in a working class community. The school does not receive Title I federal funding. The subjects of the survey were a broad cross section of the elementary school environment. They included first year teachers, bilingual teachers, and experienced teachers, including those with graduate degrees. Special education teachers were also included in the survey. In addition, the teachers involved in the survey consisted of a mix of genders and ethnicities. These teachers had received their teacher education both in the State of California and in other states.

Instrumentation

In order to better understand the attitudes of teachers towards computers and instruction, Lilia Fuentes, a teacher and a graduate student in educational technology, and I developed a twenty question survey (Appendix A). The survey consisted of thirteen questions that directly examined the teachers’ attitudes towards their ideas of the place of computers in the classroom and in instruction, and seven questions which addressed their access to computers. Based on research and experience, we included the component that looked at access because we believed that one’s access to
computers would have a definite impact on attitude. A teacher with severely inadequate access to computers for his or her students would be much more likely to have a negative attitude towards incorporating computers into instruction. The survey also attempted to address the comfort-zone of each teacher towards his or her own computer proficiency. Each question required an answer. Responses were solicited on a four-point Likert scale, ranging through Strongly Agree, Agree, Disagree, and Strongly Disagree. The survey was kept brief in order to encourage teachers to participate in it. The surveys were distributed during a staff meeting. Teachers were allowed approximately an hour to complete the surveys and return them.

Survey Results

When examining the survey, I found several issues with which the teachers strongly agreed. The majority of teachers (47%) felt that the computers are valuable research and presentation tools. It can be assumed that not only do they think computers are important to the educator, but that they feel they are a significant tool for students too. Teachers also strongly agreed (65%) that teachers must have basic computer proficiency skills. Apparently they realize the advantages of technology knowledge. In addition, teachers strongly agreed (75%) that it would be useful to have access to preconstructed computer activities that support high-level thinking. These teachers seemed to recognize the learning value of students engaging in activities that are more than just drill. The teachers also agreed that they would like
high-level thinking computer activities for both language arts (65%) and for math (65%).

I also found that the majority of teachers (65%) agreed that computers enhance the learning experience. None of the educators felt negatively towards computers ability to enrich learning. Interestingly, I found that a majority of teachers agreed that drill and high-level thinking activities were equally important in computer instruction. Perhaps the teachers answered this question in this way because they have more experience with drill software than with software involving high-level thinking activities. Apparently, they do not realize that students with more access to simulations and high level thinking activities show positive gains in achievement on researcher constructed tests, standardized tests, and national tests (Schacter, 1999). Teachers agreed (58%) that the computer activities that they used in their classrooms were easy to implement. I found through informal conversations that these teachers were using primarily drill software. This software is popular with teachers because it generally is very easy to use. To run it, teachers need only insert the disk and instruct students to follow the prompts. Teachers agreed (55%) that computers helped to enhance their instruction, and that it is the teacher’s responsibility (59%) to teach students about basic beginning computer literacy. Teachers also recognized (53%) the time-consuming nature of constructing computer support activities. Finally, I noted that even though the teachers had a limited amount of computers, the majority agreed that they had a plan for
providing their students with adequate access to the machines.

Perhaps the most interesting finding in this survey was the response to the question about computers being an important part of the academic program in these teacher's classrooms. The response was split between agree (35%) and disagree (35%). I believe that this response can be explained by realizing that even though the majority of teachers find that computers are important, a significant portion of the teachers do not find them to be a substantial factor in their own instruction. Teachers also disagreed about whether it was easy to implement computers into their teaching practices. Apparently, many of these teachers (55%) were having trouble with technology inclusion. Also, many of these teachers were uncomfortable (56%) with providing instruction to their students using multimedia programs.

I only found one issue with which teachers strongly disagreed. The majority of teachers (53%) did not feel that they had an adequate number of computers in their classrooms. Most of these teachers had only one or two computers that were new enough and powerful enough to run multimedia programs. The rest of their computers were old Apple computers. I assume that these teachers would have an even more positive attitude towards technology if they had more newer computers in their classrooms.

Conclusions

I was able to draw several conclusions from this survey. First, teachers are definitely interested (75%) in having access to preconstructed, high level thinking, computer
activities which are easy to implement. Evidently, these
teachers realized that activities of this type are something
that could benefit their students. It also appears that
teachers would appreciate not having to take their time to
develop and construct these types of activities. Obviously,
these teacher would appreciate having these types of
activities available both for language arts and for math.
Along with these activities, the survey indicates that
teachers could use more training in implementing multimedia
type programs such as Hyperstudio so that they become
proficient enough to feel comfortable providing this type of
instruction for their students.

Secondly, it was evident to me that teachers adamantly
felt that they do not have an adequate number of computers
for their students. This is information that districts and
school sites need to consider when deciding how to spend site
or technology money. This data could also encourage site
teachers or administrators to write technology grants in
order to lower the ratio of students to computers at the
school. Possibly if teachers had more access to computers,
they might utilize them more in their instruction.

A third significant finding in this survey was that even
though all of the teachers in the study felt that computers
enhance the learning experience, almost half of the teachers
did not consider them an important part of their classroom
academic program. This seems almost a contradiction of
beliefs. I believe that some of the teachers who do not
consider technology an essential part of their class program
may not have had enough training to understand how to
implement technology into their instruction. Also, these teachers could have weak technology skills themselves. This survey indicates that more technology training is needed for educators. Not only could additional training make these teachers feel more comfortable with technology, it might also give them a better attitude towards including more technology within their instruction.

Survey Limitations

This survey only examines the attitudes of a limited group of teachers in an elementary school setting. Also, these teachers work in a school where technology is heavily promoted by the administrator. As a result, these teachers may have a more biased attitude towards its inclusion in the curriculum than teachers who come from a school where there is little interest towards technology. In addition, the students that these teachers work with may have less exposure to technology than students from a more affluent area. The student level of technology expertise at a school could influence a teacher negatively towards computers because the educator may feel it is too much trouble to train technically unknowledgable students to use some of the more sophisticated programs involving multimedia or authoring tools.

Survey Implications

After conducting this survey, it was evident to me that teachers would like to have some preconstructed computer activities that use high-level thinking and involve multimedia. The survey showed that teachers would appreciate having these activities address either language arts or
mathematics. This study also indicates that teachers need these activities to be easy to use, and that the activities need to support their curriculum. Furthermore, the survey suggests that most teachers are interested in adding more technology into their instruction. In addition, this survey implies that there is a need for more curriculum relevant software and technology training.
CHAPTER THREE
REVIEW OF RELATED LITERATURE

Introduction

This chapter reviews several questions which I considered following the survey. What are the benefits of infusing instruction with technology? What do teachers need to increase their use of technology in the classroom? Do they need staff development? Would more practice time help teachers to feel more competent with technology? Do school sites need more technology mentors to assist teachers? Could more equipment encourage teachers to infuse their instruction with technology? Is there a problem finding relevant software? What can high level thinking activities and Constructionism tied to technology add to the learning experiences of children? Is multimedia an effective way to deliver instruction? Also, are graphic organizers really effective? Finally, can all of these issues and components be considered, combined, and used to create a piece of language arts software specifically for reading comprehension that can be beneficial to student learning, easy to use, and be a tool to encourage teachers to increase their computer based instruction within the classroom?

The Benefits of Computer Instruction

Almost from the time of their creation, computers have been seen as a vehicle for improving education. Early writers in the field such as Papert and Pea describe the tremendous potential for using computers to "create, change, and redefine the meaning of knowledge and intelligence in our
Culture" (Berg, Benz, Lasley & Raisch, 1998, p. 111). In 1980, Papert envisioned the computer as a medium that would assist children in taking greater control of their leaning, arguing that the introduction of the computer would change the culture of classrooms in ways that would enable them to do so. (Toomey, & Ketter, 1995). Researchers note that Papert saw the computer as the ultimate tool for children to use and create their own knowledge and to introduce them to the process of intellectual inquiry (Berg et al, 1998). Although, technology has not completely revamped education, it has shown its ability to improve the learning experience.

There are several ways that technology can promote learning for students. First it can be exciting and motivating to students. Researchers Funkhouser and Little have discovered that "computer use has been shown to increase liking and enjoyment of a particular subject" (as cited in Pugalee & Robinsons, 1998, p. 78). Research showed that children using a computer stayed focused and repeated an activity for relatively long periods of time. Records of observations revealed that when using interactive software, childrens' attention at a task improved from an average of less than 3 minutes to more than 15 minutes (Huntinger & Johanson, 2000). At its best, technology can facilitate deep exploration and integration of information, high-level thinking, and profound engagement by allowing students to design, explore, experiment, access information, and model complex problems (Anonymous, 2001). It has a tremendous motivational value, and provides new entry points to learning styles, better access to resources and expertise and
improved communication (Fulton, 1997). Students want to work on the computer. Owston states "students are increasingly adept and comfortable with technology; therefore it is important that educators begin to consider effective ways to capitalize on our students' learning preferences" (as cited in Pugalee & Rich, 1998, p. 78). Schacter (1999) notes students learn more in less time when they receive computer-based instruction. Also, student's attitudes toward learning and their self-concept improve consistently when computers are used for instruction. Simply put, kids just love working on computers.

A second reason that technology can promote learning for students is that it can help prepare them for the future. Kirkwood's study found that teachers believe elementary school technology education "builds lifelong skills such as problem-solving, creative thinking, and self-directed learning" (2000, p. 4). Modern technology improves opportunities for individualized instruction, helps students to have a better attitude towards learning, and prepares students for life in a technologically rich society (Abu-Jaber, 1996). In addition, the U.S. Department of Labor identified the 54 jobs with highest growth potential between now and the year 2005 and only eight do not require technology fluency. (The CEO Forum, 1999). Many employers insist that workers have technology skills for today's workplace and teachers should educate students to be adequately prepared for their future.

Also, technology can promote learning because it often makes teacher's lessons more interesting to students.
Huntinger and Johanson found in their study that when technology was used to support learning, children achieved success (2000). Tierney noted:

Researchers and teacher educators who study the advanced use of technology, see the potential for computing to improve the teacher-student relationship, to enable more student-centered instruction, and to make classrooms richer places for authentic and active learning. (as cited in Laffey & Musser, 1998, p. 234)

Furthermore, technology can allow lessons to be integrated across the curriculum. Students may define their own objectives and pursue these objectives through technology (Roth, 1999). Teachers can become facilitators. Also, technology allows teachers to incorporate multimedia which has the unique ability of being able to appeal to several student’ learning styles allowing lessons to reach to more students.

In addition, technology can promote student learning because it enables educators to reach all students including those with attention or learning problems. Evidence clearly points to the effectiveness of computers as access technology for young children with disabilities (Huntinger & Johanson, 2000). Computers can promote social interaction. They can help to provide a controlled learning environment. Students are often allowed through technology to progress at their own pace. Also, computers might help a struggling learner gain confidence by providing frequent feedback. Multimedia computer applications can help to develop communication and language. Computers also provide students with repeated exposures to variations of a concept (Morgan, 1996). In addition, computers can help with classroom management.
Researchers have noted that positive behavior was associated with computer use (Huntinger and Johanson, 2000). Computer technology allows the teacher to focus more on developing the potential of an individual, even in a large class (Roth, 1999). Additionally, computers can allow the students to gain individual attention. Besides reaching a broad portion of the student population, computers can improve student achievement. Kulik’s Meta-Analysis study found “on average, students who used computer-based instruction scored at the 64th percentile on tests of achievement compared to the control group without computers who scored in the 50th percentile” (as cited in Schacter, 1999, p. 4). The CEO Forum noted that:

Technology is not a panacea for the challenges facing the education community. However, we believe that when used appropriately, it can be an effective tool for promoting practices shown to improve student achievement and performance. (1999, p. 5)

Computers are often an underused instructional medium which may have the potential to enhance instruction for many students.

Finally, Teachers, who have been adequately trained, often enjoy using technology themselves. Technology expert Kathleen Fulton says teachers become hooked on technology “when they see students who may be able for the first time to understand something because they are using new kinds of media and ways of getting messages across” (Sparks, 1998, p.18). Teachers frequently enjoy having another strategy for reaching students then what has been traditionally employed in the classroom. In addition, technology can lighten the
teacher’s load “by easing the classroom management burden of reports and paperwork, thus allowing the teacher to spend more time with students” (as cited in Mowrer-Popiel & Pollard, 1994, p. 131). Teachers enjoy technology because it possesses the ability of addressing their personal interests or needs. It may expand student learning, experiences, capacities and productivity. Technology can enable teachers to teach more effectively. It can increase interest while at the same time reinforcing subject matter. Finally, technology can motivate learning through fun, relevance, reinforcement, and success (Hoffman, 1997). The CEO Forum asserts “the bottom line is clear: technology, applied well, can enhance and reinvigorate education, making schools richer and more exciting interactive communities of learning for students and teachers” (1999, p. 6).

Teacher Technology Needs:

Staff Development

Frequently, teachers have a less than enthusiastic attitude towards technology because they have not been adequately trained themselves. Strudler and Gall stated “training helps to move teachers through an awkward transitional learning period to the stage where they view computers as another professional tool” (Chin et al, 1993, p. 317). Too often, administrators have provided technology training in the same one shot, one-size-fits-all manner which they have used for any inserviceing. A one day blitz has been found to be an ineffective training method for many educational issues, but it is especially true of technology. Benson (1997) reports that more schools are discovering that
traditional models of staff development, particularly one-time inservice training for the entire faculty, are ineffective for teaching computer use and for helping teachers develop methods to use computers as instructional tools. Effective technology staff development needs to be something that happens on a regular basis.

Appropriate technology staff development has the potential to do much for a school. It can move a teacher from a feeling of technological insecurity to a sense of competency. A lack of training seems to account for teachers’ low level of confidence when they initiate computer activities (Dupagne and Krendl, 1992). Staff development can give educators ideas and methods for infusing technology into the curriculum. Also, staff development may illustrate ways to use technology to teach existing and expanded content (Ertmer, Addison, Lane, Ross, & Woods, 1999). The Web-based Commission states:

Training helps transform lifeless equipment into useful tools. Creating high tech educational tools without training teachers to use them would be as useless as creating a new generation of planes, without training pilots to fly them. (2000, p. 1)

Teachers should have adequate training to make the most of technology in the classroom. Also, this staff development needs to show teachers how to incorporate the computers into their instruction. It should not focus on running a specific program or using a piece of hardware like a scanner unless teachers are given ideas for using it with their curriculum. Professional development with technology should focus on how to use computers, software, and other technology tools to teach, not on mechanics (The CEO Forum, 1999). When educators
get the training that they need, technology stands a better chance of becoming a more established part of instruction.

To provide the kind of training that today's teacher needs, an adequate amount of money should be allocated towards it. In the past, technology plans have been written with only a small amount of money designated for training. In recent years the typical technology budget spent at best only 15 percent on training (Fulton, 1997). Today the NEA recommends that schools devote 40 percent of their technology budgets to training teachers (Web-Based Education Commission, 2000). It takes money to provide the kind of training that a teacher needs to be proficient in technology. Becker remarks that “exemplary technology teachers worked in school districts that have invested heavily in staff development and on-site staff support for computer using teachers” (1994, p. 305). Schools and districts must continue to make a commitment to professional development seeking to provide support, resources and time for teacher to learn both how to use technology and how to integrate digital content and tools into the curriculum and instruction (The CEO Forum, 2000). Schools must be prepared to invest substantially in staff development for teachers if technology is to realize its potential in schools (Hope, 1997). Sufficient funding of technology training is a key component to technology integration in schools.

Besides funding, effective technology staff development needs to consider the individual characteristics of each school staff. Researchers planning professional training have found that they need to consider “not only individual
teachers' beliefs, images and attitudes, but also the dynamics within the working cultures in which individual teachers are embedded" (Norton, McRobbie & Cooper, 2000, p. 98). At times, a school site can seem like a living, breathing entity that has its own specific personality. Because of each school's unique nature, training needs to be specifically adjusted to meet the needs of that particular staff. The CEO Forum observes "to be effective today, professional development must be based on a new mode of continuous improvement linked to the program goals of the institution, performance of teachers and students" (1999, p. 12). They also comment that the most effective in-service career development is site-based, rigorous, sustained, and designed and directed by teachers. It also balances individual needs and school priorities (1999). Technology training should take place at the school using the equipment that the teachers actually have and use. The Web-Based Commission suggests that teachers and sites need to get the confidence to "think with technology" in order to attack old curricular standards in new ways (2001). Effective technology staff development should challenge individual staffs with this type of commitment to technology. The extent to which a school embraces a positive attitude towards technology and can incorporate technology's applications into its organizational structure determines whether or not a school's staff will support technology (Hope, 1997). If the entire staff is devoted to technology inclusion through good site focused staff development, then it has an excellent chance of happening.
In addition to adequate funding, training, and attention to school dynamics, effective technology staff development should be ongoing. Schools can no longer accept one day, one time technology training. The Web-Based Education Commission reports that "the training that teachers receive is usually too little, too basic, and too generic to help them develop real facility in teaching with technology" (2000, p. 2). Technology inservice training must also appeal to the individual needs of the teacher. Researcher Donna Benson acknowledges that beneficial technology staff development is "designed to be ongoing and individualized" (1997, p. 17). Teachers need continuous practice and the availability of assistance if needed in order to make technology work for them. Ongoing training and practice can allow the teacher to feel secure in his or her technology knowledge and provide that educator with the boldness to try something new. Research indicates that one of the largest factors which determines computer integration in elementary schools is the amount of computer knowledge the teacher possesses (McCannon and Crews, 2000). Teachers need opportunities to try different types of technology like multimedia and feel that they have had adequate opportunities to plan how to use it in their curriculum and understand how it works. According to Bosner and Daughterty effective staff development includes "providing teachers with time to design a plan for how they might be able to use suggested materials and methods in their classrooms" (as cited in Pugalee & Rich, 1998, p. 81). Teachers also should have ongoing technology staff development to keep up with the evolving nature of
technology. Technology is constantly changing and improving. Solmon (1998) notes "teachers have a long way to go before they are to be rated at having high levels of skills in all the uses of modern technology deemed valuable in the classroom." (p. 17) To be truly effective, technology staff development needs to occur throughout the educator's entire career. "Professional development for teachers is an on-going, long-term commitment that begins with the decision to pursue a career in education and continues throughout the duration of a career" (The CEO Forum, 1999, p. 8). Schools should incorporate appropriate professional development at every opportunity. Appropriate staff development is one of the keys to adequately incorporating technology into instructional practices. It should be funded adequately, take into consideration the site and staff needs, and, most importantly, be on-going.

Teacher Technology Needs:

Practice Time

Would a person receive one day of training to drive a car and be expected after that limited time to be an expert driver? Of course not! It is no different with teachers and technology. Teachers can not receive one day of technology training and be expected to suddenly incorporate technology into their instructional practices. Researchers Durham, Morrison, and Ross found:

It is assumed that if teachers learn basic computer literacy skills, they will be able to integrate computers into their curriculum. Yet, teachers who receive this type of basic training often resort to infrequent use of computers or using computers for
drill and practice or as a reward for students with good behavior (as cited in Lowther & Morrison, 1998, p. 36)

Teachers often do not apply technology as they should because they have not had adequate practice time. The students frequently know more about computer applications than the teachers because the kids spend recreational time on the computers. One teacher remarked that "the ongoing joke at her school was if you need to know something about computers, then ask a student" (Pugalee & Rich, 1998, p. 84) It is pathetic that teachers should have to rely on student technology help because they lack the necessary rehearsal time. Curriculum and technology integration will never occur until educators receive the time they need to practice, to plan, and possibly even paid time to become proficient at technology.

Teachers also need time to practice in situations where they feel comfortable. Exemplary computer teachers often are present at schools where teachers are able to borrow school computers for home use (Becker, 1994). Setting up a procedure for staff members to check out computer equipment over weekends and breaks is an excellent way to foster technologically-literate teachers. Researchers found that exemplary technology using teachers spent more than twice as many hours personally working on computers at school than did other computer-using teachers (Becker, 1994, The CEO Forum, 1998). Just like any sport, new hobby, or a musical instrument, if one wishes to become proficient, than one must practice. Teachers need to spend time trying the applications
that they want to use in their classroom until they feel comfortable with them. Computer experience nurtures positive attitudes towards technology (Dupagne & Krendl, 1992). Also, hands-on is a must for any type of technological training (Chin et al, 1993). Researcher Warren Hope remarks "to use technology and prepare for it to work takes a considerable amount of time. This becomes a fundamental reason why many teachers do not use technology in their practice" (1997, p. 7). The bottom line is that teachers need to take the time to practice the technology for it to be implemented successfully.

If schools and districts really want technology to be implemented, they should consider allowing teachers to be paid for the time they train or practice. The Web-Based Education Commission notes "The overwhelming majority (90 percent) of all corporate and government training occurs on paid time. In public schools, teachers report just over a third (39 percent) of their training occurs on paid time" (2000, p. 3). Is it any wonder that it is taking so long for technology to become included properly in the classroom? How fast would corporations make technical changes if their workers had to learn the system during their leisure time? Providing stipends for educators who continue their technology training would be a real incentive for teachers to take the necessary time to become technologically literate.

Besides opportunities to learn the technology for themselves, teachers should have time to plan how to infuse technology into their instruction. Poole found that teachers need time and opportunity to restructure their curriculum
around technology (Pugalee & Rich, 1998, p. 81). This is best accomplished with fellow teachers. Fulton determined that "teachers learn best, and are more likely to embrace new approaches, when they have opportunities to discuss ideas and collaborate with peers and instructors as they put new ideas into practice" (1997, p. 79). When teachers have the time to plan technology use with other teachers, perhaps at grade level meetings, they are more likely to come up with a plan that will be usable and work for them. One group of researchers found in their studies that when grade level teams worked together that they began to organize ways to infuse technology into the curriculum. Technology is often taught as if it were the curriculum rather than a tool for learning (Laframboise & Klesisus, 1994). Time working with other teachers can spark new curricular ideas that employ the powerful tool of technology. Administrators who are seeking to imbue their site with technology rich instruction should consider scheduling regular grade level technology share times. During these times teachers who have had success with various technology applications could share what has worked for them. Roblyer and Erlanger acknowledge that instructors who model their own use of technology through training are the most effective trainers (1999). Also, for those teachers who are unsure what to do with technology, these teacher trainers could provide much needed examples because as the Web-Based Commission observes teachers and especially new teachers often "lack a clear conception of effective classroom uses of technology in their subject area" (2000, p. 1). If technology is to become widespread within classrooms,
more and more relevant training opportunities are needed (Fuller, 2000) and especially those that involve working with fellow teachers.

The final consideration involving technology and time is that there is no finite number that can be put on the amount of time that a teacher needs to learn technology well enough to incorporate it adequately within the curriculum. For some, the technology learning curve can be pretty steep. Studies show that "at least five years of computer use are required for teachers to develop computer expertise," (Becker, 1994, p. 309) and "technology integration literature agrees that teachers need five to six years staff development" (Hoffman, 1997, p. 53) in order to feel comfortable using technology regularly within their curriculum. It takes time to develop a novice computer using educator into a teacher who fully incorporates technology. As a result, administrators should realize that quality, high-level thinking technology curricular applications could take time to develop and implement. Additionally, Hoder asserts that principals must "respond to teachers' demands for time and resources" if they wish them to support technology (as cited in Hope, 1997, p. 4). Ultimately, it should be understood that "technology integration, no matter where it occurs, is a process that evolves over time" (The CEO Forum, 1999, p. 13), and the powers in education need to be patient.

Teacher Technology Needs:

Mentors

Another component of successful technology integration is the availability of a mentor or somebody who can provide
technology support to the teacher. If one to one monitoring works for new teachers, why shouldn’t it be tried for those interested in becoming better in using technology within their instruction? (Benson, 1997) Teachers need support in the professional, technical and instructional aspects of technology integration (Ertmer et al, 1999). Teachers who are just implementing technology need to have someone whom they can talk to when they are experiencing hardware difficulties, application, technology, or integration problems, and when they find that they might like some special individualized training. This mentor can be in the form of a knowledgeable fellow teacher, a technology specialist, a computer aide, or even a technology savvy administrator. “The successful integration of technology into the classroom requires the availability of quality technology support” (Ronnkvist, Dexter, & Anderson, 2000, p. 26). Hoffman states “technology complicates teaching. Administrators should not expect teachers to master what is, in many ways, an entirely new kind of instruction without adequate support” (1997, p. 53). The main idea is that if technology is to be successfully implemented, teachers can not feel that they have been left to flounder with no help easily available.

Teacher Technology Needs:

Equipment

It goes without saying that in order for technology to be positively integrated into instruction that teachers must have adequate hardware or equipment. Possibly the most overlooked success factor for technology integration is the consideration of facilities and maintenance. Many teachers
would like to use the computer with their students but don’t have enough, or even one, in their classroom (Hoffman, 1997). For technology to be a viable force at a school, as a bare minimum, each teacher should have at least one computer in their classroom that is powerful enough to run a variety of software, multimedia applications, and even access the internet. Administrators should commit both intellectually and financially to this issue if they want technology to be a significant factor at their school sites. A school’s plan for implementing technology must include provisions for purchasing hardware, software, maintenance agreements, supplies and human resources (Hope, 1997). Ideally, teachers should have in their room, or be able to visit, mini-computer labs or full size computer labs in order to allow more than one or two students access to the computer at one time. According to Bosch and Cardinale, limited access to equipment and training runs high as a reason technology has not reached its potential in school (as cited by Hope, 1997). If a teacher is forced to deal with only one relatively powerful computer in the classroom, then that teacher should have a plan in place to allow all of the students to have regular access time to the computer. Lack of adequate equipment, or no plan for a limited amount of equipment, is a sure way to thwart technology integration in the classroom.

Teacher Technology Needs:  
Software

In addition to sufficient hardware, software is a major factor in integrating technology into the curriculum. Numerous studies have shown a lack of appropriate software
impedes the integration of technology in the classroom. Computer using teachers reported that not having enough software was one of the major problems with using computers in their teaching practice (Becker, 1994, Ertmer et al, 1999, Fatemi, 1999, Strudler, 1996). This software deficiency occurs both as a lack of software resources at the site, and a scarcity in the market of software that adequately addresses specific curricular goals. Appropriate computer software is important in that "as a result of its use students learn to think better, write better, and solve problems better" (Becker, 1994, p. 317). In order for teachers to use technology regularly, they should feel that they have software that addresses their instructional needs as well as traditional classroom activities.

There are several reasons that it is essential for teachers to have the right kind of software. One purpose of appropriate software is that it can promote a more learner centered instructional environment. Bruce reports that many teachers would like to take advantage of Constructivist instructional practices that can be promoted by a technology rich environment, however they are unsure of where to begin (Howard, 2000). The right type of software can act as a catalyst to moving the teacher towards a more Constructivist classroom environment. Teachers should have the "opportunities to examine and use software that develops deductive reasoning and problem-solving skills" (Hoffman, 1997, p. 53) which is such a part of this type of classroom. Another reason that teachers need the proper software is that the software must be flexible, simple, and user-friendly.
According to Hoffman, "the emphasis is on simplicity. If the software is too complicated, teachers won't be able to justify the time involved in learning to use it" (1997, p. 54). Teachers must have software that is easy for them to use. A third reason that teachers need the correct software is that:

Teacher resistance of integration of technology can be traced to the specific occurrence of software decisions being made as to whether or not the software will increase standardized testing scores (David, 1994) The result of this unidimensional thinking limits technology's role as well as the involvement of teachers (Hope, 1997, p. 5).

In other words, teachers often see software and technology as something that is not an integral part of their instructional practices when they have not chosen software that works for and is right for them. Inappropriate software can become only another thing that they must incorporate. A final reason that teachers should have suitable software is that they might be more likely to use technology if they can address specific school objectives and personal educational objectives like improving student literacy. "For technology-based learning to work, teachers need materials (software) that help to meet carefully defined instructional objectives and excite and motivate learners" (Mellon, 1999, p. 34). Hope notes that "trying to use technology to teach specific school objectives when no specific software exists to directly address the skills will not prompt teachers to use technology (1997, p. 5). Teachers need software that will meet the needs of their students. A 1995 Congressional report found that meaningful school technology "should take into account the education goals of the teachers and the software that will help
accomplish these goals" (Strudler, 1996, p. 234). For these reasons, teachers should have access to the software which will promote their academic objectives for their students.

Once teachers have found an effective piece of software, another issue confronting them is their need to know how a piece of software works and how best to implement it in their classrooms. Fatemi notes:

Deciding how to use the content once it’s selected also presents challenges. Educators have to consider everything from which teaching style is appropriate to how to schedule students’ time, especially when the number of available computers is limited (1999, p. 2).

For the software to do what the teacher wants it to do, it should be used in a way that will work for the educator and the students. Many teachers just do not know how to implement the software so that it can address their curricular needs. In Handler’s study concerning preparing new teachers to use the computer, she stated that “new teachers expressed the need for additional information about and experiences with software” (1993, p.151). Sometimes teachers know that they want to use a specific application but they just are unsure of how to go about it. Studies that examine new software often describe the software in detail without providing sufficient information to the teacher about how it can be effectively integrated into instruction (Mellon, 1999). Hoffman remarks that teachers need “time to review and select software and develop lesson plans” (1997, p. 54) in order to use the software effectively. Majed Abu-Jaber states teachers “must develop competencies in identifying and using appropriate educational software and materials” (1996, p. 61). Concerning software and teachers, Bridget Foster the
director of the California Instructional Technology Clearing house expresses "It is not like a textbook, where you can thumb through it. You have to sit down and load it onto your computers and figure out how to use it" (as cited in Fatemi, 1999, p. 3). To utilize the software appropriately, the teacher has to stop and really consider what objective or learning skill that the software addresses and then develop a plan for integrating the application into their curriculum. Properly using appropriate software can present a challenge to many educators.

Technology, High-Level Thinking and Constructivism

One of the exciting facets of a technology rich learning environment is that it can be a catalyst for getting students to think. Having students engage in high-level thinking activities is an important role for computers. Researcher Nicola Yelland (1997) noted that Papert stated that "computers have the potential to create powerful problem-solving environments" (p. 41). She also remarked that computers could not be used effectively unless certain conditions were met which are that "technology must be integrated into curricula in environments characterized by active learning, inquiry and problem solving where higher order thinking skills are promoted" (p. 39). In addition, The CEO Forum states "technology facilitates students in explorations that can invigorate in depth analytical thinking, inspire creativity, stimulate curiosity and develop skills of innovations" (2000, p. 3). Technology appears to be at its finest academically when it is used for problem-
solving, high level learning activities. Students need the talents that technology promotes to be successful in modern society. Morgan states "to be productive students in a rapidly changing technological society, students will need to have strong critical thinking and problem solving skills" (1996, p. 50). Frequently, teachers forego high-level thinking activities for drill and games on computers. This wastes both the potential of the student and that of technology. Continuous uses of lower-level thinking activity software like drill and practice can reduce a student's control over his or her own learning and could even lead to less creativity. The best software is that which is open-ended where the child is in control (Wetzel and Mclean, 1997). The CEO Forum states "When used to teach higher-order thinking skills...computers can have a positive effect on student learning" (1999, p. 5). Computers should be utilized in the classroom in the best possible way for students, and that is by initiating high level, problem-solving activities.

In order to understand the right kind of activities that students should engage in, it is necessary to define high-level thinking. One definition of high level thinking is described by Benjamin Bloom's taxonomy. According to Bloom, high-level thinking activities include analysis, synthesis, and evaluation. Software that addresses this type of thinking includes simulations, multimedia presentations, authorware, etc. Becker reminds educators that "important academic outcomes will result from the systematic and frequent use of computer software for activities that involve higher order thinking" (1994, p. 316). Bloom identifies lower-level
activities as those which include knowledge, comprehension and application. These occur in software such as drill and practice, some games, testing software, etc. As researcher Tom Morgan points out, teachers need to make sure that the computer applications that they use engage students at higher levels of Bloom’s taxonomy (Morgan, 1996). For example, multimedia applications are an excellent way for students to utilize higher thinking skills. In 1992, Carver, Lehrer, Connell, and Erickson analyzed the skills used in designing hypermedia documents. They found that these applications utilize project management, research, organization and representation, presentation and reflection which are all high level thinking activities (McGrath & Cumaranatunge, 1997). The CEO Forum attests that technology’s greatest potential can only be shown when students master more complex and high level thinking skills through technology then they would have been able to without it (2000). Possibly, technology serves learners best when it is used for high-level thinking academic activities.

An added benefit to technology being connected to problem-solving and high-level thinking activities in the classroom is that it can encourage a Constructivist classroom. According to one group of researchers “the Constructivist learning model emphasizes the creation of active learning environments which permit critical thinking, discovery, and collaboration” (Howard, McGee, Schwartz & Purcell, 2000, p. 457). Teachers may become facilitators of knowledge in these learning environments. Through a technology integrated classroom, instruction can change “from
teacher-centered telling of information to learner-centered constructing of knowledge” where teachers promote long-term, open-end projects, cooperative learning, and authentic assessment. (McGrath & Cumarananatunge, 1997, p. 20). In Constructivist classrooms students modify the technology and how they use it for their own projects. When students do this, it is felt that they “develop and refine thinking skills such as problem solving, reflecting, analyzing, defining relationships, and other numerous skills to aid their learning” (Toomey & Ketterer, 1995, p. 475). The Teaching, Learning and Computing National Survey of 1999 found that according to Constructivist theory, when students engage in tasks of their own construction, like student chosen projects, they are more likely to carry over the learning that occurs into different situations then when the learning has occurred out of context like through reading or lectures. Even though many teachers realize that Constructivism is better for students, they prefer traditional methods of teaching. (Ravitz, YanTien & Becker, 1999). A strong integration of technology in the classroom can become a way for teachers to gradually embrace Constructivist instructional practices that may help students develop into better learners and stronger problem-solvers, while at the same time developing useful skills.

Multimedia

Multimedia is a high level thinking computer application that can be very versatile and could provide many benefits to the learner. It may incorporate text, sound, pictures and even movies. Unfortunately, it is not used often enough in
the classroom for several reasons. First, it requires specific hardware like a powerful, fast computer, scanner, digital camera, etc. that may not always be readily available. Secondly, Multimedia projects can be very time consuming to construct (Berg, 1998). As a result, teachers often get frustrated with the amount of class time that they must commit to a project. However, students usually find Multimedia activities to be very enticing and valuable learning experiences. The third problem with this type of activity is that it requires teachers to spend more time and effort preparing themselves for presentations and instructions than a standard lesson (Chin & Hortin, 1993). Nevertheless, Multimedia is worth the time and effort that it requires.

Multimedia activities can help students learn. According to Meskill and Swan, multimedia supports students in developing understanding and building meanings (1996). Multimedia can also be powerful because it supports Gardner’s 1983 theory of multiple intelligences by drawing on many intelligences such as artistic, logical, linguistic, etc. in constructing a project (McGrath & Cumaranutunge, 1997). As a result, it can appeal to the various learning styles of a variety of students. Besides addressing multiple intelligences and learning styles, Multimedia can be used as a tool to help students to reconstruct, store, and share knowledge in many forms such as through graphics, sound or words (Toomey and Ketterer, 1995). Users of a multimedia programs become active participants that can interact with the program and as such engaged learners. Wisseck suggests
“multimedia programs can motivate students by enlivening content material with dynamic visual representations of concepts or events” (1996, p. 496). For contemporary students who have grown up on a steady diet of technology that includes computers, televisions, video games, etc., Multimedia software can be a learning tool that can hook them and inspire an enthusiasm for learning because they are in control.

Graphic Organizers

Just as multimedia can be an excellent way to engage students, graphic organizers are a worthwhile means to improve reading comprehension. Teachers constantly search for ways to enhance the literacy of their students. A graphic organizer is one the tools that they use. A graphic organizer is defined as a “visual representation of knowledge” (Bromley, Irwin-Devitis & Modlo, 1995, p.4). They can take many forms including but not limited to semantic maps, webs, concept maps, story maps, Venn diagrams, etc. A graphic organizer can help to make text understandable. Using graphic organizers as an aid helps the goal of reading “for students to authentically comprehend and become independent readers and learners (Kirylo & Millet, 2000, p. 183). Graphic organizers help to improve student’s learning.

Graphic organizers may also support the reader in several ways. First, researchers Flood, Lapp, Heimlich & Pittelman have found that they “aid reading comprehension and learning” (as cited in Bromley et al, 1995, p. 8) . Person and Johnson define comprehension as an active process where readers interpret the text and build bridges between prior
knowledge and new information (as cited in Kirylo & Millet, 2000). Furthermore, graphic organizers facilitate memory for text in many different settings (Robinson, 1998). In addition, it should be noted that graphic organizers show their greatest benefits when students receive instruction in their use and when they construct their own graphic organizers (Bromley et al). Graphic organizers can be an excellent tool to use with second language learners because they allow these students to have a visual image along with the text. Finally, researchers Robinson and Katayama found that graphic organizers are the most effective when they are presented after text has been read rather than before (1998).

There are numerous benefits to using graphic organizers. These benefits include that they focus attention on key elements, help integrate prior knowledge with new knowledge, they enrich reading, writing, and thinking, enhance concept development, and they can serve as an assessment tool (Bromley et al). Graphic organizers can be a useful device in supporting literate students.

Conclusion

There can be many benefits to instruction that infuses technology. Teachers need staff development, practice time, technology mentors, the right equipment and software that engages their students in high level thinking activities. Multimedia can be a powerful type of software that often appeals to many types of learners. In addition, graphic organizers are often an important aid in supporting reading instruction. All of these issues are to be considered when developing relevant software, trying to improve teacher
attitudes towards technology, and in attempting to increase computer instruction within the classroom.
CHAPTER FOUR
PROJECT

Project Design and Development

After examining the survey results, and considering the desires of teachers to improve reading comprehension, I designed this project to incorporate the benefits of computer design, the needs of teachers, high level thinking software, multimedia, and graphic organizers. My goal was to develop some reading tools that teachers would want to use because they are easy to employ and work. While at the same time it is imperative that these tools involve problem-solving activities that could promote Constructivism. The solution was to develop some multimedia graphic organizers to use for instruction in elementary school.

The purpose of the software project is two-fold. Not only is it desirable to increase reading comprehension, but it is also my goal to help teachers integrate technology into their curriculum since experience, researchers, and survey results have indicated that this is a problem. Curriculum integration could finally allow teachers to view the computer as a part of their teaching repertoire instead of just a machine for games and drill (McCannon and Crews, 2000). The marriage of graphic organizers and technology could result in an excellent vehicle for reading instruction that the teacher would find invaluable and that students would enjoy. The CEO Forum remarks "the real strength of technology in education comes from using the right technology at the right time to meet the right objective" (1999, p. 6), and this is the
motive of this project to design a computer activity where there is a curricular need.

This chapter discusses the content area for which this project was developed, the characteristics of the project, the technological requirements, the intended audience, and the goals and objectives. Project design and development will also be described. In addition, this project was fieldtested and a formative evaluation was used. The results of this fieldtesting will be discussed. Furthermore, recommendations for future use of the software will be examined and proposed.

Content Area

The software component of this project consists of four graphic organizers that are constructed out of Hyperstudio cards in some cases linked to AppleWorks word processing documents. I designed these graphic organizers to be used with the reading components of the core language arts curriculum such as the basal reader, core literature, even teacher or selected reading texts, or any part of the language arts reading program. "In order to make the idealized contribution of technology a reality requires careful matching of software and curriculum objectives" (Hope, 1997, p. 7). Graphic organizers are something that many classroom teachers use regularly. The purpose of this project is to enhance students' comprehension of a reading text through the use of computerized graphic organizers.

Characteristics

In this program four graphic organizers are presented using Hyperstudio and a word processing program. These
graphic organizers include a Venn diagram, a story map, an outline activity, and a book report project that students can use to better understand what they have read. The graphic organizers all appear in a sample format that uses information from E.B. White’s book Charlotte’s Web as an example.

Technical Requirements

This project requires a Macintosh personal computer that utilizes Mac OS 7.1 or higher. The Hyperstudio program needs 4MB of free RAM and approximately 22MB of free disk space on the hard drive. A CD-ROM drive is highly recommended. In addition the project demands a ClarisWorks word processing program of 3.0 or higher.

Audience

I created these activities to use technology, specifically multimedia, to enhance reading comprehension through the use of graphic organizers. Research has shown that:

Multimedia that enhances regular basal text has had a positive impact on the reading progress of low achieving students. The multimedia enhancements assisted students’ ability to gain reading comprehension and decoding skills independently. (Wisseck, 1996, p. 499)

This project was designed to help elementary students improve their reading comprehension. Because the students get to utilize the computer to complete these graphic organizers, this project can be useful when dealing with a wide range of student abilities from those with learning problems all the way to giftedness. These activities are intended to appeal
primarily to intermediate aged students from third to sixth grade (ages 8-12). Yet it is possible that older and younger students could benefit from the projects too. It would be best if students had some basic understandings of word processing and the Hyperstudio program in order to make the activities easier to use.

Project Design

I used Hyperstudio to create these graphic organizer activities because from experience and discussion with other teachers I believed this program to be easy to use and available at most schools. It is a software that many students enjoy using. This application can allow students to effortlessly add drawings, text and even sound.

This project seeks to enhance a student’s understanding of text by providing them with conceptual and hierarchical graphic organizers that they can use to guide their thinking processes. In each activity, students are given a completed graphic organizer that serves as a model to them and step-by-step instructions concerning how to erase the existing information and to add their own. It is my intention that the teacher will need to give little assistance to the student once the activity is begun thus allowing the educator to be a facilitator of knowledge in true Constructivist fashion. Once the student has completed the activity it can be assessed by the teacher or shown in a presentation format to the class.

The Venn Diagram

A Venn diagram is a conceptual diagram graphic organizer. Conceptual diagrams include a central idea,
category, or class with supporting facts such as characteristics or examples (Bromley et al., 1995). A Venn diagram is used to compare and contrast information with related information being placed where the two circles overlap. Contrasting information is placed outside of the intersection of the two circles. This type of graphic organizer especially lends itself to analyzing information.

I designed the Venn diagram card using colors that allow the user to be able to clearly differentiate between the attributes of the character. Larger fonts were chosen for the title and the character names. An instruction button was added so that students can find out how to create their own
Venn Diagram Instructions

Please Read These Instructions Carefully!!!

You are going to create a Venn Diagram about two characters from the story you have read. In a Venn Diagram, you write the things that are the same about a character in the middle or intersection of the two circles. You write what is different about the character in the two circles under the character's name.

Creating your own:

1. Get the hand from the tools and click on the character's names. Delete "Wilbur" and "Charlotte." Then add the names of your two characters.

Figure 2. Venn Diagram Instructions

Venn diagram. A place for the student's name is located on the card if the student wishes to print the card or if several student Venn diagrams are linked together.

The Venn diagram acts as a character comparison activity. The sample card shows two characters from Charlotte's Web. The characteristics of the two characters are contrasted in the center area of the two circles. Their differing characteristics are placed in the outsides of the two circles. Students are to click on the instructions and get step by step directions for adjust the card to reflect the story that they have read.

Once the student chooses the instructions button a new card appears that gives the student detailed instructions for
2. Click to the right of "baby" in the light blue circle and delete all of the words in that circle. Carefully type in the description of one of your characters.

3. Click to the right of "complain" in the pink circle and delete all of the words in that circle. Carefully type in the description of the other character you are writing about.

4. Click to the right of "smart" in the lavender section of the circles. Delete those words and write in how your characters are the same.

Figure 3. Venn Diagram Instructions Continued

adjusting the card to reflect the story that he or she has read. A brief explanation of a Venn diagram is given and the student can navigate through the text box using the scroll bar. When that action is completed the student is directed to delete the two existing characters and to add his or her own. The student is then told to delete the character description in the left circle and to add description of one the characters from the new story. Next, the student is instructed to go to the other circle and delete the existing sample character description and type in the attributes of the second character that the student is comparing. The student is then prompted to delete the information in the intersection of the circles and to type in text describing
how the characters are similar. Finally, the student should type in his or her name and the graphic organizer is complete.

This Venn diagram can be especially useful in getting students to use high-level thinking skills. In 1985, Gagne' described problem-solving and high level thinking as "a type of intellectual skill that involves recalling and combining relevant rules to form a new, more complex rule" (Young, 1997, p. 38). In this activity students find a particular combination of rules or ideas that fit two specific characters. In coming up with these rules the students analyze the qualities of the characters and set up a new rule concerning their similar characteristics just as Gagne' described. This type of activity can strengthen student literary evaluation skills and possibly even improve a teacher's attitude towards using technology in the classroom.

The Story Map

A story map is another example of a conceptual graphic organizer. It contains a central idea and supporting facts. This graphic organizer shows the structure of information in a text (Bromley et al, 1995). This activity is used to get the student to pay attention to text and think about what has been read. A student identifies the elements of a story when using this tool.

I created the story map graphic organizer (Appendix C) by using the draw portion of AppleWorks (formally ClarisWorks) word processing software. A chart was composed and sectioned off with the important elements of a story.

50
Complete
A Story Map

Please Read These Instructions Carefully!!!

You will be completing a story map about the story that you have just read. Think carefully about the story.

Instructions for completing the story map:

1. Click to the right of the black words in the "main character" box. Delete those words and type in the main characters from your story.

2. Click to the right of the black words in the "setting" box. Delete those words and type the setting from your story.

Figure 4. Story Map Activity Card Instructions

These parts include main characters, setting, problem, three story events, conclusion and theme or moral. This graphic organizer was also filled out as a sample with information from the story Charlotte's Web. The instruction portion of this activity was completed using Hyperstudio. However, it was decided that the word processing program would work better for the graphic organizer itself because a story map is longer and more involved than a Venn diagram.

When a student chooses the story map activity a Hyperstudio card opens up and gives a scrolling text bar with instructions for completing the activity. The student is admonished to read the instructions carefully and to think
**Complete A Story Map**

<table>
<thead>
<tr>
<th>3. Click to the right of the black words in the &quot;Problem&quot; box. Delete those words and type the problem from your story.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Click to the right of the black words in each of the &quot;Events&quot; boxes. Delete those words and type in 3 events from your story.</td>
</tr>
<tr>
<td>5. Click to the right of the black words in the &quot;Solution&quot; box. Delete those words and type in the solution from your story.</td>
</tr>
<tr>
<td>6. Finally, click to the right of the black words in the &quot;Theme&quot; box. Delete those words and type in the theme from your story.</td>
</tr>
</tbody>
</table>

**Figure 5.** Story Map Activity Card Instructions Continued

about the story. First, the student is to delete the information in the main character box and type in the characters from the story that he or she has read. Next, the student is to delete the existing information about setting and type in the setting from the new story. The student then proceeds through the problem, three events, solution and theme box until all of the sample data has been changed over to the student’s story information. When this is completed, the student can print out a copy of the story map graphic organizer or attach it to an electronic presentation format like Hyperstudio or even the slide show component of AppleWorks to present to the class.
The purpose of this graphic organizer is to get students to concentrate on the comprehension portion of their reading. In this activity the student is analyzing what has been read and synthesizing it into the story map which is a high level learning activity. Researchers Alvermann and Boothby suggest that the "effects upon comprehension are increased when graphic organizers are partially constructed by students as a during reading or post reading activity" (Merkley & Jeffries, 2000, p. 352) just like students are doing when completing this graphic organizer. Since students go through this activity after they have read a story, it forces them to recall the text and enter it correctly onto the story map. This type of computerized activity will help the student's comprehension of a piece of text and as such be a valuable learning device for teachers.

The Outline

The outline is a hierarchical graphic organizer. It includes a main concept with sub concepts of lesser importance arranged beneath. This type of graphic organizer can help students to learn to differentiate between main ideas and concepts that support the main idea. Outlining is an important skill because it helps the student to concentrate on the what's important in a text. Understanding the main idea is the crux of good reading comprehension.

Like the story map, I constructed the outline with both Hyperstudio and AppleWorks. The Hyperstudio card alone was too small for the outline activity. It was a challenge to design a way for students to understand outlining. After much
consideration, I decided that color coding would be a useful way for students to understand how to match text to an outline format. Technology is an especially potent way to teach this type of outlining because of its capacity to include substance such as colored text. Outlining is a difficult concept for many students because it is so abstract. Yet, it is an important concept for students to master.

The student begins this activity in Hyperstudio. On the Hyperstudio card the student is given instructions as to how to complete the outline activity. The student then selects the "Go to Activity" button and proceeds to the short story and outline activity which is constructed using the
3. Continue matching the colored supporting facts with their numbers in the outline. Erase the word "supporting fact" and add in the correct information from the paragraphs.

4. Continue working until you have completed all of the points of the outline.

Figure 7. Outline Activity Card Instructions Continued

AppleWorks word processing software. A three paragraph story on pigs to accompany the sample Charlotte’s Web theme of all of the graphic organizers is written for the student to read. Teachers may also type in their own story matching curriculum content for the student to use in the future. Each line of the story is color coded. After reading the story, the student proceeds to the outline. The main idea and the subordinate points are also color coded to match the points in the story. The student simply needs to match the colors in order to see the main idea and supporting ideas. When the student has completed the activity, it too may be printed out or included in an electronic presentation.
This activity, like the others, is designed to help students contemplate the text that they read. By outlining a text, the student can see the patterns that are a part of all text. As Kikylo and Millet discovered in their research on graphic organizers "as students are engaged in a lesson, learning unfolds and meaningful understanding is fostered" (2000, p. 83). That is the goal of this activity that students will gain more meaningful understanding of the text and improve comprehension. In addition, I hope that teachers will have a better attitude towards technology through activities such as these because they will find that students enjoy these computerized activities and are motivated to learn.

The Book Report

The book report used here is not the typical book report. Rather, it is another conceptual graphic organizer. It is different then the other graphic organizers in that it is longer, and it can also be broken down into smaller components. One of the main benefits of this particular activity is that it will focus student attention onto key literary elements of a text. The type of delayed review of a text like that which occurs through completion of this graphic organizer can allow students to "shift their focus to the concept relations communicated by the graphic organizer instead of trying to remember only the surface structure of a text" (Robinson & Katayama, 1998, p. 24). In other words, this activity can cause students to contemplate what they have read.
When designing this activity, my goal was to expose students to several literary elements that are part of the state standards and language arts curriculum. Cards were designed to include the title page (Appendix F), summary (Appendix G), setting (Appendix H), characterization (Appendix I), and theme (Appendix J). An evaluation card (Appendix K) was also added to give the student a chance to evaluate the story that he or she had read. This activity was created so that teachers have a choice. The educator may have students engage in a longer project by addressing all of the literary elements contained in the activity, or a teacher may choose to focus on one element and use Hyperstudio's storyboard feature to choose one of the cards. By engaging in this type of postreading activity it is anticipated that students will gain a greater comprehension of the text.

Each card in this activity provides detailed instructions in a scrolling text box. The card opens with a sample once again reflecting the Charlotte's Web theme. Students are told how to alter the text and the graphics and add their own. Students may also add sound to the cards. Once the student has finished changing the card to reflect his or her story, the cards may be printed out for assessment purposes. The cards would also present nicely linked together. For example if a teacher was concentrating on the concept of theme in literature, each student could create a card depicting the theme of the story that he or she had read. This group of theme cards could then be linked together for a classroom presentation to reinforce student understanding of theme.
This book report activity encourages students to use problem solving and high-level thinking. Students have to solve the problem of how to graphically represent their story. In addition, depending on the card, they have to use analysis, synthesis and evaluation. This activity does what a graphic organizer is supposed to do. "It is designed to activate a reader's background knowledge, prepares students to understand, assimilate, and evaluate new information read, and to facilitate comprehension of text" (Kikylo & Millet, 2000, p. 182) Papert, in 1980, was also interested in developing tools like this that "children might be able to use them to think, explore, solve problems, and construct knowledge" (as cited by McGrath & Cumaranatunge, 1997, p. 20). A multimedia software like Hyperstudio is especially adapted to this type of activity because it makes high-level thinking activities fun while at the same time a worthwhile learning experience.

Formative Evaluation

The formulative evaluation was a very valuable part of this project. It allowed teachers to actually fieldtest these graphic organizers and provide feedback as to their usefulness. It also sparked some ideas for possible additions and revisions to the activities. The educators comments were extremely useful and beneficial to me.

Each of the teachers who evaluated these graphic organizers were elementary teachers in a California public school setting. These teachers all had a variety of experience with students of different ability levels. One teacher was even a full time resource teacher for students
who are learning disabled. Each of the teachers who participated in the evaluation of these graphic organizers is extremely interested in promoting student literacy within their classroom.

Every educator who examined this project was a volunteer. They were given a disk and were asked to examine the activities and then to try them with their students. The teachers were also given a software formative evaluation sheet (Appendix L). These teachers were given up to two weeks to complete this task. The results of the formative evaluation have been compiled and are presented in Appendix M.

Recommendations

All of the teachers who participated in the evaluation appeared to find the graphic organizers useful to their instruction of Language Arts. Based on their responses to the formative evaluation instrument, the teachers all agreed that completion of these activities could increase comprehension of the text. They liked the Venn diagram and story map graphic organizer because they found these the easiest to use. One teacher even returned a student created version of the story map which is listed in Appendix N. Another teacher stated that she does this type of activity currently with pencil and paper and liked the fact that there was a way to incorporate computer technology into it. A different educator liked the scaffolding that the activities provided for English Language Learners. Finally, one teacher remarked that it would be useful to have these activities at the beginning
of the year so that there would be more time available to instruct the students in how to use them.

Some limitations to the project were also exposed. First, these activities were usable only with Macintosh computers. One teacher expressed interest in fieldtesting these activities but couldn’t once she found out that they need Macintosh computers because her entire school has recently converted to a PC platform. Also, a couple of the teachers stated that while the sample was good, it would be easier for their students to complete a blank diagram rather than having to delete and add their own text. Finally, while one teacher really liked the graphic organizers, she expressed frustration at having to figure out a way to put all of her students through the activities using only one computer.

According to the formative evaluation, these graphic organizers were well received by the teachers and their students enjoyed using them. One teacher expressed an interest in adding even more graphic organizers to the existing four and that is something that I need to do. A story web, a concept map, and a cyclical graphic organizer would all be useful additions to this project. Blank diagram cards also should be added with a link to the existing activities. In addition, these graphic organizers could be tested in higher grades to determine their usefulness with older students. It could also be useful to include ideas of how to work an entire class through these activities with only one computer since that was a concern of a teacher. Finally, more types of curriculum relevant computer
activities like these graphic organizers need to be developed and used to promote technology in the classroom.

In addition to extra training, time, and adequate equipment, teachers should have more software that is relevant to their curriculum in order to improve their attitude towards and use of technology. It is hoped that these graphic organizers can be one small step in promoting and encouraging teachers to utilize more technology into their instruction. Only when today’s technology, like books in the past, becomes an integral part of instruction will teachers possibly have a better attitude towards it and adequately incorporate it into their curriculum. As the CEO Forum admonishes “the bottom line is clear: technology, applied well, can enhance and reinvigorate education, making schools richer and more exciting interactive communities of learning for students and teachers alike” (1999, p. 6). In this age of standards and rigorous state testing, technology can be a beneficial learning tool that educators should recognize as a friend and embrace.
APPENDIX A:

TECHNOLOGY SURVEY
TECHNOLOGY SURVEY

Please circle the number that best reflects your attitudes towards the use of computers in teaching. (4=Strongly Agree, 3=Agree, 2=Disagree, 1=Strongly Disagree)

Teacher Attitudes

1) Computers are an important part of the academic program in my classroom.
   4  3  2  1

2) I feel that computers enhance the learning experience.
   4  3  2  1

3) It is easy to implement computers into my teaching practices.
   4  3  2  1

4) Drill and higher level thinking activities such as authoring tools are equally as important when it comes to computer instruction.
   4  3  2  1

5) Computers help me enhance my teaching.
   4  3  2  1

6) Computers are valuable research and presentation tools.
   4  3  2  1

7) The computer activities that I use in my instruction are easy to implement.
   4  3  2  1

8) Teaching beginning computer literacy is the responsibility of the elementary teacher.
   4  3  2  1

9) Teachers must have basic computer proficiency skills.
   4  3  2  1

10) I feel qualified to teach basic computer literacy.
    4  3  2  1
11) Constructing computer support activities for my is too time consuming.

12) I feel comfortable in providing my students with instruction for using or creating a multimedia program such as Hyperstudio or Power Point.

Classroom Access to Computers

14) It is important for students to have ample computer access time.

15) I have access to adequate resources for incorporating computers into my instructional activities.

16) It would be useful to have access to preconstructed, higher level thinking, computer activities.

17) I have an adequate number of computers for my students in the classroom.

18) I have a limited amount of computers in my classroom, I have a plan for providing each student with adequate access.

19) If provided with easy to implement higher level thinking computer activities, I would be interested in those addressing Language Arts.

20) If provided with easy to implement higher level thinking computer activities, I would be interested in those addressing Math.
APPENDIX B:

TECHNOLOGY SURVEY RESULTS
## Technology Survey

<table>
<thead>
<tr>
<th>Question</th>
<th>Percentage of Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computers are an important part of the academic program in my classroom.</td>
<td>25% 35% 35% 5%</td>
</tr>
<tr>
<td>I feel that computers enhance the learning experience.</td>
<td>35% 65% 0% 0%</td>
</tr>
<tr>
<td>It is easy to implement computers into my teaching Practice.</td>
<td>10% 35% 55% 0%</td>
</tr>
<tr>
<td>Drill and higher level thinking activities such as authoring tools are equally important when it comes to computer instruction.</td>
<td>31% 58% 11% 0%</td>
</tr>
<tr>
<td>Computers help me enhance my teaching.</td>
<td>15% 55% 25% 5%</td>
</tr>
<tr>
<td>Computers are valuable research and presentation tools.</td>
<td>47% 42% 11% 0%</td>
</tr>
<tr>
<td>The computer activities that I use in my instruction are easy to implement.</td>
<td>05% 58% 32% 05%</td>
</tr>
<tr>
<td>Teaching beginning computer literacy is the responsibility of the elementary teacher.</td>
<td>23% 59% 18% 0%</td>
</tr>
<tr>
<td>Teachers must have basic computer proficiency skills.</td>
<td>65% 35% 0% 0%</td>
</tr>
</tbody>
</table>
## Technology Survey (Cont.)

<table>
<thead>
<tr>
<th>Question</th>
<th>Percentage of Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel qualified to teach basic computer literacy</td>
<td>26% 48% 21% 05%</td>
</tr>
<tr>
<td>Constructing computer support activities for my instruction is too time consuming.</td>
<td>32% 53% 05% 10%</td>
</tr>
<tr>
<td>I feel comfortable in providing my students with instruction for using or creating a multimedia program such as Hyperstudio or Power Point.</td>
<td>06% 0% 56% 38%</td>
</tr>
<tr>
<td>It is important for students to have ample computer access time.</td>
<td>47% 53% 0% 0%</td>
</tr>
<tr>
<td>I have access to adequate resources for incorporating computers into my instructional practices.</td>
<td>07% 13% 47% 33%</td>
</tr>
<tr>
<td>It would be useful to have access to preconstructed, higher level thinking, computer activities.</td>
<td>75% 25% 0% 0%</td>
</tr>
<tr>
<td>I have an adequate number of computers for my students in the classroom.</td>
<td>0% 06% 41% 53%</td>
</tr>
<tr>
<td>If I have a limited amount of computers in my classroom, I have a plan for providing for each student with adequate access.</td>
<td>19% 50% 25% 06%</td>
</tr>
<tr>
<td>Question</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>If provided with easy to implement higher level thinking computer activities, I would be interested in those addressing Language Arts.</td>
<td>65%</td>
</tr>
<tr>
<td>If provided with easy to implement higher level thinking computer activities, I would be interested in those addressing math.</td>
<td>65%</td>
</tr>
</tbody>
</table>
APPENDIX C:

STORY MAP
<table>
<thead>
<tr>
<th><strong>Story Map</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Characters</strong></td>
</tr>
<tr>
<td><strong>Setting</strong></td>
</tr>
<tr>
<td><strong>Main Problem</strong></td>
</tr>
<tr>
<td><strong>Event #1</strong></td>
</tr>
<tr>
<td><strong>Event #2</strong></td>
</tr>
<tr>
<td><strong>Event #3</strong></td>
</tr>
<tr>
<td><strong>Solution</strong></td>
</tr>
<tr>
<td><strong>Theme or Moral</strong></td>
</tr>
</tbody>
</table>
APPENDIX D:

OUTLINE STORY
Pigs

Pigs look different from other animals. They have strong bodies covered with coarse hair. Pigs also have a snout at the end of their head which is their nose. Pigs do not see very well. However, they have a good sense of smell which helps them find their food. Pigs have short curly tails. They also have four toes on each foot. When fully grown, a pig can weigh up to 500 pounds or about as much as two grown men.

Pigs have several different names. Young pigs are usually called piglets. A group of baby pigs is known as a litter. A boar is a male pig of any age. A sow is a female pig. A group of pigs is called a herd. Pigs are also called hogs or swine.

Pigs on a farm have special needs. The main food that pigs eat is corn. They also eat sorghum, barley, wheat, rye and oats for energy. Pigs may either be kept in buildings or in an outside pen. If a pig lives in a pen or lot, it usually has a small hog house in which to sleep.
APPENDIX E:

OUTLINE
Outline

Title

I. Main Idea Paragraph 1
   A. Supporting fact 1
   B. Supporting fact 2
   C. Supporting fact 3
   D. Supporting fact 4
   E. Supporting fact 5

II. Main Idea Paragraph 2
   A. Supporting fact 1
   B. Supporting fact 2
   C. Supporting fact 3
   D. Supporting fact 4
   E. Supporting fact 5

III. Main Idea Paragraph 3
   A. Supporting fact 1
   B. Supporting fact 2
   C. Supporting fact 3
   D. Supporting fact 4
   E. Supporting fact 5
APPENDIX F:

BOOK REPORT TITLE CARD
Title Card as it appears in the activity
APPENDIX G:

BOOK REPORT SUMMARY CARD
Charlotte's Web is a story about friendship. In this story a girl named Fern saves a little pig from being killed by her father. Her dad wants to kill Wilbur because he is a runt, or the littlest pig in the litter. Instead, the father gives the tiny pig to the girl to raise and she names him Wilbur. Wilbur happily lives with Fern as his friend on her farm.

Eventually, Wilbur grows too big to live with Fern. So she gives him to her uncle, Mr. Zuckerman. The Zuckermans want to raise Wilbur and later eat him. As Wilbur grows used to his new home, one of the other animals tells Wilbur that he is to one day be the Zuckerman's dinner. Wilbur is very upset. He is lonely on the farm and wishes for a friend. He communicates with the other animals.

Summary Card as it appears in the activity
APPENDIX H:

BOOK REPORT CHARACTER CARD
Who was your favorite character?
Wilbur
Why did you like him?
He was kind, friendly and smart
How did he or she change in the story?
At the beginning of the story, Wilbur was a selfish cry-baby. By the end of the story he had grown up and cared as much about others as he cared about himself.
What would other characters in the story say about this character?
They would say that he was radiant.

Please read these instructions carefully!
Choose a character from your book and answer the questions about him or her.

Character Card as it appears in the activity
APPENDIX I:

BOOK REPORT SETTING CARD
Setting:
The setting for most of this story is a modern farm. All the animals live happily together there. The story could have happened in any area of the United States where there are a lot of farms. The story also takes place at a fair. It happened recently because the book talks about trucks and ferris wheels which were not around over one hundred years ago. In addition, the story takes place through many seasons of the year. The setting is important to the story because all of the main characters

Setting Card as it appears in the activity
APPENDIX J:

BOOK REPORT THEME CARD
The theme of this story is that friends are very valuable. Sometimes they can help when no one else can!
APPENDIX K:

BOOK REPORT EVALUATION CARD
Charlotte's Web is a great book. It is exciting and interesting to read. I liked all of the characters in the book. I just wish that Charlotte didn't have to die in the story. The book would have been better if she had lived. Maybe instead of dying she could have had

Please read these instructions carefully!
On this card you will evaluate your book. On a scale of 1–10, with 1 being the lowest and 10 being the highest, how would you rate this book? What did you like about the book? What would you change about this book if you could? Would you tell a friend to read this...
APPENDIX L:

FORMATIVE EVALUATION
Formative Survey

Please circle the number that best reflects your experience in using the created language arts graphic organizers with your students. (4=Strongly Agree, 3=Agree, 2=Disagree, 1=Strongly Disagree)

1) These graphic organizers are useful to my instruction of language arts in the classroom.
   4 3 2 1

2) I would be more likely to have my students engage in higher level thinking activities incorporating the computer when using these types of graphic organizers.
   4 3 2 1

3) My students would have an improved reading comprehension when using these types of graphic organizer.
   4 3 2 1

4) My students enjoy completing these types of computer activity.
   4 3 2 1

5) I found the story map to be a beneficial activity for my students.
   4 3 2 1

6) I found the Venn diagram activity to be a beneficial activity for my students.
   4 3 2 1

7) I found the outline activity to be a beneficial activity for my students.
   4 3 2 1

8) I found the book report to be a beneficial activity to my students.
   4 3 2 1

9) Please write below any comments you have about the graphic organizers.
APPENDIX M:

FORMATIVE EVALUATION RESULTS
# Results of Formative Evaluation

<table>
<thead>
<tr>
<th>Questions</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>These graphic organizers are useful to my instruction of language arts in the classroom.</td>
<td>83%</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>I would be more likely to have my students engage in higher level thinking activities incorporating the computer when using these types of activities.</td>
<td>50%</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>My students would have an improved reading comprehension when using these types of graphic organizers.</td>
<td>33%</td>
<td>67%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>My students enjoy completing these types of computer activities.</td>
<td>67%</td>
<td>33%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>I found the story map to be a beneficial activity for my students.</td>
<td>83%</td>
<td>17%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>I found the Venn diagram to be a beneficial activity for my students.</td>
<td>100%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>I found the outline activity to be a beneficial activity for my students.</td>
<td>60%</td>
<td>40%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>I found the book report to be a beneficial activity for my students.</td>
<td>50%</td>
<td>50%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>
APPENDIX N:

STUDENT SAMPLE STORY MAP
<table>
<thead>
<tr>
<th>STORY MAP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Characters</strong></td>
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