

2000

Assessing the impact of hypertext on learners motivation and achievement in language arts

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ASSESSING THE IMPACT OF HYPERTEXT
ON LEARNERS MOTIVATION AND ACHIEVEMENT
IN LANGUAGE ARTS

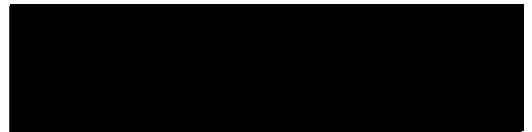
MASTER'S THESIS

Submitted to the School of Education
University of Dayton, in Partial Fulfillment
of the Requirements for the Degree
Master of Technology in Education

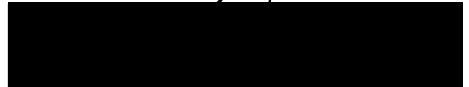
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August 2000

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Abstract

The increased technology availability for schools has brought about questions of how this technology should be used, if it is effective with our students, and if it is a motivator that can help to engage our students. This study investigated one aspect of using technology through the use of hypertext, asking the questions of whether hypertext would have an effect on the performance and motivation of students participating. Using a one group Pretest-Posttest Design, an already intact eleventh grade language arts class completed an eighteen-week project comparing the use of hypertext to that of regular text. The results indicated that students were more motivated, performed more consistently, were more engaged, and retained more information using hypertext.

Assessing the Impact of Hypertext on Learners Motivation and Achievement in Language Arts

Chapter I Introduction

Some of the major concerns in education today are the motivation of students to participate in their own education, how the brain actually learns, and the effect of technology, such as hypertext, on motivation and learning. Can the use of hypertext-based versus text-based compositions vary? To what extent do these differences vary across individuals of different exposure to technology across the selected subject of English? Are students more willing to comply with hypertext assignments?

Students face a world in which the images they see, such as MTV, change every 1-3 seconds. They are accustomed to the use of television, VCRs, video games, car phones, pagers, sophisticated tape recorders, advanced electronic calculators, and in some cases ... even computers. They are no longer just linear, lecture-based learners, making it difficult to engage all students with traditional teaching methods. They could benefit from an approach to learning that no longer requires that thought only be of a linear, hierarchical structure (Edelman, 1992). They benefit from a means of expression that reflects more directly how the brain works in all of its complexity and its outpouring of interrelated ideas.

In the article by Edelman from "Funderstanding", a website specializing on providing information related to learning, Edelman states that one of neurosciences findings is that the brain is not a computer. The structure of the brain's neuron connections is loose, flexible, webbed, overlapping, and redundant. It is impossible for such a system to function like a linear or parallel-processing computer. Instead the brain

is better described as a self-organizing system that allows students to express their thoughts as they occur in a stream-of-consciousness style. This style can be achieved by the use of some form of a hypertext (Reinking, 1994, p. 24).

Background of the Study

According to Reinking (1994), hypertexts remind us that having the discipline to organize thoughts into a linear hierarchical argument is a substantial part of literacy only because print technology doesn't provide other ways to structure an argument, not because that is the natural way we think. He suggests that as computers become ever more prevalent in the classrooms of today, we must consider how that technology may both support and constrain literacy development, while it changes our very definition of the nature of reading and writing. Reinking suggests that hypertext is "the harbinger of the post-typographic world (p. 24).

Larry Cuban (1998), in an interview with *Technology and Learning*, says that we don't really know if technology in education is effective or not because we have not yet measured its true impact on learning. He says there has been much research about computers in the classroom and much anecdotal evidence but no body of serious research to measure whether it can help in areas such as intellectual development. He says his hunch is that it does, but we will not know for sure until further research is done. In his article in *Education Week*, "The Technology Puzzle" (1999, August), Cuban states that more computers would be used in classrooms by teachers if they had time to implement programs, could see the reasons why their use would warrant the extra preparation and loss of other instructional time, and consistent advice from experts instead of the ever changing advice available at present.

Dr. Terrel Bell, former Secretary of Education, is the author of the *Nation at Risk* (1989) report that lit a fire under American education. He said that traditional classrooms where the “chalk and talk” method of teaching thirty or more students, all facing a teacher and a chalkboard, is outdated and must be replaced. He said that today’s youth are tired of listening to teacher lectures and call it ‘yak in the box’.

John Goodlad (1994, p.105) described U.S. classrooms as the popular image of a teacher standing or sitting in front of a class imparting knowledge to a group of students. According to teacher and student interviews and his observations, Goodlad concluded that lecture and explanation made up the most frequent teaching activities and increased steadily from the primary to the senior high school years. The discourse in most classrooms was described as fan shaped (Martin, 1983), with the teacher at the focal point of the fan. The following quote is from Margaret Cintorino (1993) and describes this picture:

The teacher stands at the front of the room and addresses the large group. Some of the students listen; some do not. Some of the students accept the validity of the teacher’s words and the teacher’s right to say them; some do not. Some of the students absorb the teacher’s proffered construction of knowledge and alter their own systems of knowledge in response; most do not. It is a difficult and detached way to learn. (p. 23)

Martha Rapp Ruddell, in an article from *Reading Online*, “Dot.com Lessons Worth Learning” (2000, July), describes a TV commercial that aired for the first time during the Superbowl game. Kids are talking – telling a story collectively, and avidly, saying things like; there’s these aliens, see, and they’re coming at us, and they keep coming closer and closer. As they talk the children are gesturing excitedly and adding details to the story, and there is absolutely no doubt about their engagement in the

activity. Then comes a voice-over that says something like, when we can get them this interested, we can teach them anything. A silent visual message follows that gives a dot.com Web site address.

This is a lesson well worth learning. When students are engaged and interested, when the room appears to crackle with energy and excitement, and when everyone, including the ones not considered the “good” kids, participates fully... real learning happens. This is further illustrated by research reports (Catterall, 1995; Petrosko, 1998) that again emphasize the importance of engaging to allow active learning that increases student achievement as well as test scores. This research counter-balances the ideas being pushed on educators to use transmission models of teaching to increase scores on the newly mandated high-stakes proficiency testing. These methods don’t call upon students to build, draw, perform, role-play, or make things (Goodlad, 1994, p. 105). And now, twenty years after Goodlad’s study, we know that seatwork in many classrooms still is dominated by drill and practice on the facts and skills measured by standardized tests, and often a hiatus from teaching and learning occurs for children to “practice” taking an upcoming state-mandated test (as observed in this researcher’s school).

These reports indicate that educators need to find alternative methods of instruction if we are to succeed in teaching students in the world of today. As Reinking (1994) stated above, technology, hypertext included, may be part of the answer.

Statement of the Problem

The purpose of this research was to determine if the use of hypertext has an effect on students’ architecture of literacy learning spaces? Will the use of technology in the form of hypertext make a difference in the way students learn? Will hypertext have an

effect on learners' motivation and achievement when studying language arts? Will doing research using hypertext, writing using hypertext, and creating electronic portfolios using hypertext have an effect on how students' learn, or will their motivation and achievement remain the same as using regular text?

Statement of the Hypothesis

The speed that technology is moving into education is dramatically exponential. Technology, including hypertext utilization, is widely used in business, thus education must embrace technologies' use. The World Wide Web is considered the mother of all hypertexts (Reinking, 1997). Educators are struggling to determine if there are best methods for putting technology to use in educating the youth of the world. Some research has been done on the effect of the use of hypertext on students' learning. Although there is base research, the authors of that research have called for further investigation into the effect of hypertext in teaching. This project was prepared in response to those calls for additional research.

Therefore, it was hypothesized that students using hypertext will be more motivated to engage in their assignments. Second, students using hypertext will achieve better in language arts than when they use regular text alone.

Null Hypothesis

The two null hypotheses for this project are:

There will be no significant difference in the motivation of students to engage in academic assignments relative to hypertext and non hypertext activities.

There will be no significant difference in the achievement of students completing assignments using hypertext and non hypertext.

Chapter II

Review of the Literature

Today's graduates must be prepared as students for a job market in a world that is already interfaced with technology and beginning to demand that they know how to communicate electronically. The Buffalo News (1999) recently reported that one in three U.S. workers now uses computers for bookkeeping, inventory control, communications and databases; for workers with college degrees, the number who use computers on the job is even higher – almost 60 percent. We as educators are becoming aware that our graduates must be technology-literate if they are to compete in today's workplace.

Dr. David Dwyer (1998) was with Apple's Classroom of Tomorrow Project for a number of years. In an interview with *Technology and Learning Online*, he was asked if students wrote more using technology made them better writers. He said that word processing didn't automatically make them write better but they became more engaged in their writing and that unless the kids are engaged, you don't get anywhere.

Integration of Literacy Instruction and Technology

Much research has been done to examine the integration of literacy instruction and technology (Leu, 2000; Reinking & Bridwell-Bowles, 1996; Reinking, McKenna, Labbo, & Kiefer, 1998). Some of that research examines the impact of word processors on written expression (Cochran-Smith, 1991; Edinger, 1994; Labbo, 1996). Most studies have shown that using this technology is beneficial, especially in revision (Baker & Kinzer, 1998). Even further research shows that once the World Wide Web and hypertext are included in the instruction of the development of writing abilities, students

can find support for their writing efforts (Anderson-Inman, 1997). The use of the Web also increases their awareness of audience (Gallini & Helman, 1995) and gives beneficial feedback (Guhlin, 1996).

Even though these studies have shown the effectiveness of technology for encouraging students to develop better reading and writing abilities, they have not given a clear picture of instructional approaches and methods to use when integrating this technology into literacy programs. Zorfass (1992) examined the inquiry approach in middle school classrooms to integrate technology into the literacy curriculum. Even though the approach was successful, the teachers determined that the extra time required for collaboration between disciplines was time consuming.

Hypertext

In an article titled "Multimedia Literacy: Transforming Meanings and Media", Lemke(1994) states that there is a close correspondence between multimedia authoring skills and analysis to traditional skills of text-writing and critical reading. He further states that we need to understand how restrictive our literacy education traditions have been before we can see how much more students will need than we are giving them for the future. We do not teach students how to integrate drawings, pictures, graphs, and diagrams, much less photo images, video clips, sound effects, voice audio, music, or animation into their writing. He states that what we really need to teach is how various literacies, various cultural traditions, combine these different modalities to make meanings that are more than the sum of what each could mean separately.

Research also has found that difficulties encountered by students who have a learning disability in expressing themselves in writing were helped by the use of

multimedia applications (MacArthur (1996). The use of this technology can also encourage cooperative learning and increase lexical density, revisions, cohesion, and metacognitive talk (Jones & Pellegrini, 1996; Klenow, 1992; Moeller, 1993).

Once students are allowed the freedom from the narrow restrictions of the literacy education traditions Lemke talks about, they will be able to write as they think and create hyperlinks to enable the readers to browse all their related ideas, allowing them to become engaged as Dwyer suggested above. The pressure to think and create in a linear fashion is relieved allowing the student to concentrate on the creation of the text. The process of pulling together representative work from a year of contributions to a language arts class into a portfolio of word processed, tidy pages becomes an exciting prospect that allows the student writer to develop a text that is multi-layered, multi-media-based, sound and video enhanced, and non-sequential (Tierney et al., 1997). This freedom of creation appears to have the potential for changing how we learn, what we learn, and the kind of community and communication we create. (Tierney, et al.)

Directions Indicated by Research

The creation of hypertext and other authoring systems, such as PowerPoint, allows literacy to be supported by new conventions and new ways of interacting. Students are allowed to create a product using the following: new means to display ideas when and where they are relevant to the text by allowing the reader to scroll, use hyperlink buttons, and other means to navigate through the text; links to create a “pulsing network of ideas” (Bolter 1991); and taking the mundane alphabetical text presentation of ideas and interlacing it with graphics, video clips, animation, or explanatory links; creating a relationship with readers unlike linear texts in which the participant can

explore the multiple layers of the writing, accessing ideas and communications asynchronously.

In the Apple Classroom of Tomorrow, students embraced the multimedia and multi-layered texts, saying that texts were “no longer boring, but dynamic” (Tierney et al., 1997). They critiqued each other’s creations with the same attention they might give to a video game. Students continually asked, “How did you do that?” “Where did you get that graphic?” “Can I borrow that idea?” and “I might modify and use that in my own project” (p.3).

The discussion here about technology, including whether it is good or bad for teaching, is built upon the myth that we can stand apart from technology. As Suchman (1988, p. 174) says, “We are taught to view the political and the technological as separate spheres, the former having to do with values, ideology, power, and the like, the latter having to do with physical artifacts exempt from such vagaries of social life.” Thus, we conceive a set of doors into alternate futures, reflecting a free choice among new technologies, and ask “whether” we should pass through. In actuality, we and our technologies constitute invisible entities (Bijker, Hughes, & Pinch, 1987). Technology is not something that people will choose to adopt; it is already a part of our literacy practices regardless of what we do. This research addressed one aspect of implementing that technology in education.

There are many different kinds of technology, applications, and uses for education. According to Means et al (1993), these technologies, applications, and uses can all be classified as tutorial, exploratory, tool, and communications uses of technology. Tutorial uses of technologies like drill and practice programs and tutoring

systems may all be useful but are unlikely to magically transform education (Levin & Meister, 1985). Using these, educators end by teaching as they have traditionally done with the only difference being that they can reach more students.

Electronic Learning magazine (1998) stated that the new technology is essential in schools, but in order for it to work we can no longer afford to slap technology into a curriculum designed for 19th century classrooms. The new technological tools of the 21st century must be coupled with new visions about the work of teachers and students. Educators have a deep and abiding prejudice for books, particularly those that tell stories, over other forms of communication and artistic expression (Reinking, 1997). This is what behavioral scientists call conditioning and even though Reinking considers it a positive prejudice, he warns that even a positive prejudice narrows perspective and limits opportunity for one to grow in new directions. He says that we need to be open-minded enough to face the possibility that reading on some type of computer screen may be as endearing to future generations as reading pages in a book has been to ours. He questions if perhaps we as educators might be ethnocentric in our preference for one technology of reading and writing, even though the technology of books is environmentally threatening, using processes to make paper with the application of toxic chemicals to create the print on dried sheets of wood pulp and rag mush sewn and glued together. He questions also if we may even believe that books are the measure and the standard by which all literate activity should be judged for all time.

In an address to the National Reading Conference, Jim Flood (Flood and Lapp, 1995) further argued that literacy must even be expanded to include the visual arts. The term "representational literacy" was coined by the Technology and Cognition Group at

Vanderbilt University (1994) to show that a broader range of media and different forms of expression have to be considered a part of today's literacy and that includes the World Wide Web and hypertext in all forms.

Teirney et al. (1997) thinks that the change that needs to be made in the way we incorporate technology into our teaching is to use technology as tools and communication channels in order to provide students with a different kind of education, one that is created around the provision of challenging tasks that can get them ready for our technology-laden world. These methods are referred to as authentic because students are using them for the same kinds of purposes and in the same ways that adults will use technology outside the school walls. Thus, technology supports student performance of an authentic task. Technology use is integrated into activities that are core parts of the classroom curriculum.

The uses of technology that are meaningful require extended periods of time for their implementation. They call on skills and knowledge from other disciplines. They encourage small group work, with different students doing different activities, just as on a sports team, and with the teacher functioning as a coach and facilitator for many groups. These uses of technology are flexible and can support any curriculum and can be fully assimilated into a teacher's ongoing core practice (Means et al., 1993).

Tierney et al. (1997) uses just such implementation. The students aren't learning software specifically; they are learning it in order to create texts that are fun, different, and educational. They create texts that function like the brain, in a non-linear fashion, allowing students to write the way the human brain thinks.

The technology to teach or support anything we want to teach is available and improving every day. Although some research has been done on the impact of hypertext on students' perceptions, performances, and product; more still needs to be done. Studies need to be done over a longer period of time than the Tierney study (1997) in order to make it more generalizable. This research proposed to conduct a similar study, using fresh students that had barely been exposed to technology. The study was done to determine if there is a positive effect on students' motivation and performance using hypertext in teaching language arts.

Chapter III

Methodology

Purpose

The purpose of this study was to assess some aspects of electronic portfolios, using hypertext, on students' architecture of literacy learning spaces in language arts. In other words, will the use of hypertext, which is simply a collection of footnotes that take turns being the main text (Landow, 1992) (see Appendix D), allow students to build a new space in which to acquire literacy? Will this technology motivate better writing, allow easier access to information, or make a difference in any way in how the students learn? Studies have been done (Tierney, Kieffer, Whalin, Desai, Moss, Harris and Hopper, 1997) involving students in two areas of study including science and English, but they were of a very short three week duration, included only ten student participants, and used only one factor for assessment in English. Tierney and his colleagues stated that the study would need to be done under other circumstances to show the true impact on English. This research proposes to do exactly that. The study addressed two questions. First, will students become more enthusiastic participants when they use hypertext-based versus text-based. Second, would the students' products be of higher quality when they use hypertext rather than regular text?

The Participants and the Setting

The students participating in this study were two of the researcher's intact language arts eleven classes in an urban school setting in the Midwestern United States. The students (n=21) were assigned to classes at the beginning of the year. Students included about fifty percent African American and fifty percent Euro-American students

from various socioeconomic backgrounds, over fifty percent of students in the school receive free or reduced lunches. These students had varying degrees of experience with computers and software. Only one had ever used PowerPoint previously. The researcher had been their teacher for one semester by the time research began. The classroom was equipped with six computers, CD-ROMS, the World Wide Web, network to the school library with appropriate search software, a laser printer, video camera and player, a digital camera, and access to a class size computer lab and a scanner.

Students were rotated between writing that was hypertext-based projects and regular text projects, which together made up an electronic portfolio that determined the students' success in the course and the research study. The majority of the portfolio of work (both hypertext-based and regular text based) was based on an interdisciplinary project with American Government in which students created a colony on Mars in the year 2025. The colony developed, following the same events as the development of the United States. There are hyperlinks to historical events as well as scientific data and World Wide Web links to support the implementation of technology to terraform and settle Mars. The literature created by students loosely corresponds with the writings of American Literature.

Examples of the writing include journals and diaries of the earliest Martian settlers. They include letters home, entries that show the developing need for the colony to become independent of earth, a Martian Declaration of Independence, writings by colonists encouraging all members of the colony to unite and defeat earth's control over their destiny, a constitution that was developed after independence was gained, literature describing the war and the setting up of the new government and a Web Page to represent

the project online. The Martian Colony experienced a Civil War, an Interplanetary War I, an Interplanetary War II, a war to correspond with Korea and Vietnam, etc.

The writings were connected by hyperlinks to appropriate references in each, to other writings, and to scientific and literary resources added to the portfolios and to links on the World Wide Web as well as their own Web page. These products were part of the assessment of success in the research and completion of writing for the project.

Design

This research study was designed similarly to Tierney et al (1997) with the addition of adding quantitative measures making it a combination quantitative/qualitative study. The study uses a one-group pretest-posttest design using the added measure of taking two assignments from the beginning of the study, one using hypertext and one using regular text, and two assignments at the end of the study, again one using hypertext and one using regular text, to control for history and maturation. The quantitative statistics gathered were used to determine if null hypotheses could be rejected. The qualitative data were used for student intervention and curriculum decisions and were considered beyond the scope of this study.

The study used an essay format Pretest, and an essay format Posttest. On the pretest, students used regular text because they had no knowledge of hypertext at that point. On the posttest, they could choose which method, regular text or hypertext, they would use. The tests were evaluated using the same four point rubric (see Appendix B) for each test. A measure of student compliance to complete each, the pre and post assignments, was taken and evaluated using a rubric (see Appendix B). Each student produced a body of work that included both regular text-based assignments and

hypertext-based assignments. As in the Tierney study, the research compares the regular text work to the hypertext work of the same group of students using no control group, making it a one-group pretest-posttest design. Two of each type of assignment, along with the pretest and posttest, were chosen to use as measures of the effect of the use of hypertext. Finally, an interview consisting of twenty-eight questions based on the ones used by Tierney et al(1997) in their hypertext study were used to gain information about student attitudes toward the use of hypertext vs. the use of regular text in their research, reading, and writing. Again, these measures were evaluated qualitatively only for student intervention and curriculum decisions, unlike Tierney, who used the qualitative data almost exclusively.

Instructional Approaches

The teacher/researcher used both a modified inquiry approach and process writing in her literacy program. The inquiry approach gives students the opportunity to identify topics in which they are interested, research those topics, and present their findings (Leu and Kinzer, 1999; Macrorie, 1988). This method is designed to be learner centered because it allows students to choose their own research topics, rather than having them assigned. The researcher, as do many other teachers, found it necessary to use a modified inquiry approach because the interdisciplinary project and the curriculum for American Literature required that the project teach certain topics. For example, they were required to base the course on American Literature topics, but the researcher encouraged students to identify particular topics they wanted to research within the broad area of American Literature, space exploration and colonization for the Martian project.

Cooperative learning opportunities frequently presented themselves within the inquiry approach because students chose similar topics and often decided to research and present as a group. This inquiry approach also allowed better implementation of the interdisciplinary project because it created an integration across content areas, allowing students to incorporate social studies and science with their language arts study.

The process approach to writing instruction requires that children of all ability levels brainstorm, draft, edit, revise, and publish their own writing (Graves, 1983; Harste, Short, and Burke, 1988). In process writing students do not progress through a predetermined sequence of writing skills, instead, the teacher observes writing activities and provides minilessons for any student or group of students that need a skill at any stage of the writing process. This approach further encourages cooperative learning because it allows student authors to share their writing as well as peer edit and share the writing of other student authors. This in turn provides feedback and encourages students to understand better the reading-writing connection (Baker, Rozendal, and Whitenack, in press; Tierney and Shanahan, 1996).

Students and parent's signed informed consent forms allowing the students to participate in the research (See Appendix C). Of the forty-six students in the two classes, twenty one parents signed the consent form. The study measures are based on the performance of these twenty-one students. There were three Euro-American males, two Euro-American females, one Hispanic male, one Asian female, nine African-American females, and five African-American males.

Data Collection

Data was drawn from observations of students working on projects, interviews consisting of extensive discussion tied to 30 questions that were asked (See Appendix A for sample of these 30 questions), along with the students' participation, the projects themselves, and outcome and process measures as evidenced by the posttest and the portfolio (how has student knowledge shifted and have problem solving skills developed). Participants were asked how they would go about creating the assignments for their portfolios using hypertext and how they would create them with regular text. They were observed doing both.

Instrumentation

Pretest and Posttest

A pre-test was given in the form of a written assignment for a five paragraph essay. Along with the writing prompt for the pre-test assignment, students were given a four point rubric as a guide to what was expected as far as content, grammar, usage, and mechanics were concerned. A posttest was given using the same format as the written assignment for the pretest and assessed using a rubric parallel to that of the pretest rubric, after extensive research and writing using hypertext, with students having the opportunity to take this essay posttest using either hypertext or regular text as they chose. The two were assessed using the four point rubric.

Measure of Compliance

The compliance of students on the pre and posttests was measured using parallel rubrics (Appendix B), which found a significant difference between compliance on the pretest and on the posttest with the students being more compliant on the posttest.

Interviews

The interviews were based on discussion tied to thirty questions that were asked of each individual student. The results from interviews were analyzed and used to determine what intervention, if any, was needed with each individual student. These results were also catalogued to use in making curriculum decisions.

Time Factors

The study took place during the second semester of eleventh grade Integrated Language Arts /American Literature classes. The first semester taught basic language arts skills, terminology, basic computer skills and an introduction to the electronic portfolio study about to take place. The entire second semester was allotted for the completion of the study.

Data Analysis

Data from the thirty questions and responses were categorized according to similarities and differences between the two modes. Field notes were analyzed by each segment being coded, categorized, then analyzed (Glaser and Strauss, 1967; Towe, 1998; Strauss and Corbin, 1990). The projects, both electronic hypertext-based and regular text-based, were evaluated and compared as to degree of compliance shown and completeness and depth of the projects. The results were then reviewed by a knowledgeable peer, not directly involved in the study (Lincoln and Guba 1985).

The statistics; results from the pre and posttests, compliance measures, and the four assignments, with two being hypertext and two regular text, were evaluated using

Wilcoxon matched-pairs signed-ranks test, a nonparametric method based on a statistic calculated from signed ranks of differences.

The qualitative data was evaluated and used only for student intervention and in order to make better informed curriculum decisions. The qualitative data was considered beyond the scope of this study and not used in the final evaluation.

The Role of Researcher

It was the responsibility of the researcher to instruct students on all aspects of the projects, both using hypertext and regular text. The researcher taught research skills along with all required language arts skills to complete the research. The researcher collected all data, observed and recorded all sessions, analyzed observations of sessions, prepared and conducted all interviews, coded, categorized and analyzed interview data, synthesized all data, and reported results of research.

Provisions for Trustworthiness

The extent to which confidence can be placed in the research outcomes is moderate to high. The data collected from interviews, observations, and product were multiple sources of data across participants and times and used for student intervention. The researcher hopes to show credibility by showing that the study results are similar to the Tierney (1997) study the research is based upon, but evaluated using quantitative data collected. This similarity should also demonstrate transferability and the assumption that the results can be generalized to contexts beyond this study; whether they be quantitative, qualitative, or a combination of both, as was this study. Ethical considerations included having students and parent's sign informed consent forms allowing the students to participate in the research (See Appendix C). All information was kept confidential.

Member checks were conducted at regular intervals to insure that participants wanted to continue in research, to eliminate observer bias by checking researcher perception, and to clarify collected information.

Chapter IV

Results

The data acquired from this investigation confirms Tierney's longitudinal research (Tierney et al , 1997). As in Tierney's research, once the skills were learned to use hypertext, students showed more interest, were more willing to comply with assignments and showed improved research and writing skills. In addition, their main ideas were presented with more clarity and students retained information better. The students' comments in this research paralleled that of Tierney and his colleagues.

Students, in participating in the interview and discussion for this research, often stated that hypertext offered advantages not found in regular text. Some of their comments were; " The use of graphics offered clarity to ideas we presented.", "Having sound was way cool.", "The hyperlinks made going to other facts cool and we didn't have to keep repeating a point, we could just link to it.", "Research was much easier using the net.", and "At first it was hard because we had to learn to use the hypertext, but then, man, it was easier and a bunch more fun." When asked about how the use of regular text and hypertext are alike and how they are different, all but one student said that hypertext is more fun, more interesting, and made it easier to "hang-in" until the work was finished.

When looking back at the research done on the World Wide Web, it is apparent that Owston was correct when he said that no medium, in and of itself, is likely to improve learning unless it is effectively exploited (Owston, 1997). Students who had high absentee rates were less positive about the use of hypertext, the Web in particular,

because they lacked the practice and instruction the other students had been afforded by being present everyday. In order to get full value from using the World Wide Web, students must be instructed in its use and allowed the time to explore in a positive, structured manner, while under guidance.

Because analysis of data is from a single intact group, all change in their level of participation or their level of performance would more than likely be attributable to instruction or maturation. A pretest was administered to determine the starting point of the participants. The test was evaluated using a four point rubric (see Appendix B) that established a baseline for each student's performance and abilities before the introduction of the use of hypertext. At the end of the study, a posttest was administered. It was the same format and used the same rubric for evaluation as the pretest.

Pre/PostCompliance

In addition to the pre and posttests, a measure of compliance to the written assignments was taken in order to determine differences in motivation in students. In this way students' "early on" motivation was compared to their later motivation. Five students weren't interested enough to even take the pretest. Four of the students complied, giving very minimal effort to the test. The other twelve complied as was required. On the posttest, only two students refused to comply. All others complied, doing what was required to complete the assignment. The results were evaluated using Wilcoxon matched-pairs signed-ranks test, a nonparametric method based on a statistic calculated from signed ranks of differences and used because it is an equivalent statistic for a t-test when the assumption of normally distributed differences is not appropriate. Also, if samples are obtained from a nonnormal population, the Wilcoxon nonparametric

test controls the probability of Type I errors. Even though the power of the test to detect alternatives declines, despite maintenance of the significance level, it is better than the t test because the t test declines even more (Zimmerman, 1996).

Wilcoxin obtained ($T=3.116$ $p=.002$) for the difference between pre-compliance and post-compliance to the written assignment pre and posttests. Thus, one can reject the null hypothesis. Because the null is rejected, student compliance is positively affected by the use of hypertext. This is further illustrated by student comments in interviews such as, "My ideas were easier to present and illustrate using hypertext. I felt that what I was trying to say was much more clearly understood because there was sound where needed, video and graphics and cool stuff that made others want to read what I was saying." (student comment)

Pre / Posttest Writing

The pretest administered was a five paragraph writing assignment given early in the research. The assignment was to be evaluated using a four point holistic rubric (Appendix B), where 4=A, 3=B, 2=C, 1=D, and 0=cannot be scored. An assignment was evaluated to be a "4" that focused on the topic and had enough supporting ideas or examples with a logical structure. It conveyed a sense of wholeness with writing that showed a mature command of language. A "3" paper contained writing that was related to the topic with adequate supporting ideas and examples even though development may have been uneven. The order was logical with some sense of completeness. A "2" paper showed an awareness of the topic but contained loosely related material with ideas that were not developed. There was an attempt at organization but the paper lacked completeness. A "1" paper was only slightly related to the topic with few supporting

ideas and little or no organizational pattern. The rubric judged the overall information given in the essay, how well the information applied to the prompt given, sentence and paragraph structure, grammar, mechanics, and usage. The students were given the evaluation rubric along with the prompt as the criteria for the writing assignment. They were also given instructions, as with all writing assignments for the entire year, to pre-write, do a rough draft, peer edit, and word process a final draft to be evaluated by the researcher.

The posttest was administered at the end of the study in the same manner as the pretest. It was evaluated using a rubric parallel to the one used for the pretest. After both the pretest and posttest were evaluated, results of testing were evaluated using Wilcoxon matched-pairs signed-ranks test, as used with the pre and post compliance scores. The Wilcoxon obtained was significant ($p=.001$). A difference between the scores from the pre-test given early in the research and those of the posttest given toward the end of the research clearly found student efforts related to the use of hypertext.

Table 1.

Two-sided probabilities using normal approximation		
	PRETEST	POSTTEST
PRETEST	1.000	
POSTTEST	$p = .001$	1.000

Regular text versus PowerPoint Hypertext

The next measures taken were from a regular text writing assignment and a hypertext assignment very early in the study and compared to the same format regular text and hypertext assignments toward the end of the study. These assignments were part of the interdisciplinary project for the creation of a colony on Mars. The students' writing assignments were assessed using a four point holistic rubric as were the pre and

posttests. The rubric and the assignment prompts were given to students simultaneously as the criteria for the assignments. The results were again measured using Wilcoxon. Wilcoxon obtained was significant ($p < .001$) for the comparison of the regular text assignment and the hypertext assignment done early in the study. This finding indicates that students showed increasingly higher achievement on the hypertext assignments. Thus, once again, the data indicates a rejection of the null hypothesis.

Table 2.

Two-sided probabilities using normal approximation		
	Regular Text Assignment 1	PowerPoint Assignment 1
Regular Text Assignment 1	1.000	
PowerPoint Assignment 1	0.001	1.000

The regular text assignment was parallel in structure to the PowerPoint-hypertext assignment. Both were part of the interdisciplinary Mars Millennium Project that was done with social studies input.

Table 3

Wilcoxon Signed Ranks Test Results		
Two-sided probabilities using normal approximation		
	Regular Text Assignment 2	PowerPoint Assignment 2
Regular Text Assignment 2	1.000	
PowerPoint Assignment 2	0.001	1.000

$p = .001$

Figure 1 shows graphs that indicate that all but one student showed a change using hypertext. The vertical axis shows the possible scores from the rubric ranging from 0 to 4. The horizontal axis represents each of the students participating in the assignment. The graphs show a trend that indicates that students overall show a change in performance using hypertext and that the treatment worked for twenty out of twenty-one students.

Figure 1. Comparison of student performance on early regular text assignment (RTASSN1) compared to early hypertext assignment (PPASSN1)

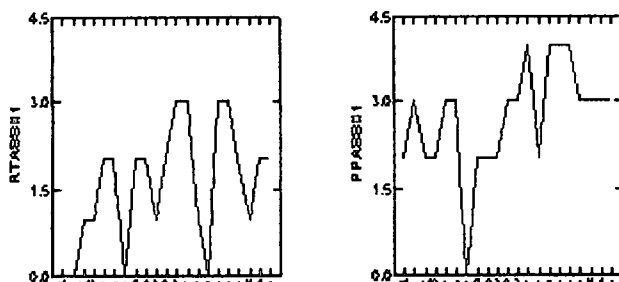
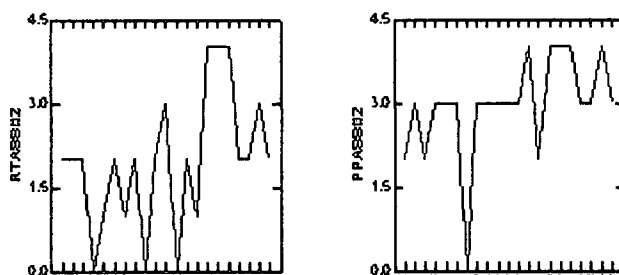


Figure 2 shows the results of the assessment using a rubric where an assignment was evaluated to be a "4" that focused on the topic and had enough supporting ideas or examples with a logical structure. It conveyed a sense of wholeness with writing that showed a mature command of language. A "3" paper contained writing that was related to the topic with adequate supporting ideas and examples even though development may have been uneven. The order was logical with some sense of completeness. A "2" paper showed an awareness of the topic but contained loosely related material with ideas that were not developed. There was an attempt at organization but the paper lacked completeness. A "1" paper was only slightly related to the topic with few supporting ideas and little or no organizational pattern. The rubric judged the overall information given in the essay, how well the information applied to the prompt given, sentence and paragraph structure, grammar, mechanics, and usage. Figure 2 indicates that at least three students scored maximum scores, "4" on the rubric, on the regular text assignment. All other students were below a "3" on the rubric. On the PowerPoint hypertext assignment, those three students were joined by two additional students. Thus, there was sixty six percent increase in the number of students with maximum scores using hypertext. Furthermore, while only two students produced written work that scored at the third level of the rubric using regular text, when a hypertext lesson was offered, eleven students performed at the third level of the rubric.

Figure 2. Comparison of student performance on late in the study regular text assignment (RASSN2) compared to late in the study hypertext assignment (PPASSN2)



In looking at Table 4, we see that the mean of scores were higher on the second set of tests than the first indicating growth in both regular text and hypertext. Looking at the variance we see that there is greater variance in the regular text than in the hypertext, indicating more consistency with the hypertext.

Table 4

	PRECOMP	PRETEST	POSTTEST	POSTCOMP	RTASSN1
N of cases	21	21	21	21	21
Mean	1.048	1.667	2.905	1.714	1.571
Variance	0.548	1.533	1.690	0.414	1.057
	RTASSN2	PPASSN1	PPASSN2		
N of cases	21	21	21		
Mean	1.952	2.714	2.952		
Variance	1.448	0.914	0.848		

Summary

The eleventh grade students who participated in the study were positively affected by the use of hypertext in studying language arts. These students experienced a change in motivation toward completing work for language arts and produced higher quality academic products. Students' comments also indicate that they were better motivated to be more consistent in their performance on hypertext assignments. All data indicate that hypertext enhanced these students' language arts program at the eleventh grade level. In Chapter V, a discussion and recommendations of these findings are presented.

Chapter V

Conclusion

The study's goals were to assess whether the use of hypertext had a positive effect on the motivation and performance of high school students in language arts. It asked the basic question: Are there identifiable differences in the motivation and academic products of eleventh grade students when hypertext-based lessons were used instead of text-based lessons?

This results of the study indicate that students are affected positively through the use of hypertext in language arts. Through the collected data, the researcher was able to qualitatively assist individual students and make curriculum decisions. The qualitative findings, although beyond the scope of this project, strongly suggest that this model, based on the work of Tierney et al be continued.

Pretest Assessment

The use of a pretest assessment was indicated for determining students base level of performance in language arts. The test was a written assignment administered very early in the research process. A writing prompt and a holistic grading rubric were given to guide students through the assignment. In addition to the writing assignment itself, a measure of compliance was taken in reference to that assignment. Students were far from enthusiastic about having to write a paper that required prewriting, rough drafts, peer edits, and researcher evaluation. Results from the pretest were evaluated and formed a baseline from which to measure student progress after the application of the treatment.

Posttest Assessment

The posttest was also a written assignment guided by a writing prompt and a parallel holistic rubric . Once again, compliance measures were taken. After evaluating the posttest scores, they were further evaluated in comparison with the pretest scores. Results indicated that students were more compliant with the posttest and their mean score was higher than that of the pretest. If one reviews Table 3, the mean for the pretest was 1.667 and 2.905 for the posttest, indicating a very positive rise in scores for the posttest. The mean for compliance on the pretest was 1.048 and 1.714 for the posttest, again indicating a positive change in compliance toward the testing. An interesting aside was that students showed a positive growth in assignments done using regular text with a positive change from a mean of 1.57 to a mean of 1.92. The growth was not as significant as that of using hypertext, but was a high enough difference to be interesting.

Table 4 also indicates that there was a higher consistency of performance using hypertext than using regular text with a mean of 2.714 for the first hypertext assignment and a mean of 2.952 for the second. If compared to the regular text assignments, the hypertext show a significantly better performance as well as being more consistent as is shown by the mean of the first regular text assignment being 1.571 and the second at 1.952. These results indicate both better and more consistent student performance using hypertext.

Reflections

Using the Web for research and for sharing what we had learned capitalized on the distributed nature of knowledge and socially based learning models (Vygotsky, 1983).

Students learned through, about, and with technology in order to complete their projects. They were truly impacted beyond our class by the technology we had learned. Several students created their own personal Web pages and extended our class Web page. A growing body of research in the cognitive sciences suggests that students learn and better retain what they learn when engaged in "Authentic" learning tasks (Conte, 1997). In schools, as in this project, this simulated authentic learning often comes in the form of an individual or a small group of students actually carrying out simulated real world projects using computer and network software tools and databases. In this project, students were creating a government and a civilization on Mars. In addition to improved subject matter learning, students develop their skills in cooperation, communication, and problem identification with this approach (Resnick, 1987a, pp. 13-20; Resnick, 1987b; and Raizen, 1989.)

In previous American Literature classes I have taught, most students have a difficult time remembering the different periods of the literature such as the Romantic Period, the Period of Realism, etc. These students had researched each period thoroughly, either individually or as a group, then presented to the rest of the class using hypertext presentations. Because the use of hypertext easily allowed for simulated authentic assignments, such as the studying of the Constitution in order to write a constitution for their created Martian colony, the students appeared to become a part of the studies, not merely doing the work for a grade. One of the benefits was the fact that the authentic tasks appeared to be of great value in students truly understanding the periods of literature and remembering them.

The Participants

This project was conducted using intact classes of eleventh grade language arts students that had been assigned to the classes. The population was ethnically diverse, having Asian American, African American, Hispanic and Euro-American students. Tracking is no longer in place in the researcher's school, creating very diverse classes with students that range from inclusion with various learning disabilities, to semi-gifted students who are easily bored. This situation can lead to challenge in keeping all levels of students engaged in the activities. This researcher found, as a personal observation, that students from both extremes remained better engaged using hypertext than when using regular text only. One real threat to that engagement was the high absenteeism in both classes that made up the research population.

One possible solution for that absenteeism could be to pay the students for attending, as did other previous research (Tierney et al, 1997). Many of the students in this research population were required to work in the evenings to help with family support, causing them to oversleep or not feel well enough to attend school. If a stipend could be provided during research periods, perhaps attendance would be more consistent.

Assumptions and Limitations

Additional studies could possibly include across the curriculum studies using a control and a treatment group. This type of study could better determine the effect of hypertext in other subject areas. Schools such as the large inner city, multicultural one used in this study, however, have limitations that make doing research extremely trying and difficult. Technology control, such as creating and updating web pages is only done once a month. Students need more immediate feedback and more direct control over their work. The population and location need to be carefully considered to eliminate

many of the problems this researcher faced. Tierney's ability to use Apple's Classroom of Tomorrow effectively eliminated many of the problems the average teacher/researcher would encounter. Obviously, these issues must be taken into consideration when doing an across the curriculum study.

Another consideration for continued study would be the effect of the researcher on the study. This researcher found that student loyalty toward the teacher was a strong motivator to students who liked their instructor, with the converse also being true. A study of this type might be better served if administered by an outside researcher. Objectivity would more clearly be possible than in research done by one who is responsible for each and every student's success or failure in the subject they teach.

Suggestions for Additional Study

The Tierney et. al. study as well as many similar studies mentioned in this research seem to follow the same findings trend. More research, and research that tests different applications of hypertext use is still needed to confirm where to use hypertext and where regular text could be more efficacious.

A final suggestion for further study would be distantly related to the present study in following up on Larry Cuban's theories as to why teachers are reluctant to implement the inclusion of technology such as hypertext in their classrooms. If more studies were done to discover the most effective implementation of hypertext for both student and teacher, would the use of this technology be more prevalent? Is professional development in districts unproductive or incomplete for the teacher training necessary to complete this implementation? Perhaps the two studies could be tied together to ask the

question of whether teacher training has an effect on whether students show more growth and motivation using hypertext than regular text?

This research brought forth many issues that need to be resolved before technology that uses hypertext, especially the use of the World Wide Web, can effectively be integrated into every school's curriculum. Control of the technology uses in the school, teacher training, time for teacher preparation, and how the use of hypertext should be implemented are just a few of the issues that must be addressed in order to successfully use the plethora of information that is available to most students. Not only should this study be replicated, but other studies that address further issues should be conducted if we are to smoothly integrate the use of technology, hypertext in particular, into the classroom.

Appendix A Interview Questions

(Modified/Used with Dr. Tierney's permission)

Appendix A contains a total listing of student interview questions within categories (the letters A to K show main areas and the letter F with a number show the original order of questions within the final interview format; PP stands for PowerPoint, RT for regular test, and B for both). These categories were chosen to organize the data, but were not taken to be mutually exclusive.

- A
 - F-02 A F-02 Based on my observations of what you have done, what do you think I will learn about the similarities and differences between PP and RT?
 - F-06 F-06 What are your views about the sim and diff between doing projects on PP and doing them with RT?
 - F-09 F-09 What ways do they serve similar of different purposes?

- B
 - F-10 B F-10 In what ways do they contribute to learning different things?
 - F-11 F-11 How would you characterize or describe the type of Things you learned from doing PP projects vs. RT projects?

- C
 - F-03 C F-03 Based on my observations of your finished products, what do you think we will learn about the work of putting together these projects?
 - F-12 F-12 In what ways do you approach PP and RT projects differently?
 - F-13 F-13 What types of things are easier, more difficult, and Why?

- D
 - F-14 D F-14 Describe for me how the written text on PP may differ from a regular text.
 - F-15 F-15 What impact does that have?
 - F-16 F-16 Describe the use of graphics (pictures) on PP and RT And how they differ and have different impacts.
 - F-17 F-17 Are there things you do with text in PP that you don't do in RT?

- E
 - F-04 E F-04 Use of resources
 - F-20 F-20 What resources are important for PP vs. RT?

- F-26 F-26 How do multimedia options assist or complicate the development of PP pages?
- F-23 F-23 Do you have any suggestions as to what other resources you would have liked to have and any comments on the resources that we did provide?
- F F-05 F F-05 Interviews and pre-post-test measures
- G F-07 G F-07 Tell me about yourself as a writer using PP.
F-08 F-08 Tell me about yourself as a writer using RT.
F-21 F-21 What is the easiest about writing on PP and in RT?
F-22 F-22 What is the most difficult about writing on PP and in RT?
- H F-18 H F-18 In what ways are the ideas included in PP vs. RT different?
F-27 F-27 Where did most of your ideas come from for the written assignment?
F-28 F-28 Where did most of your ideas come from for the PP assignment?
- I F-19 I F-19 In what ways do you think people respond differently to PP vs. RT?
- J F-24 J F-24 What did you like and dislike about being involved in this project?
F-25 F-25 Any other reactions or suggestions?
- K F-01 K F-01 Tell me some of the things you have learned from being in this study.
F-29 F-29 What was the most exciting piece of information you learned about yourself?
F-30 F-30 What was the most exciting piece of information that you learned about English?

Appendix B

Rubrics and definition of variables

The columns labeled "Pre Comp" and "Post Comp" represent compliance for the pre-test and for the post-test using the following key:

- 0 = non-compliance
- 1 = compliance
- 2 = enthusiastic compliance..

The pre and post- tests (columns headed "Pre-test" and "Post-test") and all other writing assignments were scored using the following holistic rubric with 4=A, 3=B, 2=C, 1=D, and 0=cannot be scored:

- 4 The writing focuses on the topic with ample supporting ideas or examples and has a logical structure. The paper conveys a sense of completeness, or wholeness. The writing demonstrates a mature command of language, including precision in word choice. With rare exceptions, sentences are complete except when fragments are used purposefully. Subject/verb agreement and verb and noun forms are generally correct. With few exceptions, the paper follows the conventions of punctuation, capitalization, and spelling.
- 3 The writing is generally related to the topic with adequate supporting ideas or examples, although development may be uneven. Logical order is apparent, although some lapses may occur. The paper exhibits some sense of completeness, or wholeness. Word choice is generally adequate and precise. Most sentences are complete. There may be occasional errors in subject/verb agreement and in standard forms of verbs and nouns but not enough to impede communication. The conventions of punctuation, capitalization, and spelling are generally followed.
- 2 The writing demonstrates an awareness of the topic but may include extraneous or loosely related material. Some supporting ideas or examples are included but are not developed. An organizational pattern has been attempted. The paper may lack a sense of completeness, or wholeness. Vocabulary is adequate but limited, predictable, and occasionally vague. Readability is limited by errors in sentence structure, subject/verb agreement, and verb and noun forms. Knowledge of the conventions of punctuation and capitalization is demonstrated. With few exceptions, commonly used words are spelled correctly.
- 1 The writing is only slightly related to the topic, offering few supporting ideas or examples. The writing exhibits little or no evidence of an organizational pattern. Development of ideas is erratic, inadequate, or illogical. Limited or inappropriate vocabulary obscures meaning. Gross errors in sentence structure and usage impede communication. Frequent and blatant errors occur in basic punctuation and capitalization, and commonly used words are frequently misspelled.

NOTE: The following are categories of papers that cannot be scored:

- | | |
|-------------------------------|-----------------------|
| A: Blank paper | E: Off Topic/Off Task |
| B: Refusal to write | F: Erased/Crossed Out |
| C: Illegible/Foreign Language | G: Plagiarism |
| D: Insufficient Text | |

Appendix C

January 2000

Dear Parent/Guardian:

Your child is being invited to participate in a research study that is being conducted in the language arts program this winter and spring. The purpose of the project is to find out what impact using hypertext vs. regular text has on students' writing in language arts.

A form is attached to this letter that describes the project, what I hope to learn from this study, and what will be involved if you choose to allow your child to participate. Please read the form and if you choose to allow your child to participate, please write your child's name on the line provided, and return the form in the stamped envelope provided. You may keep a copy of the form for your records.

If you choose not to have your child participate, your child will still be a part of the project to use technology in language arts.

If you have any questions about this form or about the study, please call Mrs. Carlene Blake at 937-259-2538.

Sincerely,

S. Carlene Blake
Language Arts Department
Belmont High School

Appendix C (cont'd)

Students Consent Form

I understand that I will be part of a research project during the last semester this year.

I will read some stories and complete some writing assignments using both hypertext and regular text.

Some of the sessions in which I participate will be either audio or video taped, or both. If I don't like being tape recorded, I can ask to hear my tape and talk to my teacher about how we learn about writing with hypertext by listening to tapes of students as they write using both hypertext and regular text.

My teacher will ask me questions about my impression about using each method to write. My answers will be tape-recorded.

I know that I can choose to stop being a part of the study at any time. That means that I will still work with my language arts class everyday. I just won't be tape-recorded.

I know that being a part of the study will help the language arts teachers understand better what the impact of hypertext is, if any, on a child's writing.

I know that if any reports are written about what I have learned about writing and technology, my name will not be used in the report.

Name

Date

Appendix C (cont'd)
Investigator: S. Carlene Blake

I understand that my child has been invited to participate in a research project entitled "Assessing the impact of hypertext on learners' architecture of literacy learning spaces in language arts". The purpose of this study is to see how much difference using hypertext to write makes with students. This project will take place during the winter and spring quarter.

I understand that my consent for my child to participate in this project means that the following will occur:

During language arts, all children will be observed participating in the same activities every day. Some sessions, my child will talk with the teacher. These sessions will be audio recorded and transcribed. Any student who either voices or exhibits discomfort at being audio taped during a session will be given the opportunity to listen to their own recording on tape and to talk about why teachers tape students during a session. If after that discussion, they are still uncomfortable, I will record notes without audio taping.

I understand that my child will be interviewed at the end of the research about their impressions concerning the use of hypertext vs. regular text. These interviews will be audiotaped and transcribed.

I understand that after the tapes of the weekly sessions and the interviews have been transcribed, the tapes will be destroyed. My child's name will be removed from the transcription and a code name or number will be assigned. A separate list of the participants' names and corresponding codes will be kept in a locked file. At no time will my child be identified in any reports or presentations about this project.

The researcher in this project is hoping to learn more about how students create text using hypertext vs. using regular text.

I understand that my child is free at any time to choose not to participate in the study. If he or she chooses not to participate, there will be no negative effects on his or her participation in language arts. I may also decide to withdraw my child from this study with no negative effects on my child's participation in language arts. I understand that if I have any questions or concerns about this study, I may contact Carlene Blake at 937-259-2538.

My signature below indicates that I give permission for my child to participate in the study "Assessing the impact of hypertext on learners' architecture of literacy learning spaces in language arts."

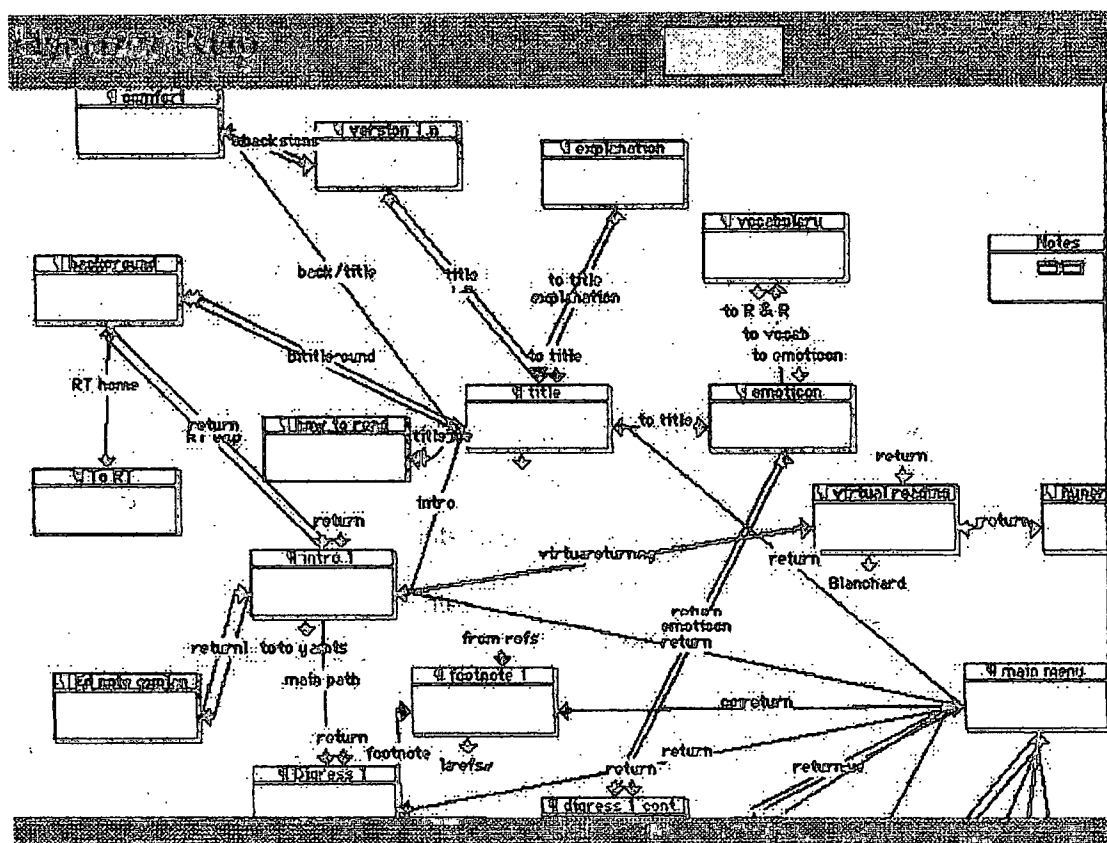
Child's Name

Date

Parent/Guardian Signature

Appendix D

Example illustrating movement within text using hypertext.



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