EXPLORING THE USE OF INTERACTIVE MULTIMEDIA AS AN INSTRUCTIONAL RESOURCE IN MIDDLE SCHOOLS OF NORTHWEST OHIO

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ABSTRACT

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Public education in the United States is in a notable state of transition regarding its use of computer technology as a tool to help educate K-12 students, but usage in the classrooms of American public schools is inconsistent and far from reaching its full potential, according to a report issued in 2003 by the National Research Council.

Advocates who endorse interactive multimedia as part of computer based instruction believe that it can enhance teaching and learning because it can combine the benefits of visual and audio media with sophisticated programming to offer useful feedback during instruction. If interactive multimedia truly has the potential to enhance teaching and learning, then it should be studied.

This descriptive study explored the use of interactive multimedia as an instructional resource in middle schools located throughout northwest Ohio. The research method for this study was a survey sent to middle school teachers. The sample was a stratified convenience sample of schools selected from urban, suburban, and rural communities throughout northwest Ohio. Teachers were asked if they used interactive multimedia in their classrooms, and were also asked what subject matter they taught, how many years they had been teaching, and what their gender was.

A slightly larger majority of the teachers that responded to the survey indicated that they do use interactive multimedia as part of their classroom instruction, but responses were different between the strata, and it became apparent that most teachers still used interactive rarely during the school year.

It was also discovered that a majority of teachers who indicated that they do not use interactive multimedia listed reasons that seemed more circumstantial in nature, rather than due to choice or personal preference not to use it. Lack of computers and lack of training emerged as the two most common deterrents as to why those teachers were not using interactive multimedia as part of their instruction.

The results of this regional study seemed to validate the National Research Council's claims that computer technology (which includes interactive multimedia), is still not being utilized to its full potential.

This thesis is dedicated to all public school teachers everywhere who strive each day to develop the minds of our children, to my incredible wife Beth who made countless sacrifices to support my efforts while I was in graduate school, and to Robert and Liz Henderson for their unconditional generosity and support.

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CHAPTER I. INTRODUCTION

Context of the Problem

Many advocates believe that interactive multimedia has great potential to enhance classroom instruction in K-12 public schools, perhaps more than any single electronic medium introduced so far (Prensky, 2001; Romano, 2003; Rother, 2004). Developers continue to make progress in creating impressive presentations that may incorporate video, animation, 3-D objects, sound, images, and text with advancing levels of interactivity and intelligently planned content. Interactive multimedia can be deployed through the Internet, CDs, or as self-running desktop applications. Although there can be a wide variety of applied uses for interactive multimedia as an instructional resource, as demonstrated by many higher education institutions (Brown, 2000), its presence in the classrooms of K-12 public schools, as well as other educational technologies, seems to be scarce when compared to its perceived potential, (Haertel & Means, 2003; Hofer, Chamberlin, & Scot, 2004; National Research Council of the National Academies [NRC], 2003). In 2003, the NRC reported that the potential of Information Technology was still not being realized in the nation's public schools. Interactive multimedia could simultaneously fall under the category of Information Technology and also Educational Technology. The NRC report addressed a perceived national issue, yet curious Ohio residents and educators may wonder whether or not the NRC's statement is accurate about the state of Ohio, and with good reason. The state of Ohio initiated efforts to increase the use of educational technology in its K-12 classrooms. For example, in 2003 the state announced an educational reform that included new academic content standards for Technology (Ohio Department of Education [ODE], 2003). However, even the Ohio Department of Education web site lacks specific data that could describe how interactive multimedia is currently being used throughout Ohio's K-12 schools.

One way to determine if interactive multimedia is being used to enhance classroom instruction in Ohio schools would be to conduct a survey of teachers. However, in *Evaluating Educational Technology*, Haertel and Means (2003) indicated that there are several complex variables involved with classroom instruction, and in the same book, in a separate article, Culp, Honey, and Spielvogel (2003) stated that research designed to address local concerns in evaluating the effectiveness of educational technology can still create data that would benefit policymakers at state and federal levels. The observations made by those authors imply that localized studies would be more advantageous when a researcher examined issues related to the implementation of educational technology and, hence, the use of interactive multimedia. Thus, a survey should be conducted at a local level in northwest Ohio. Northwest Ohio is a prime location because it offers a diverse demographic area that includes rural, suburban, and urban populations.

The schools chosen for the survey were public middle schools that serve rural, suburban, and urban populations. Middle schools were selected for two reasons. The first reason is that the survey asked teachers whether or not they utilize interactive multimedia as part of classroom instruction. Although this possibility certainly exists in elementary schools, it is assumed that students in middle schools will have had much more opportunity to gain exposure to computers through personal experience as well as through school and district endeavors such as the Ohio SchoolNet program (Ohio SchoolNet, 2005). The second reason that middle schools were selected for the survey is because one of the objectives of the Ohio Department of Education's new academic standards for Technology was to increase computer and multimedia literacy for students in order to enable them to pass the Eight Grade Technology Literacy requirements of the *No Child Left Behind Act* (ODE, 2003). The researcher interpreted that objective to mean that

the state views middle school as a critical period for finalizing desired computer skills for students before they enter high school.

Statement of the Research Problem

There are no conclusive studies or sources from northwest Ohio that describe whether or not local middle school teachers are using interactive multimedia to enhance classroom instruction. A localized survey should be administered in the region to get a more accurate understanding of teachers' practices regarding the use of interactive multimedia.

Significance of the Study

Advocates of interactive multimedia believe that it has great potential to enhance classroom instruction, yet various reports (e.g., the NRC's) claim that its potential is not being realized in the nation's K-12 public schools. Although the practice of using interactive multimedia may seem scarce from a national perspective, it is difficult to interpret the accuracy of such reports at the local level. Instead, localized studies should be used to describe local practices, as implied by Haertel and Means (2003). The state of Ohio has made noticeable attempts to promote the use of educational technology in its own K-12 public schools (ODE, 2003), yet there are few definitive reports available from the state that clearly relate how a majority of teachers are either using interactive multimedia in the classroom, or if they are even using it at all. This lack of reporting clearly supports the notion that more studies should be conducted to address not only the use of interactive multimedia in the classroom but also its use in specific regions. If it is determined that a majority of teachers in the region are not using interactive multimedia in the classroom, then potential inhibitors might be easier to identify at the local level (e.g., economics or regional policies). If a study revealed that many teachers within the region actually do use interactive multimedia in the classroom frequently, then that region could be examined for best practices that could help form solutions for other regions.

Ultimately, policymakers at the state and federal levels could examine the data from such studies to help with future planning, and the local region that was the subject of the study would also have an overview of its own internal practices. Any party that was responsible for implementing interactive multimedia into the K-12 public schools of a designated region would also have a better understanding of how to proceed, based on the results of such studies, and they would also be at a notable disadvantage if they did not have such information.

Research Questions

In order to address the stated research problem, and to collect data that could represent teachers by subject matter taught, teaching experience, and gender, the following four research questions were asked on the survey:

- "Based on the definition of interactive multimedia listed above, do you currently use any form of interactive multimedia as part of your instructional methods in your classroom? (Please decide if 'Yes' or 'No' applies then mark the box or boxes next to the most appropriate responses below)".
- "What topic do you currently teach?"
- "Including the current school year, how many years have you been teaching?"
- "(Optional) – Your Gender"

Assumptions

The most prevalent assumption of this study was that there would be an increased chance of successful distribution of the surveys by following a protocol of directly contacting or visiting each selected school to ask for cooperation in distributing the surveys to the teachers at the school. Another assumption was that by respecting the fact that teachers have limited spare time, the researcher would be more successful in acquiring responses by limiting the number of questions to four and by keeping each question as easy to answer as possible. It was also

assumed that because teachers are people in a noble profession, they are more likely to lend their cooperation to this survey, and that they may have been interested in this topic. The final assumption of this study was that by carefully selecting a convenience sample of diverse schools in the designated region of northwest Ohio, the study could generate data that could be used to compare various aspects of the entire region, such as differences between rural, suburban, and urban schools.

Limitations

As with any survey, there was a risk that there could be limited responses and there may be inherent signs of bias in the responses that are collected (Bourque & Fielder, 1995). Another limitation was that since the survey was self-administered, the respondents were only able to view the survey questionnaire and develop their own interpretations of the questions without the opportunity to receive clarification through a human contact. This study excluded certain types of schools, such as charter schools, that actually might have contributed significantly different responses than those from public schools. A final note is that budget restrictions in distributing the survey may have resulted in excluding many schools that were otherwise perfectly qualified to participate. Thus, the final data was as representative of the entire region as desired.

Definition of Terms

The following terms have been defined within the context of this study:

Computer – This term specifically applies to a single personal computer. In its basic configuration, a conventional personal computer will have a keyboard for typing; a mouse for operating controls displayed on the monitor; a monitor or screen that displays data for the user; internal components by which data is stored or retrieved data and material is presented on screen.

Computer technology – A generalized term that infers the presence and use of computers (and related equipment) within a public school for learning purposes, either in a classroom or a

specialized facility, such as a library or a designated computer center. It is important to distinguish the computer from other modes of technology that may be in use as instructional devices in a public school (e.g., scientific laboratory equipment, vocational machinery, and audio/visual equipment).

Digital Divide – A term found frequently during the review of literature. In general, it indicates that there are inequities in computer resources between various schools. For example, schools in low-income areas may have less computer resources than schools in affluent areas, or rural schools may have less computer resources than schools in urban and suburban areas. The primary implication is that access to computers in all public schools is not equal, which invokes questions related to ethics and fairness in education.

Implement / Implementation – In the context of this study, implementation will represent the process of introducing interactive multimedia into a live classroom with students. It implies that the interactive multimedia is actually in use by the teacher and students as part of the curriculum and classroom learning experience, even if it is used only occasionally or only once. Another term often used in this context is 'integration'.

Interactive Multimedia – In the context of this study, these two words will be paired together. This term will include three main criteria. First it describes presentations delivered exclusively through a computer. Second is the implication of the word *multimedia*, which by itself is loosely interpreted and can lead to confusion. Any combination of media (text, images, animation, video, sound, etc.) used to make a presentation could be described as multimedia. Third is the functional definition of the word *interactive*. In essence, the user is somehow an involved participant in the presentation, not just a passive spectator. Therefore, the complete term 'interactive multimedia' infers that the presentation incorporates some combination of media while the user controls the delivery of that presentation and participates rather than observes.

For educational purposes, interactive multimedia attempts to teach the user something by presenting related media and by engaging the user in various modes of activity, such as simulations, puzzles, games, quizzes, problem-solving scenarios, or any other form of learning activity where the user participates in the outcome. An example will clarify this meaning: having the user watch a video on the computer is not interactive because the user is a passive spectator during the experience. Inviting the user to create a custom 3-D spaceship, and then control it in a simulated flight would be considered highly interactive because the user is first engaged in a thought process and then becomes an active participant during the experience. Interactive multimedia designed for educational purposes also may be referred to as educational software, courseware, learning software, edutainment, or e-learning.

Internet (the Internet) – A generic name for the massive network of all computers, servers, and interconnected systems worldwide that support the World Wide Web. The entire physical infrastructure of physical devices worldwide that store, transmit, and display the content of the World Wide Web.

Middle School – A school typically serving students between 12 and 14 years of age, at grade levels generally between 6th and 9th grade. (See "Public School" below).

Public School – Any school that is open to the public as an extension of the local state government. The standard sequence of public schooling in the United States ranges from grades K through 12, where K starts with children who are approximately five years old and 12 is the final grade, achieved at approximately age eighteen. It is important to note that this study will specifically concentrate on public middle schools, which generally host students between 6th and 8th grades, aged roughly between 12 and 14 years of age. It is also important to note that private schools, church schools, and charter schools have been explicitly excluded from this study.

Web site– Any individual collection of content arranged into one or more pages on the World Wide Web that can be accessed at one address or site on the Web. Often a web site is specific to one entity, such as a private individual, business, or an organization.

World Wide Web (the World Wide Web) – A blanket term for the entire collection of all data, links, content, images, media, services, and ideas that can currently be accessed over the Internet. The Internet is the range of all equipment worldwide that serves as an infrastructure that supports the World Wide Web, but the World Wide Web itself is an abstract notion that encompasses the entire range of all collective thoughts, services, information, and media that are accessible from the Internet.

CHAPTER II. LITERATURE REVIEW

The initial focus of the literature review was to gain insight about current trends in the use of interactive multimedia as part of classroom instruction in K-12 public schools. The overall literature review revealed many aspects of how computer technology is perceived and applied in the classrooms of public schools throughout the United States, and many separate sources seemed to converge on a few common topics that will be addressed. Documents related to specific information about public schools within the state of Ohio were also examined for demographic purposes and to locate evidence of activity related to computer technology. Because the study relied on a survey, additional references were reviewed to help develop effective strategies for creating, distributing, and analyzing the results from the survey. The literature review includes the following topics: Advocates for Computers and Interactive Multimedia in K-12 Classrooms, Deterrents of Computers and Interactive Multimedia in K-12 Classrooms, Teacher Concerns Related to Implementing Computer Technology, Proposed Solutions for Implementing Computers and Interactive Multimedia, Social Concerns, An Overview of Current Educational Technology Practices in Ohio, and Conducting the Survey: Demographics and Strategies.

Advocates for Computers and Interactive Multimedia in K-12 Classrooms

Many advocates believe that interactive multimedia has great potential to enhance classroom instruction in public schools, perhaps more than any single electronic medium introduced so far (Prensky, 2001; Romano, 2003; Rother, 2004). According to the National Research Council of the National Academies (NRC, 2003) empirical studies have indicated that information technology has a substantial affect on students' learning and achievement (NRC, 2003). Commercial developers have created impressive educational presentations that may incorporate video, animation, 3-D objects, sound, images, and text with advancing levels of

interactivity, assessments, and intelligently planned content. Content can be deployed through the Internet, on CDs, or as self-running desktop applications. There are a variety of applied uses for computer technology and interactive multimedia, but their benefits as a teaching aid have been eagerly explored for quite some time now. Universities and colleges have capitalized on the benefits of interactive multimedia as a way to enhance classroom instruction or provide additional educational resources to students. Often, interactive multimedia is utilized to help explain particularly intricate processes or concepts that may be hard to envision when conventional instructional methods are used. The Medical University of Ohio (MUO), located in Toledo, Ohio, has enjoyed the benefits of custom designed interactive multimedia for over a decade (Medical College of Ohio, 2003). The Center for Creative Instruction is an internal department at MUO that specializes in the development of award-winning interactive multimedia. Their advanced products are specifically designed through collaboration with the faculty for use as classroom presentations and learning resources with a primary emphasis on human anatomy. MUO instructors use these products to educate future doctors, surgeons, and nurses presently enrolled at MUO, and some of those products are also published and can be ordered by the general public. At Bowling Green State University, in Bowling Green, Ohio, interactive multimedia was also explored to assist in teaching the complex topic of Organic Chemistry (Popik, 2001). The original goals for implementing interactive multimedia were to balance conventional lectures with new technological tools to help improve comprehension for undergraduate students while changing negative perceptions about the course. In the publication *Interactive Learning; Vignettes from America's Most Wired Campuses* (Brown, 2000), almost 100 examples of thoroughly recorded scenarios are provided to describe how university faculty from throughout the United States have turned to interactive multimedia to help in the teaching process. The subject matter of these courses included such fields as physical science and

engineering, computer science and information systems, mathematics, biological sciences and medicine, social sciences, fine arts, literature, languages, writing, and humanities. Almost every common category of educational study was represented in that collection, which reinforces the notion that interactive multimedia is extremely adaptable, and it is not simply used by individuals in fields related to computers or computer technology.

Advocates who specifically call for the implementation of computer technology in the classrooms of public schools still have varying viewpoints on the subject. The parents of the children enrolled at public schools form one of the most influential groups who are requesting the implementation of computer technology. According to a posting on the web site for the National Education Association (NEA) (as cited in Rajala, 2003), many parents and teachers agree that technology must be integrated into public schools so that today's students have the skills they need to succeed in the 21st century. Later, in a posting from 2005, the NEA stated that educators are gradually implementing advanced technology and that soon it may even be a legal requirement (although this assertion includes computer technology, it is not limited only to computer technology). Linda G. Roberts, former director for the U.S. Department of Education's Office of Educational Technology, shared a similar sentiment (Haertel & Means, 2003). The underlying logic of most advocates for computer technology in K-12 classrooms is that it can enhance teaching and learning and that the students should be prepared to pursue job opportunities in many fields where computers are present. Some teachers are also impressed enough by positive experiences with computer technology and interactive multimedia that they have shared their supportive viewpoints. Nearly eighty percent of over 1,000 teachers polled in a 2004 survey responded that access to classroom-based computers improves student performance in the classroom (Rother, 2004). Shawna White May (2003) wrote about her positive experiences with interactive multimedia as a tool to help her students with reading, and she also

emphasized the same point that technology integration is crucial for students who are growing up in what has been called the modern Information Age or Digital Age. Public officials also have voiced their sentiments about the benefits of computer technology. Nevada Senator Harry Reid (Sanford, 2001) shared his beliefs that Congress does realize the affect that technology and the World Wide Web have, not just in education, but also in many aspects of life and in society.

Author Marc Prensky specifically endorsed the benefits of digital game-based learning in his book, *Digital Game-Based Learning* (2001), citing case studies where school children were actively engaged in learning activities centered around digital games and explained how they gained skills with fractions and critical thinking. Prensky also posed the argument that many children arrive in the classroom from homes that have a wide variety of digital games only to arrive in the classroom, which has few or none. He expounded the benefits of 'edutainment', claiming that making a lesson fun is a solid way to motivate learning, and actively challenged the notions of different parties who frown upon edutainment and gaming in the classroom for various reasons, refuting their viewpoints with multiple examples of success stories involving game-based instruction.

Author Michael Romano (2003) presented many items to consider when discussing the need for computer technology and interactive multimedia. The first was the disparity between left-brain and right-right brain thinking. Romano argued that most conventional forms of instruction, such as lecturing and extensive reading, favor students with left-brain tendencies and discriminates against those who are right-brain thinkers. Romano (2003) made a related observation by writing, "The twenty-first-century child is the product of a culture that bombards them with rapid-fire images. From birth, his environment literally wires and rewires visual pathways to the brain" (p.15) Romano also stated, "Information technology skillfully integrated into the curriculum will allow teachers to improve the fidelity, relevancy, and accessibility of the

information they make available to learners. It is proposed that this empowers teachers so that they might do what they do—*better*." (p.26)

Even though advocates endorse the potential of computer technology and interactive multimedia, it is worth noting that they still only represent one viewpoint.

Deterrents of Computers and Interactive Multimedia in K-12 Classrooms

In 2003 the NRC, with sponsorship from the U.S. Department of Education, reported that the potential of information technology was still not being realized in the nation's public schools. It is important to note that in an educational context, interactive multimedia and computer technology both could be categorized under titles like Information Technology or Educational Technology. If computer technology and interactive multimedia have so much potential to be effective instructional resources, as the advocates claim, why are they developing so slowly in an environment where they could make a significant difference, as stated by the NRC in 2003?

The impact of computer technology in the classrooms of public schools varies significantly among individual campuses and school districts throughout the United States, and there is certainly much debate and scholarly research surrounding the topic (at local and national levels). In the past decade, there has been a notable movement to proliferate computer technology into public schools nationwide. Linda G. Roberts, former director for the U.S. Department of Education's Office of Educational Technology (Haertel & Means, 2003) described the national technology plan that helped boost computer technology's presence in public schools between 1995 and 2000. The result, if viewed at a national level, was that most schools now have Internet access and most classrooms are Internet-ready. There is now approximately one computer for every three to five students in public schools (May, 2003; Rother, 2004), and teachers are gradually receiving better training and gaining confidence in using computers. Although computers are seen by most people as a necessary and useful tool in

learning, implementing computers into classroom instruction for K-12 schools has still faced considerable challenges and resistance.

Budgets are definitely a common concern (Charp, 2003a). Despite published estimates that billions of dollars have been spent on technology funding for public schools across the United States (Hofer, Chamberlin, & Scot, 2004), overall the budgets still seem to be restrictive enough that individual schools are only functioning with marginal computer facilities on their campuses and lack significant resources (Wendol & King, 2004). Many schools still have computer distribution ratios of one computer per every three to five students as reported by May (2003) and Rother (2004). Even when budgets allow for computer upgrades and purchases, there are still many critics who point out that it hasn't even been determined whether or not computers truly make a notable difference in educating children (Neal, 1998), although evaluation and research efforts are certainly underway (NRC, 2003). Critics also caution against squandering funds on computers and related technology when those funds might be better spent on other necessary materials for the students (Haertel & Means, 2003). A final thought regarding budget issues is that once computer technology is implemented, the cost of ongoing maintenance becomes a required and costly attachment to a school or district's budget.

Another area for concern involves pedagogical issues that may arise from using computer technology and interactive multimedia as instructional resources in the classroom. This topic is more focused on the actual learning content delivered through computer technology instead of the hardware or physical equipment itself. For this topic, the generic term *interactive multimedia* will be used to represent educational content presented through a computer.

While advocates tout the benefits of interactive multimedia and computer technology, or some even proclaim technological revolutions in education, skeptics are quick to point out that similar claims were made when the radio. was invented, then motion pictures, then television;

however, none of these media truly revolutionized education. They were just modestly assimilated where they could serve a purpose (Romano, 2003).

Commercial vendors are the primary source of most interactive multimedia used in K-12 schools (NRC, 2003). Developers who create interactive multimedia for educational purposes may refer to their products as information technology, educational technology, educational software, courseware, learning software, edutainment, distance learning, or e-learning. Depending on how their product is deployed, it may also be referred to as computer-based training(CBT), or web-based training (WBT), online courses, distance learning, or other titles that imply the product's technical functionality. Commercial developers primarily specialize in the development of technological products, and they often create a product hoping that it will compete well as a retail item that can be sold for profit in a market where schools and educators are the primary target audience. Despite the impressive products that are being produced, there are a few areas for concern about implementing them into the public schools. Because they are commercial products it will cost money to buy them, and as already mentioned, school budgets are often restrictive (Charp, 2003a). If a school does have both the funds and the intentions to purchase interactive multimedia, teachers usually don't have the time to do extensive product research (Romano, 2003); yet if they do not conduct this research, they could end up with a product that is incompatible with their teaching objectives and preferences (NRC, 2003), student capabilities (May, 2003), or even the actual hardware and classroom computers themselves. To compound this problem, some teachers are not even the primary purchaser of the software (NRC, 2003) so they are the recipient of items that were scrutinized by a party outside of their classroom.

In general, developers of educational software are usually specialists in their technological fields, and some may lack any practical experience as educators. Their training

may involve exposure to learning theories and various instructional design models (Alessi & Trollip, 2001), but only in narrow terms of how they could apply it to developing interactive multimedia. That is usually the extent of any educational considerations they may pursue; the rest of their training involves technological applications, the study of other products, usability testing, and other concepts focused on the creation of a product. Competitive developers try to anticipate as many factors as they can to make products that are easy to use, appealing, and compliant with the standards and expectations of public education. Unfortunately one size does not fit all in this case. Therefore, each educational software product generated by commercial venues faces some possibility of being a mismatch for certain teachers that would receive the product (NRC, 2003). The underlying fact is that teachers are still the final experts not only on what should be taught in their individual classrooms, but also how it will be taught (Romano, 2003). In essence, unless the developers could collaborate directly with the teachers who will use their product, it would be very difficult for any commercial developer to create a single product that solves every potential problem for every teacher who receives the product. There is also no guarantee that the product will be favored by the teacher or the students, and if it is not well received, it could face reduced or discontinued use, in which case it becomes a regrettable expense (Romano, 2003).

Another prevalent source for interactive multimedia that appears in public schools is the World Wide Web. Both students and teachers can search the web to find learning resources (Keane, 2002). Educational interactive multimedia is often provided for free through the web sites of respectable venues (e.g., museums, universities, organizations, and even sites made by private individuals or corporations). Unfortunately, the World Wide Web can pose many setbacks as part of classroom instruction. Aside from technical considerations such as slow performance and compatibility issues on certain classroom computers, the Web can also be a

precarious environment for young students. Stephen Kline summarized the perils of students using the Web in his article that was published in *Toys, Games, and Media* (2004). In regards to optimists toting the benefits of the Web for educational purposes, Kline stated, "They dismissed the violence of gaming, the cyberstalking in the chat rooms, the insistence of porn merchants, the banality of 'cut and paste' homework assignments, the encounters with racism and hate sites, the perpetual Spam as incidental to the logic of networked computers and the inherent 'potentialities' interactive media bring to children's learning" (p. 141). Along with Kline's observations, it is also important to consider factors such as the occasional difficulty in conducting a fruitful search for desired content on the web, respect for copyright issues, and as a reminder of budget concerns, the expenses that may arise from decisions to subscribe to web-based services.

In discussing some of the deterrents for computer technology in K-12 schools, the topics of budget and pedagogical considerations have been presented, but another crucial element that needs to be addressed is the impact that implementing computer technology has had on the teachers in K-12 schools. This topic will be covered in the next section.

Teachers' Concerns Related to Implementing Computer Technology

Although there are some teachers who are openly enthusiastic about computer technology, it still presents a challenge to many other teachers (Romano, 2003). As computers gradually make their way into classrooms, more teachers are faced with the sudden responsibility of not only learning how the computers and software work, they are also expected to teach computer skills to their students as well (Karnovsky, 2001). There is also a common concern that many universities are not offering computer training for pre-service teachers as part of their preparation for teaching careers. Since in-service teachers all have varying levels of knowledge and experience with computers, this often requires a concentrated phase of training for the

teachers, along with curriculum modification that will include new computer training for students. This poses multiple problems for teachers, because they may not have time for training, or their schools and districts lack funding that could pay for teacher training. Many teachers feel that they do not get enough appropriate training to properly integrate computers into their curriculums (Romano, 2003; Rother, 2004), and not all teachers welcome the new burden of computer training on top of their other demanding responsibilities (Rogers, Woycitzky, & Houtz, 2002). Some teachers perceive the computer as an obstacle, distraction, or even a threat to their existing curriculums and job security (Romano, 2003). Although many people believe that teachers will always be a critical part of classroom instruction, others coldly project technological takeovers, such as International Data Corporation (Charp, 2002a), which justifiably puts some educators on the defensive. In addition, other teachers may welcome the use of computers, but do not feel prepared to successfully or properly implement computers in their classrooms (Charp, 2003b). Teachers also have varying attitudes and perceptions about the benefits of computer technology. Rother (2004) cited a survey where teachers gave a wide variety of ratings to the computer hardware and software they use. Although the exact definitions of "hardware" and "software" were not provided in the article, the critical point was that teachers have a diversified range of opinions and levels of satisfaction about the computer resources in their classrooms.

In summary, the population of all K-12 teachers is extremely diverse regarding their attitudes, abilities, and acceptance of computers as part of classroom instruction. Even larger and more diverse are the multiple, interconnected influences that K-12 teachers encounter, such as personal preferences (Haertel and Means, 2003), student diversity, parental input, colleagues, communities, administrations, unions, and political issues involving all levels of government from local to federal. When considering all of these factors, it becomes apparent why the K-12

teacher population is so diverse. Because teachers ultimately determine the use of computer technology in the classroom, it is their needs, based on all of the considerations mentioned above, that should be the top concerns of anyone who endorses, advocates, or is involved with the implementation of computer technology or interactive multimedia in K-12 classrooms.

Proposed Solutions for Implementing Computers and Interactive Multimedia

If computer technology and interactive multimedia are going to have a successful impact on classroom instruction in public schools on a widespread basis, they must be set up through intelligent phases of implementation that present more solutions for teachers than problems. This review of literature revealed a few sound strategies about how to successfully implement interactive multimedia into the classroom so that it is both helpful and beneficial to both the students and the teachers as well. Some related areas that will be discussed are planning considerations, the potential roles of resource personnel, and guidelines for follow-up evaluations to determine effectiveness of the interactive multimedia.

With the sponsorhip of the U.S. Department of Education, The National Research Council arranged a series of workshops between 2001 and 2003 to address the unrealized potential of information technology as a resource in K-12 education in the United States (NRC, 2003). These workshops included a combined audience of K-12 educators, commercial developers of information technology and educational software, and scientific researchers who were studying how people learn. As part of these workshops, attendees participated in a roadmapping process to help establish courses of action that could work toward gaining solutions and meeting desired goals (both short term and long term). Some of the general suggestions that surfaced included securing cheap, fast computers for schools until all students had access to them; working towards a nationwide, uniform style of curriculum and standards that included proper use of information technology; using scientific research about how people learn to set

standards in the production of information technology designed for educational purposes; and forming partnerships between schools and local businesses and communities that involve technology.

Implementing any instructional resource requires planning, regardless of its medium, intended use, or cost. Planning for the implementation of interactive multimedia as an instructional resource is no different, other than the technological considerations that accompany it. Many questions should be asked before implementation. Does the school have a sufficient technological infrastructure in place that can support the implementation of interactive multimedia? As mentioned previously, the technological capabilities of schools are expanding slowly, but progress has been made (NRC, 2003). Levinson and Grohe (2001) compared the technological capabilities of public schools today with banking in 1980, just before the advent of the automatic teller machines. They projected that the technological infrastructure within public schools is poised for a technology-driven wave of change, and that the focus will shift from constructing the technical infrastructure to establishing learning solutions with the help of technology. Planning will also require needs assessment. Is the interactive multimedia even necessary as a learning resource? Some processes might be better taught in other ways. For example, using interactive multimedia is not a practical way to teach a child to swim. Teacher Shawna White May also pointed out that interactive multimedia should be appropriate for the students who will use it (May, 2003). This implied that preparing interactive multimedia should always take the learners' characteristics into consideration (Clarke, 2001). It should interact with them at their current level of knowledge; it should be capable of gaining their attention and holding their interest; and it should somehow provide a direct benefit to their learning process. There are also considerations involving the intended instructional delivery of content deployed as interactive multimedia. Will the content be designed to accompany and reinforce elements of

instructors' lectures and discussions that are held in front of students or will it be a presentation that each student encounters individually? If teachers used interactive multimedia to enhance a group discussion by projecting the content onto a large screen, they could ask questions, demonstrate a process, as well as control the content delivery (Clarke, 2001). If students will work individually with the interactive multimedia, the interactive multimedia should include a feature that allows the teacher to review each student's progress in order to help the teacher determine what topics the student comprehends, and which topics they may be struggling with. It would also have to be determined which methodology would be best to engage them in that material such as simulations, tutorials, or drills (Alessi & Trollip, 2001). Many other factors would have to be considered in the design of the interactive multimedia itself, such as technical capabilities, logical presentation of content, aesthetics, usability, and even attention to proper combinations of media for more effective learning (Mayer, 2001). It might even be mandatory to prepare the content in such a manner that it can help students meet standards-based goals (Reed, 2003). The scope of content should also be considered. Ki, Chung, and Lam (2003) endorsed a minimalist approach to developing content. The idea was to break content apart into smaller lessons or learning objects, where the user was only focused on a specific topic while interacting with a presentation made with interactive multimedia. Romano (2003) proposed many items to consider when implementing technology, such as studying mistakes from previous implementation processes in order to make better plans for future ones. Romano also stated that there should be more efforts to make teachers aware of how technology could be helpful for them and their students so that they would become willing participants, not forced recipients. This idea would also require adequate levels of teacher training and preparation to boost the teachers' confidence in their own ability to properly utilize the technology in the classroom. Romano also mentioned that the implementation of technology should not occur as a revolution,

but rather as an evolution. This implied that integrating interactive multimedia into classrooms must take place through a gradual process. That philosophy was also expressed by the director of technology for the Le Roy Central School District in upstate New York, Dr. Debby Baker (Karnovsky, 2001) who recommended a piecemeal approach to integrating computer technology.

The potential roles of resource personnel will be a significant factor in how successfully interactive multimedia will be implemented in classroom instruction. Teachers often have great levels of knowledge, dedication, and capabilities, but they are still human. The assistance they receive during implementation, and whether or not that assistance is beneficial and productive, will have a significant impact on their attitudes and perceptions of integrating interactive multimedia into classroom instruction. The types of personnel who can lend technical support vary dramatically among schools and districts, but in many school districts there are a growing set of archetypes for positions with titles like Instructional Technologists and similar job titles (Hofer, Chamberlin & Scot, 2004). These personnel often fill many responsibilities, but their primary focus usually involves supporting the teachers in their use of technology in the classroom. Some of these "specialists" may even be able to produce custom interactive multimedia content per teacher specifications. Ki, Chung, and Lam (2003) described a process where interactive multimedia was custom created for classrooms in public schools, but this system was unique in that the teachers themselves became highly empowered collaborators in the process. They worked directly with the developers to determine learning objectives, pedagogic ideas, and classroom functionality. They were also involved with all revisions; they were the authorities on when a learning object was finalized and ready for classroom implementation; and they also were in charge of directly evaluating the learning objects' effectiveness as an instructional resource in the classroom. Ki, Chung, and Lam (2003) reported that this experience was a highly successful venue, and that over 1400 separate learning objects

were created and implemented within less than a year as part of this program. A final suggestion regarding the potential roles of support personnel involves an interesting suggestion by Debbie Babcock, client support and Internet services manager for the Children's Museum of Indianapolis (as quoted in Charp, 2002b, p. 12). Babcock stated, "I would like to see collaboration of state universities and colleges, school districts, and museums in the development of standards-based education content." This sentiment supported the ideology held by the president of Bowling Green State University, Sidney Ribeau (Bowling Green State University, September 2004). Ribeau's Academic Plan called for such collaborations between the students and faculty of the university and external organizations in the surrounding community of northwest Ohio. This Academic Plan also endorsed the potential for new media and emerging technologies as ways to promote creative teaching.

Once interactive multimedia is officially implemented into the classroom, the task is still nowhere close to being complete. A reliable system must be included for evaluation of the interactive multimedia as a classroom resource. The logic behind evaluation is that the performance of the interactive multimedia, good or bad, should be assessed in order to determine if the material should be kept in use as is, or revised and redeveloped for improved instructional effectiveness. Horton (2001) had an even more assertive approach. He claimed that being skeptical of a product and thoroughly evaluating its effectiveness should be a regular practice when implementing new interactive multimedia. The product should prove its worthiness before it is considered acceptable and worthwhile. Horton's logic has merit, particularly for public schools that function with limited resources and funding. Educational interactive multimedia must meet expectations and standards, just like any other classroom resource. It is very difficult to justify investing in products that can not meet educators' and administrators' expectations when budgets are slim. Horton also warned that 'self-serving' commercial developers and their

products should not be trusted until the products truly prove themselves as worthy for use in the classroom.

To summarize the implementation strategies, it is fair to say that many ideas keep coming from dedicated teachers, scholars, professionals, and officials. Despite the practicality of the ideas and the positive outlook of their combined synergy, there will still be many ongoing challenges to face over the next five to ten years, and budgets will probably continue to be one of the most persistent problems to address.

Social Concerns

Although the contents of this literature review cover several interrelated topics regarding computer technology and interactive multimedia as instructional resources in K-12 education, one obvious notion is that K-12 education is definitely in the midst of a massive, ongoing transformation, and this will probably still continue for many years. As efforts to proliferate computer technology continue, issues of fairness and ethics will arise. The concept of a *digital divide* looms over the process of implementing computer technology in K-12 schools (Levinson & Grohe, 2001). The digital divide concept infers that while certain schools may get superior resources, others may have none, and all parties involved would eventually have to consider the fairness and implications of those circumstances. Socioeconomic influences should not determine whether or not a school system can acquire computers for its students. Aside from economics, there also should not be a disparity in levels of access to technology among urban schools versus rural schools. When Senator Harry Reid responded to a question about the digital divide (Sanford, 2001), he mentioned that he believed that all communities and schools should have equal access to technological resources.

At the conclusion of the workshops arranged by the National Research Council (NRC, 2003), and despite the ambitious efforts to seek out solutions during the workshops, an attendee

named Steve Rappaport acknowledged that the workshops had failed to address the needs of "people who had been left behind" (p. 69). The NRC publication did not elaborate on Rappaport's comment or a specific definition for people who had been left behind, but the inclusion of this idea in the publication pointed out that even in a situation where proactive, educated people came together to address issues of computer technology in K-12 education, they can still neglect important issues that have social implications.

An Overview of Current Educational Technology Practices in Ohio

In 2003 the NRC, with sponsorship from the U.S. Department of Education, reported that the potential of information technology had not yet been realized, despite valiant efforts by the nation's K-12 schools to add more computers and Internet access from 1995 to 2000. That statement has to be interpreted at a national level, so individual schools, communities and even states will have different experiences that may or may not support the NRC's claim at regional levels.

On the surface, the state of Ohio appears dedicated to promoting the effective use of educational technology. In 2003 the Ohio Department of Education announced an educational reform that included new academic content standards in technology (ODE, 2003). In the document that detailed the new academic content standards for technology, it was clearly stated that one of the objectives of the new standards was to increase computer and multimedia literacy in hopes of enabling students to pass the Eight Grade Technology Literacy requirements of the *No Child Left Behind Act* (ODE, 2003). Although this objective indicated that the students would acquire the skills to create and utilize multimedia themselves, it also implied that multimedia will eventually become a more prominent part of the classroom experience for them. If the students will be expected to produce projects involving multimedia, then perhaps interactive multimedia should be used more often as part of general classroom instruction in

many subjects, whether it is designed to accompany a teacher's discussion, or it is part of a guided lesson where the students are participating under teacher supervision. The eTech Ohio Commission was announced on July 1, 2005, on the web site for the Ohio SchoolNet organization. Based on the web site's descriptions of the responsibilities that the eTech Ohio Commission will oversee, the commission is poised to serve Ohio's educational community as a centralized location for online resources, including interactive multimedia content (Ohio SchoolNet, 2005). Although Ohio's teachers and administrators are making noticeable attempts to enhance K-12 public education through technology, it was still difficult to locate any notable forums where those teachers' comments and input were available. The Ohio Department of Education web site lacked specific data that could describe how interactive multimedia is currently being used throughout Ohio's K-12 schools.

In general, finding out about the practices of individual Ohio teachers requires extensive searching, if any source could be found at all. Certain schools or school districts may have web sites that may share news of teachers' innovations, but most simply describe larger plans and events within the school. Considering the importance of the role that teachers will have in successfully implementing educational technology in the classroom, it seems important that their input and opinions should be examined as part of the process for setting standards, launching plans, or implementing educational technology in the classroom. As mentioned previously, teachers should be acknowledged as the final experts on what should be taught in their classroom (Romano, 2003). This means that the input of the teachers should ultimately be the source used to determine if Ohio is in fact utilizing educational technology and interactive multimedia effectively to enhance classroom instruction, or if Ohio is still included in the statement about the unrealized potential reported by the NRC. A survey seemed to be the most practical way to acquire the answer, and based on the suggestions of Haertel and Means (2003) along with the

ideas of Culp, Honey, and Spielvogel (2003), the survey effort should be localized. Since the survey has been conducted as part of a graduate thesis originating at Bowling Green State University, a natural choice of regions would be northwest Ohio where the university is located.

Preparing the Survey: Demographics and Strategies

The creation of the survey to be administered in northwest Ohio required the researcher to review appropriate literature in two separate phases. The first phase involved determining the sample to be considered for the survey. The Ohio State University's Department of Human and Community Resource Development created detailed reports about all Ohio counties, and they were updated as of July19, 2005 (OSU, 2005). Those reports were available on the Internet and were used to examine the demographics of nine counties that were considered for the survey. Next, middle school teachers were selected to participate in the survey for two reasons. The first reason was that the survey would ask teachers whether or not they utilize interactive multimedia as part of classroom instruction, and although this possibility certainly exists in elementary schools, it is assumed that students in middle schools will have had much more opportunity to gain exposure to computers through personal experience and through endeavors offered in Ohio public schools, such as the SchoolNet program. The second reason that middle school teachers were selected to participate in the survey is because one of the objectives of the Ohio Department of Education's new academic standards for Technology was to increase computer and multimedia literacy in hopes of enabling students to pass the Eight Grade Technology Literacy requirements of the *No Child Left Behind Act* (ODE, 2003). This implies that the middle school experience is seen as a critical period for finalizing desired computer skills for students before they enter high school. The next step was to locate individual public schools in northwest Ohio to consider for the survey. Statistics for individual schools were located on the World Wide Web at www.schoolbug.org (Schoolbug.org, 2005). The data available for each school included

location and contact information, grade level range of students attending the school, full-time staff count, student-to-teacher ratio, and a breakdown of student ethnicity.

The final phase of the literature review involved the examination of references that described effective techniques and strategies for creating, distributing, and interpreting the data from a survey. Topics included basic aspects of survey construction and how to create self-administered and mail surveys (Bourque & Fielder, 1995), as well as how to analyze survey data (Fink, 1995).

CHAPTER III. METHODOLOGY

This chapter covers Statement of the Research Problem, Research Design, Sample Selection Process, Research Questions, Protection of Human Subjects, and Timeline.

Statement of the Research Problem

There are no conclusive studies or sources from northwest Ohio that describe whether or not local middle school teachers are using interactive multimedia to enhance classroom instruction. Therefore, a localized survey should be administered in the region to gain a more accurate understanding of teachers' practices regarding the use of interactive multimedia.

Research Design

This was an associational study because although it initially collected descriptive data, the researcher also produced various analyses of the results in order to offer possible explanations of phenomena that was revealed (Kaufman & Harvey, 2003). The instrument for collecting the research data was a self-administered survey distributed to full-time teachers at selected middle schools in northwest Ohio (see Appendix D in order to view the actual survey form). In order to promote cooperation from the teachers, who presumably have very little time, the researcher designed the survey to be very brief with only four questions. The survey form began by providing the teachers with a specific operational definition of interactive multimedia (as stated in the Definition of Terms section in Chapter 1). Based on that definition, the teachers were then asked if they were using interactive multimedia as part of their classroom instruction. Their choices for a response were either yes or no. Teachers who responded yes were also asked how often they used interactive multimedia during the school year. Teachers who responded no were asked why they did not use interactive multimedia and were given options that addressed issues like lack of computers or appropriate software, inadequate teacher training, or if the teacher was not convinced of the academic merit of interactive multimedia as a learning

resource. All of those deterrents were mentioned in the literature review. The next question asked the teacher what subject matter they taught. This question was included to see if teachers form their decisions to use or not use interactive multimedia based on their perceptions of its relevance and usefulness regarding their subject matter. The third question asked the teacher how long they had been teaching, which was included to determine if different attitudes existed among different experience levels of teachers. The final question was optional and asked the teacher to list their gender in order to see if gender had any influence on whether or not a teacher used interactive multimedia.

Sample Selection Process

The sample selection process required two separate phases of research. The first phase involved studying the demographics of counties in northwest Ohio that were considered for the survey. Eight counties are distributed into the far northwest corner of the state of Ohio. In alphabetic order they are Defiance, Fulton, Henry, Lucas, Ottawa, Sandusky, Williams, and Wood. Hancock County was also considered because it included the city of Findlay, which balanced out the variety in sizes of populations throughout the region.

These nine counties offer a diverse cross-section of demographics for the state of Ohio. The Ohio State University's Department of Human and Community Resource Development created detailed reports about all Ohio counties, and they were updated as of July19, 2005 (ODE, 2005). Those reports were available on the Internet and were used to examine the demographics of the nine counties listed above. The largest city in this entire region is Toledo, Ohio, with a population greater than 300,000. Toledo was selected as the main source of information for urban schools, and the Toledo metropolitan area was also examined to supply data for the schools that were categorized as suburban. Aside from the Toledo metropolitan area, most of

northwest Ohio is rural, with only a few cities that have populations over 20,000. Some of the smallest towns examined had populations of less than 1,000 and would be categorized as rural.

The teachers chosen for the survey were from public middle schools throughout the region of northwest Ohio. Middle school teachers were selected to participate in the survey for two reasons. The first reason was that the survey asked teachers whether or not they utilize interactive multimedia as part of classroom instruction, and although this possibility certainly exists in elementary schools, it was assumed that students in middle schools would have had much more opportunity to gain exposure to computers. It was assumed that their exposure may be from personal experience or from classroom exposure to endeavors like Ohio's SchoolNet program. The second reason that middle school teachers were selected to participate in the survey was because one of the objectives of the Ohio Department of Education's new academic standards for Technology was to increase computer and multimedia literacy in hopes of enabling students to pass the Eighth Grade Technology Literacy requirements of the *No Child Left Behind Act* (ODE, 2003). This objective seemed to imply that middle school is viewed by the state as a critical period where students should acquire desired computer skills before they enter high school.

The next step was to locate individual public schools in northwest Ohio to consider for the survey. Statistics for individual schools were located on the World Wide Web at www.schoolbug.org. The data available for each school included location and contact information, grade level range of students attending the school, full-time staff count, student-to-teacher ratio, and a breakdown of student ethnicity. This data was then used to determine if a school was eligible for the study based on the following two criteria. The first criterion was that the school needed to be a traditional, taxpayer supported public school. Charter schools, private schools, church schools, online schools, or any other form of institution not matching the first

criterion were rejected for the survey. The second criterion was that the school needed to have students predominantly enrolled in grades six through eight, since the desired grade level of the students was 8th grade or before. Some public middle schools were listed with a grade range of only 7th and 8th grade, others were 6th to 8th grade, 7th to 9th grade, and some had slightly wider ranges of 4th or 5th grade to 8th grade. All of these schools were considered on the premise that they contained the target group of students at the desired grade levels without extensive variation. Other schools with wider variability in grade levels were rejected for the survey, such as those that were K-12, K-8, or 7-12. This decision was made to avoid complicating the survey results with data from teachers affiliated with grade levels considerably outside of the desired grade levels of six through eight.

In order to preserve a cross-sectional representation of the demographics of northwest Ohio, the target population was stratified into three categories: urban, suburban, and rural, based on local populations. Four middle schools were then selected as convenience samples to represent each stratum. The four middle schools selected for the urban category were all from Toledo, Ohio, the largest city in northwest Ohio, and they were chosen due to variations in the reported ethnicity of the student populations. One school was predominantly African-American, another school was predominantly Caucasian, and the other two schools had proportionally balanced mixtures of ethnic groups. The four middle schools chosen for the suburban category were located in communities adjacent to the city of Toledo, and each school had a unique quality that might yield specific data for the study, whether it was in a high-income sector, had abnormally low student-to-teacher ratios, or was believed to have already used interactive multimedia as part of classroom instruction. The rural category included four middle schools that were selected because they represented four different towns in rural areas with reported populations ranging from 558 to 40,000. The schools in the selected sample also were chosen

because of their relative accessibility from a central location, the main campus of Bowling Green State University, in Bowling Green, Ohio. The final sample of selected middle schools represents a reasonable cross-section of the population found in northwest Ohio. It includes twelve schools from four counties, nine different towns or cities with varied population sizes, and the survey to be administered will be initially distributed to approximately 500 full-time teachers within the selected schools.

Research Questions

In order to address the stated research problem, and to collect data that could represent teachers by subject matter taught, teaching experience, and gender, the following four research questions were asked on the survey:

- "Based on the definition of interactive multimedia listed above, do you currently use any form of interactive multimedia as part of your instructional methods in your classroom? (Please decide if 'Yes' or 'No' applies then mark the box or boxes next to the most appropriate responses below)".
- "What topic do you currently teach?"
- "Including the current school year, how many years have you been teaching?"
- "(Optional) – Your Gender"

Protection of Human Subjects

When conducting research, the safety and rights of human participants is a significant factor. Before the survey and its related materials could be deployed, it first had to be examined by the Human Subjects Review Board (HSRB) at Bowling Green State University. HSRB also insisted that each survey should be accompanied by a cover letter addressed to the teachers that thoroughly explained their rights when participating in the survey. They also recommended that the designated contact person at each school should also receive a letter for

their own records, explaining their rights and the rights of any teachers that participated. Once HSRB personnel determined that the study was ethical and that the teachers' rights were properly explained to them in the cover letter, they issued authorization to proceed. HSRB's letter of approval can be viewed in Appendix A, the approved cover letter for designated contact persons can be viewed in Appendix B, and the individual teachers' cover letter can be viewed in Appendix C.

Timeline

The timeline of the study is broken down chronologically by its milestone events as follows:

Initial Literature Review: December 2004 - February 2005

Finalization of Committee Selection: April – May 2005

Second Phase of Literature Review: August 2005

Defense of Proposed Thesis Topic: August 2005

Departmental Approval of Thesis Topic: November 2005

HSRB Approval of Study: December 2005

Initial Communication with Selected Schools : First week of January 2006

Surveys Deployed At Participating Schools : January 13th, 2006

Final Survey Collected: February 10th, 2006

Data Recorded and Organized: February 13th –16th, 2006

Results Prepared: February 16th – February 26th, 2006

Defense of Thesis: Monday, March 13th, 2006

Final Manuscript Completed: March 20th, 2006

CHAPTER IV. SURVEY PROCESS AND INITIAL FINDINGS

This chapter will cover the following topics: Survey Response Rates and Totals, Yes Responses and Frequencies of Use, No Responses and Deterrents Reported By Teachers.

Survey Response Rates and Totals

The protocol used by the researcher for deploying the surveys was to establish a designated contact person at each school selected for the sample. The researcher also offered an incentive reward valued at $50 for each school that could deliver an 85 percent response rate by January 27th of 2006. Four schools earned this reward. This combination of techniques proved to be quite effective in gaining participation for this survey. Many of the persons who agreed to manage the surveys at each school were in fact principals and assistant principals.

Unfortunately the study's preselected stratified sampling was jeopardized during the survey process. Because Toledo, Ohio is the largest city in northwest Ohio with a population over 300,000, it was seen as an ideal location for the urban category. When administrators were contacted at the four schools selected from Toledo, only one agreed to administer the survey at that school. The other three administrators indicated that they would assist the researcher, but only if authorization was first granted by the district, Toledo Public Schools (TPS), and the affiliated local teacher union. In order to comply with this request, the researcher made many attempts over the course of several weeks to communicate with the designated personnel at the district office but there was never any return correspondence so authorization to proceed was never granted. If district authorization is eventually granted for the survey to commence, then the researcher intends to follow through and perhaps publish an addendum to this study.

The significant outcome from the scenario with TPS was that the study's entire preselected sample was imbalanced, and only minimal data from the urban category was obtained. The result is that the data that was collected for the urban category is probably not

reliable for generalizing the results as an accurate representation of teacher practices within TPS or other urban districts. The original preselected sample would have involved approximately 588 teachers with 210 teachers included in the urban category. With the absence of the three TPS schools, the urban category was only represented by 65 teachers at the lone school that participated, of which only 21 responded to the survey.

Aside from the encounter with the study's urban category, cooperation and response rates in the suburban and rural categories was quite impressive. The suburban sample included approximately 224 teachers, with 163 responding. The rural sample included 119 teachers with 103 responding to the survey. The average response rate from both of those categories was 81 percent.

The survey still produced a reasonable number of responses: 21 urban teacher responses, 163 suburban teacher responses, and 103 rural teacher responses. The total number of surveys collected was 308. The nine schools that participated had a combined total of 408 teachers, so the overall response rate from the modified sample was 75.49 percent. Figures related to the original preselected sample, and the individual urban, suburban, and rural categories can be viewed in Table 4.1. Table 4.1 shows preliminary figures for the number of participants. Comprehensive and specific figures from the results of the survey are covered in all other tables and figures throughout the chapter.

Table 4.1
Totals for Preselected Sample and Responses to the Surveys

Urban category— (Toledo, Ohio)		
Schools selected:	Approx. full-time teachers on staff:	Number of responses
Byrnedale Junior High School	45*	0*
Deveaux Junior High School	65	21
East Toledo Junior High School	55*	0*
Robinson Junior High School	45*	0*
* (*did not participate in the survey, pending district approval*)		
	Total: 65	Total: 21
		Response Rate: 32%
Suburban category—		
Schools selected:	Approx. full-time teachers on staff:	Number of responses
Anthony Wayne Junior High School (Whitehouse, OH)	60	33
Fassett Middle School (Oregon, OH)	36	31
Gateway Middle School (Maumee, OH)	48	45
Perrysburg Junior High School (Perrysburg, OH)	80	54
	Total: 224	Total: 163
		Response Rate: 73%
Rural category—		
Schools selected:	Approx. full-time teachers on staff:	Number of responses
Donnell Middle School (Findlay, OH)	35	31
Eastwood Middle School (Pemberville, OH)	27	16
Elmwood Middle School (Cygnet, OH)	19	19
Napoleon Middle School (Napoleon, OH)	38	37
	Total: 119	Total: 103
		Response Rate: 87%
Sample Totals		
Total number of teachers at the participating schools: **408**		Total Responses: **287**
		Overall Response Rate: **70%**

The survey posed questions that would allow for teachers to be examined within various groups. The first of these groups was based on course subject matter that each teacher taught, and this information is displayed in Table 4.2.

Table 4.2

Distribution of Teachers Based on Subject Matter Taught (Ranked by Frequency Totals)

Course Subject Taught	**Urban** f_1 **(%)**	**Suburban** f_2 **(%)**	**Rural** f_3 **(%)**	**Totals** $\sum f_1$ **-** f_3**(%)**
English / Journalism*	**6** (28.5%)	**35** (21.5%)	**13** (12.6%)	**54** (18.8%)
Special needs groups	**4** (19%)	**18** (11%)	**13** (12.6%)	**35** (12.2%)
Teach multiple subjects**	**0** (N/A)	**11** (6.7%)	**23** (22.3%)	**34** (11.8%)
Mathematics	**2** (9.5%)	**17** (10.4%)	**9** (8.7%)	**28** (9.8%)
Science	**1** (4.8%)	**19** (11.7%)	**8** (7.8%)	**28** (9.8%)
Visual and performing arts	**3** (14.3%)	**12** (7.4%)	**12** (11.7%)	**27** (9.4%)
Social Studies / History	**1** (4.8%)	**17** (10.4%)	**8** (7.8%)	**26** (9%)
Health / Physical Education	**3** (14.3%)	**8** (4.9%)	**8** (7.8%)	**19** (6.6%)
Other***	**0** (N/A)	**10** (6.1%)	**5** (4.9%)	**15** (5.2%)
Computer / Technical	**1** (4.8%)	**9** (5.5%)	**3** (2.9%)	**13** (4.5%)
Foreign Languages	**0** (N/A)	**5** (3.1%)	**0** (N/A)	**5** (1.7%)
Business / Vocational****	**0** (N/A)	**2** (1.2%)	**1** (0.9%)	**3** (1.2%)
Totals per Strata:	$\sum f_1$ **= 21**	$\sum f_2$ **= 163**	$\sum f_3$ **= 103**	N = **287**

* Includes any teachers who responded “Reading” in the “Other” field

** Included any teachers who marked more than one box for course topics taught

*** Includes Home Economics, librarians, counselors, media specialists, accelerated, etc.

**** Includes any teachers who listed “Industrial Arts” in the “Other” field.

The survey also asked the teachers how many years they have been teaching. This allowed for examination of whether or not experience level influenced a teacher's preferences for using interactive multimedia. Table 4.3 shows the distribution of teachers according to teaching experience.

Table 4.3

Distribution of Teachers According to Teaching Experience

Teaching Experience	**Urban** f_1 **(%)**	**Suburban** f_2 **(%)**	**Rural** f_3 **(%)**	**Totals** $\sum f_1$ **-** f_3**(%)**
1 to 3 years	**0** (0%)	**18** (11%)	**11** (10.7%)	**29** (10.1%)
4 to 7 years	**1** (4.8%)	**29** (17.8%)	**17** (16.5%)	**47** (16.4%)
8 to 11 years	**6** (28.6%)	**30** (18.4%)	**14** (13.6%)	**50** (17.5%)
12 to 15 years	**3** (14.2%)	**15** (9.2%)	**9** (8.7%)	**27** (9.5%)
16 or more years	**11** (52.4%)	**71** (43.6%)	**51** (49.6%)	**133** (46.4%)
No response	**0** – N/A	**0** – N/A	**1** (0.9%)	**1** (0.1%)
Totals per Strata:	$\sum f_1$ **= 21**	$\sum f_2$ **= 163**	$\sum f_3$ **= 103**	N = **287**

One significant observation of Table 4.3 is that 133 out of 287 teachers (46.4% of all teachers participating in the survey) reported that they have been teaching for 16 years or more.

A final demographic attribute that was explored was the influence of gender on decisions of whether or not to use interactive multimedia. Table 4.4 shows the distribution of gender among teachers that participated. (It should be noted that teachers were informed on the survey sheet that answering the gender question was optional).

Table 4.4

Gender Distribution of Teachers Who Participated in the Survey

Gender	**Urban f_1 (%)**	**Suburban f_2 (%)**	**Rural f_3 (%)**	**Totals $\sum f_1$-f_3(%)**	
Male	**3** (14.3%)	**42** (25.8%)	**35** (34%)	**80** Males	27.9%
Female	**16** (76.2%)	**118** (72.4%)	**66** (64.1%)	**200** Females	69.7%
No response	**2** (9.5%)	**3** (1.8%)	**2** (1.9%)	**7** not reported	2.4%
Strata Totals:	$\sum f_1$ **= 21**	$\sum f_2$ **= 163**	$\sum f_3$ **= 103**	N = **287**	

All statistics covered up to this point have been related to demographic data for the teachers who participated in the survey. Table 4.5 is the first set of statistics that represents teachers' use of interactive multimedia. The first survey question asked teachers if they use interactive multimedia as part of their classroom instruction, according to the provided definition of interactive multimedia. Table 4.5 displays how many teachers marked yes, and how many marked no.

Table 4.5

Distribution of Yes and No Responses for Using Interactive Multimedia.

Response	**Urban f_1 (%)**	**Suburban f_2 (%)**	**Rural f_3 (%)**	**Totals $\sum f_1$-f_3(%)**
Marked Yes	**7** (33.3%)*	**101** (62%)	**46** (44.7%)	**154** (53.7%)
Marked No	**14** (66.7%)	**62** (38%)	**57** (55.3%)	**133** (46.3%)
Totals per Strata:	$\sum f_1$ **= 21**	$\sum f_2$ **= 163**	$\sum f_3$ **= 103**	N = **287**

As indicated in Table 4.5, a slightly higher majority of the teachers responded that they do use some form of interactive multimedia for classroom instruction. The suburban stratum was

the only category where yes responses outnumbered no responses, and the suburban stratum also had the largest percentage of yes responses (62%), which might imply that northwest Ohio is somewhat representative of the digital divide, as mentioned in the review of literature. The most crucial function of the survey was to analyze the frequency of usage among teachers who answered yes, and find out what the most common deterrents were for those teachers that answered no. Yes responses were followed by options for how often the teacher used interactive multimedia as part of classroom instruction (daily, weekly, monthly, etc.) While reviewing all surveys, the researcher made an unforeseen discovery that some teachers are responsible for teaching more than one course topic (such as both Math and English), so they marked multiple boxes on the survey for the question that asked them what subject they taught. When each survey was examined for totals, teachers involved with multiple topics were recorded into a separate category (as shown in Table 4.2). However, when the researcher was reviewing the yes responses and then recording how often each teacher used interactive multimedia, it was not clear if the teachers responsible for multiple topics were using interactive multimedia in all of those courses, nor was it clear how often they used interactive multimedia in each course. In order to manage that sudden complication, the researcher estimated that if the teacher was inclined to use interactive multimedia, perhaps their habits would be the same regardless of the subject matter they taught. Based on this line of reasoning, the researcher added a corresponding mark next to each topic that the teacher taught. Therefore, if a teacher that taught Math, Science, and English and answered yes with a frequency of one to five times per week then that would simultaneously generate a response of one to five times per week in the Math category, the Science category, and the English category. This system was a spontaneous decision by the researcher, but it did seem to be the most logical way to record data for the teachers that taught multiple subjects. It is important to note that this decision may have created data that doesn't

fully reflect exact preferences for those teachers in each topic that they teach, and creating a table for this descriptive statistic probably would have resulted in inflated numbers with limited accuracy.

A similar problem occurred when the researcher was reviewing the reasons that were given after a no response. Not only could a teacher be responsible for multiple topics, but they were also allowed to indicate more than one reason as to why they do not use interactive multimedia if they answered no. The researcher decided to apply the same logic as before. Therefore, each topic the teacher taught would receive a mark in the no category next to each reason that was selected by the teacher. The dynamics of that arrangement resulted in a complex overlap of potential responses. It would be difficult to generate a comprehensive table showing distributions with the reasons given for a no response. Like the dilemma with yes responses, the adjusted numbers probably would have been inflated and inaccurate.

Considering those logistical setbacks, the best way to present the data was to examine the usage frequency of yes responses and the deterrents listed as reasons for no responses by examining the individual demographic groups (subject matter taught, teaching experience, and gender) as well as the stratum groups (urban, suburban, and rural). Table 4.6 displays the frequency of use indicated by teachers that responded yes and separates them first according to which subject matter they teach, in the same order as they appeared on the survey, and then by which stratum they represent.

Yes Responses and Frequencies of Use

Table 4.6

Indicated Usage Frequencies Listed After a Yes Response According to Subject Matter

R = Rural stratum total, **S =** Suburban stratum total, **U =** Urban stratum total

Subject Matter Taught	**Daily Use**	**1-5 times per week**	**1-5 times per month**	**1-5 times per semester**	**1-5 times per year**
English / Journalism	**R** 0 **S** 2 **U** 0	**R** 3 **S** 3 **U** 1	**R** 4 **S** 7 **U** 0	**R** 5 **S** 5 **U** 0	**R** 3 **S** 7 **U** 0
Foreign Language	**R** 0 **S** 0 **U** 0	**R** 0 **S** 1 **U** 0	**R** 0 **S** 1 **U** 0	**R** 0 **S** 0 **U** 0	**R** 0 **S** 1 **U** 0
Social Studies / History	**R** 0 **S** 0 **U** 0	**R** 1 **S** 1 **U** 0	**R** 2 **S** 3 **U** 0	**R** 5 **S** 3 **U** 0	**R** 4 **S** 5 **U** 0
Mathematics	**R** 0 **S** 1 **U** 1	**R** 3 **S** 1 **U** 0	**R** 0 **S** 3 **U** 0	**R** 1 **S** 3 **U** 0	**R** 3 **S** 5 **U** 0
Science	**R** 0 **S** 2 **U** 0	**R** 2 **S** 6 **U** 0	**R** 2 **S** 5 **U** 0	**R** 3 **S** 2 **U** 0	**R** 0 **S** 7 **U** 1
Other	**R** 2 **S** 0 **U** 0	**R** 0 **S** 0 **U** 0	**R** 0 **S** 3 **U** 0	**R** 2 **S** 1 **U** 0	**R** 0 **S** 3 **U** 0
Visual or Performing Arts	**R** 0 **S** 0 **U** 0	**R** 0 **S** 3 **U** 0	**R** 0 **S** 1 **U** 0	**R** 1 **S** 1 **U** 0	**R** 2 **S** 1 **U** 0
Computer / Technical	**R** 0 **S** 4 **U** 1	**R** 0 **S** 2 **U** 0	**R** 1 **S** 2 **U** 0	**R** 0 **S** 0 **U** 0	**R** 1 **S** 0 **U** 0
Health / Physical Education (P.E.)	**R** 0 **S** 0 **U** 0	**R** 2 **S** 2 **U** 0	**R** 1 **S** 1 **U** 0	**R** 0 **S** 1 **U** 1	**R** 1 **S** 2 **U** 0
Business / Vocational	**R** 0 **S** 0 **U** 0	**R** 0 **S** 0 **U** 0	**R** 0 **S** 0 **U** 0	**R** 0 **S** 0 **U** 0	**R** 0 **S** 0 **U** 0
Special Needs Groups	**R** 0 **S** 0 **U** 0	**R** 0 **S** 2 **U** 1	**R** 2 **S** 2 **U** 0	**R** 0 **S** 4 **U** 1	**R** 3 **S** 3 **U** 0
Total Responses	**R** **S** **U**	**R** **S** **U**	**R** **S** **U**	**R** **S** **U**	**R** **S** **U**
--per stratum	**4 9 2**	**11 21 2**	**12 28 0**	**17 20 2**	**17 34 1**
--per choice	**15**	**34**	**40**	**39**	**52**

Table 4.6 reveals a significant trend among those teachers who answered yes when asked if they used interactive multimedia as part of their classroom instruction. The pattern of usage is best defined by the per response totals at the bottom of the table. The daily column displays a total of 15 teachers, while the 1 to 5 times per year column displays a total of 52 teachers. There is also a progressive increase in the number of responses as the frequency of use declines. In other words, teachers that do use interactive multimedia as part of their classroom instruction are most likely using it in sparse intervals. The totals indicate that approximately 50 percent of those teachers are using interactive multimedia in their classrooms at intervals of 1 to 5 times per semester or less, and that approximately 25 percent of all teachers in the yes category are really only using interactive multimedia 1 to 5 times per year.

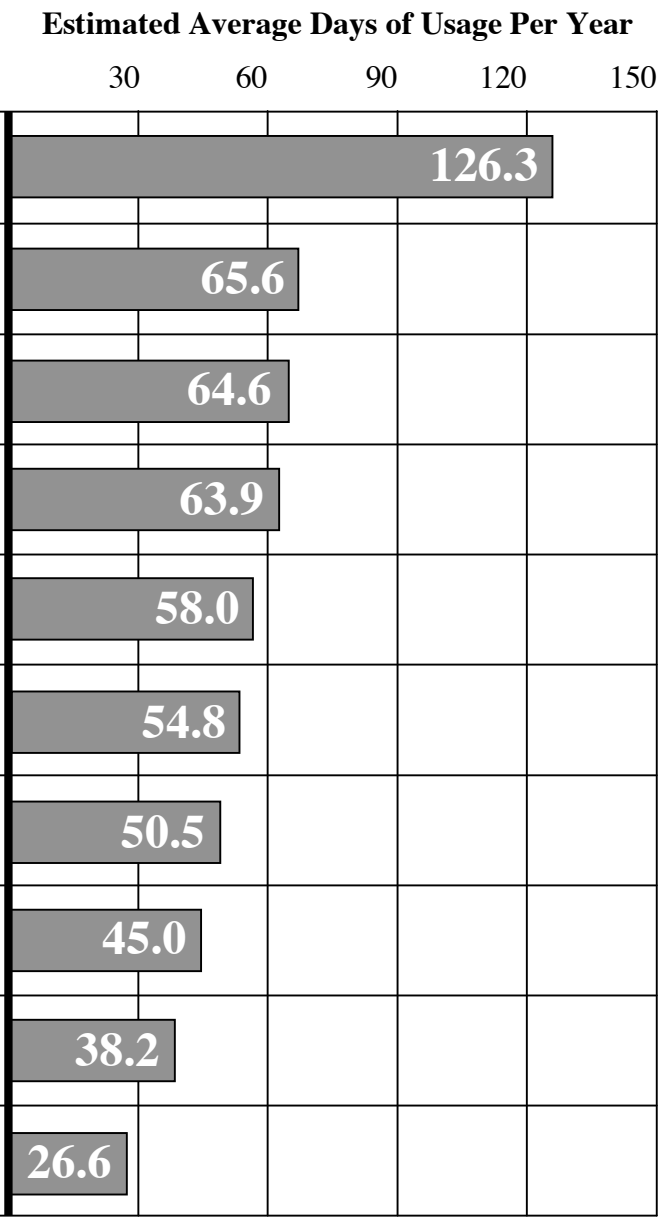
Table 4.6 is useful for studying overall usage trends, but its nominal structure is not conducive to determining which subjects are using interactive multimedia most frequently. In order to rank usage by subject matter, the researcher used the responses in a literal sense. Using a school year of 36 weeks as a model, the school year would comprise of 180 days of instruction (five days per week). When considering the options for how often the teachers use interactive multimedia in the classroom, the maximum number of days possible per response translates into annual usage as follows:

Daily	=	180 days
1 to 5 times per week	=	144 days (at 4 days per week since 5 is daily)
1 to 5 times per month	=	45 days (where one month = 4 weeks out of 36)
1 to 5 times per semester	=	10 days (5 days per semester, 2 semesters total)
1 to 5 times per year	=	5 days

This structure was then used as a scoring system for all responses recorded in Table 4.6.

To calculate the final scores used for ranking the responses by subject matter, the researcher calculated an average score for each subject matter using the responses from all three strata. Figure 4.1 displays a ranking system based on the scores that were obtained (averages per subject matter in each stratum are also included).

Subject Taught	Individual Stratum Averages
Computer / Technical	Rural = 91.3 Suburban = 137.25 Urban = 180
Health / Physical Education	Rural = 97.6 Suburban = 58.8 Urban = 10
Foreign Languages	Rural = N/A Suburban = 64.6 Urban = N/A
Science	Rural = 58.3 Suburban = 68.4 Urban = 5
Visual / Performing Arts	Rural = 6.6 Suburban = 83.6 Urban = N/A
Mathematics	Rural = 65.2 Suburban = 39.5 Urban = 180
English / Journalism	Rural = 45.1 Suburban = 49.6 Urban = 53
Other	Rural = 76 Suburban = 22.9 Urban = No data
Special Needs Groups	Rural = 20 Suburban = 39.4 Urban = 77
Social Studies / History	Rural = 25.3 Suburban = 27.8 Urban = N/A



Note: Business / Vocational was excluded because there were no teacher responses, and N/A next to an item indicates that there were no teacher responses for that item.

Figure 4.1

Estimated use of interactive multimedia, ranked by average days of usage per subject.

Figure 4.1 is more descriptive of how often teachers use interactive multimedia per individual subject, however, it is important to note that the scoring system used was only designed to establish an estimated ranking system. There are three items to consider when viewing Figure 4.1. First, the makeshift scoring system designated each usage level at its maximum possible value. As a result, the actual average days of use would certainly be lower than the posted values, and without exact figures from each teacher, an accurate daily average per subject was not achievable. Second, it is necessary to point out that the averages listed per stratum may only be reflective of the responses given by one or two teachers, so they may be skewed and are probably not representative of all teachers that fit into that category. Third, the Business / Vocational category did not have any teacher responses so it was not included in Figure 4.1.

One anomaly that appears in Figure 4.1 is the notably higher rate of use among teachers in the Computer / Technology category. That recorded average is nearly double the second ranked value, but it seems to make sense that this group would have such a high response rate considering that the title of their category implies consistent or daily access to a computer facility.

The next way to examine all yes responses was according to teaching experience. The structures of Table 4.6 and Figure 4.1 were used again to examine this mode of grouping teachers. Table 4.7 shows how many teachers responded in each of the experience categories.

Table 4.7

Indicated Usage Frequencies Listed After a Yes Response (by Teaching Experience)

R = Rural stratum total, **S =** Suburban stratum total, **U =** Urban stratum total

Teaching Experience	**Daily Use**	**1-5 times per week**	**1-5 times per month**	**1-5 times per semester**	**1-5 times per year**
1 to 3 years	**R** 0 **S** 0 **U** 0	**R** 0 **S** 0 **U** 0	**R** 2 **S** 5 **U** 0	**R** 1 **S** 1 **U** 0	**R** 1 **S** 6 **U** 0
4 to 7 years	**R** 0 **S** 3 **U** 0	**R** 1 **S** 3 **U** 0	**R** 1 **S** 3 **U** 0	**R** 1 **S** 5 **U** 0	**R** 2 **S** 6 **U** 0
8 to 11 years	**R** 0 **S** 2 **U** 1	**R** 1 **S** 10 **U** 1	**R** 2 **S** 4 **U** 0	**R** 1 **S** 3 **U** 1	**R** 2 **S** 1 **U** 0
12 to 15 years	**R** 1 **S** 0 **U** 0	**R** 0 **S** 1 **U** 0	**R** 1 **S** 1 **U** 0	**R** 0 **S** 2 **U** 0	**R** 2 **S** 5 **U** 0
16 years or more	**R** 3 **S** 2 **U** 0	**R** 5 **S** 5 **U** 1	**R** 3 **S** 6 **U** 0	**R** 8 **S** 11 **U** 1	**R** 7 **S** 16 **U** 1
Total Responses	**R S U**	**R S U**	**R S U**	**R S U**	**R S U**
--per stratum	**4 7 1**	**7 19 2**	**9 19 0**	**11 22 2**	**14 34 1**
--per choice	**12**	**28**	**28**	**35**	**49**

Table 4.6 revealed a trend where usage levels were more likely to occur at 1 to 5 times per month or less, and Table 4.7 confirms that trend. The scoring system used to generate the estimated ranking system for Figure 4.1 was also used to create Figure 4.2, which provides an estimated ranking of which group in Table 4.7 averaged the most frequent usage levels of interactive multimedia.

Teaching Experience	Individual Stratum Averages	Estimated Average Days of Usage Per Year (20 40 60 80 100)
1 to 3 years	Rural = 26.3 Suburban = 22.1 Urban = N/A	23.1
4 to 7 years	Rural = 50.8 Suburban = 59.4 Urban = N/A	57.6
8 to 11 years	Rural = 42.3 Suburban = 100.8 Urban = 104.8	90.1
12 to 15 years	Rural = 58.8 Suburban = 26.0 Urban = N/A	36.1
16 years or more	Rural = 58.1 Suburban = 34 Urban = 53	43.9

N/A next to an item indicates that there were no teacher responses for that item.

Figure 4.2

Estimated use of interactive multimedia, ranked by average days of usage per experience level of teachers.

As with Figure 4.1, it is important to note that the average scores listed above are only estimates based on the maximum possible values per level of usage; exact averages would probably be much less than the figures produced, and the scores were established to help create an estimated ranking system for reference. It is also important to reiterate that some items may have only received one or two responses per strata, so some of the reported strata averages may not accurately represent the population of all teachers in that category. Figure 4.2 offers an interesting set of information about how teaching experience may influence a teacher's preference to use interactive multimedia. The two groups with the highest levels of average usage encompass teachers with 4 to 11 years of experience. This raises a question about why that group seems to be more involved with interactive multimedia than the others.

The final topic to examine with yes responses is the gender groups. Table 4.8 shows the distribution of teachers' responses according to how often they use interactive multimedia, per gender.

Table 4.8

Indicated Usage Frequencies Listed After a Yes Response According to Gender

R = Rural stratum total, **S =** Suburban stratum total, **U =** Urban stratum total

Gender	**Daily Use**	**1-5 times per week**	**1-5 times per month**	**1-5 times per semester**	**1-5 times per year**
Male	**R S U** 2 2 0	**R S U** 0 4 0	**R S U** 3 6 0	**R S U** 3 6 1	**R S U** 5 6 0
Female	**R S U** 2 5 1	**R S U** 6 12 2	**R S U** 6 14 0	**R S U** 8 12 1	**R S U** 10 25 1
Total Responses **--per stratum** **--per choice**	**R S U** **4 7 1** **12**	**R S U** **6 16 2** **24**	**R S U** **9 20 0** **29**	**R S U** **11 18 2** **31**	**R S U** **15 31 1** **47**

In order to compare usage between the two genders, the scoring system that was used to generate Figure 4.1 and Figure 4.2 was also used to generate Figure 4.3.

Gender	Individual Stratum Averages	Estimated Average Days of Usage Per Year (15 30 45 60 75)
Male	Rural = 42.3 Suburban = 54.0 Urban = 10	48.9
Female	Rural = 50.8 Suburban = 50.0 Urban = 96.6	52.5

Figure 4.3

Estimated use of interactive multimedia, ranked by average days of usage per gender.

Figure 4.3 clearly indicates that gender does not seem to have a significant influence on how often a teacher uses interactive multimedia. Considering that the averages are very close to one another, the implication is that neither gender has a significantly higher use of interactive multimedia. It is also important to note that the averages displayed in Figure 4.3 are based on the scoring system intended to create an estimated ranking system. The scoring system relies on maximum possible usage rates, so the numbers displayed in Figure 4.3 are most likely inflated and are probably not accurate of actual averages. It is also worth mentioning that nearly 70 percent of all respondents were female, which could be affecting the averages displayed in Figure 4.3.

In summary about the analysis of yes responses and how frequently teachers use interactive multimedia, many observations were made. Of all teachers who responded that they do use interactive multimedia, almost 50 percent reported that they only use it one to five times per semester or less. When teachers' responses were compared according to the subject matter they taught, a notable hierarchy emerged where teachers of Computer or Technical courses used interactive multimedia most frequently and teachers of Special Needs Groups and Social Studies

or History used interactive multimedia the least. Analysis of teachers' experience levels revealed that teachers with experience ranging from 4 to 11 years of experience used interactive multimedia the most frequently. Gender did not seem to be a factor in determining how often a teacher used interactive multimedia, because the average scores for frequency of use were similar for both genders.

No Responses and Deterrents Reported by Teachers

Teachers who responded no were given five options to explain why they did not use interactive multimedia. In Tables 4.9, 4.10, and 4.11 those options were abbreviated for spacing purposes. The first option was lack of computers in the classroom (abbreviated as *No Computers*). The second option was no interactive multimedia resources available (abbreviated as *No Multimedia*). The third option was lack of training (abbreviated as *No Training*). The fourth option was that interactive multimedia was not appropriate for the subject matter (abbreviated as *Not Appropriate*). The fifth option was that the teacher was not convinced of the educational merits of interactive multimedia (abbreviated as *Not Convinced of its Merit*). The teachers were also allowed to mark more than one response at their discretion. The teachers who indicated that they do not use interactive multimedia in their classrooms fell into two categories of potential reasons as to why not. One category included teachers who do not use interactive multimedia due to circumstances such as absence of computers in their classroom (at least three teachers added comments indicating that they had limited computers or outdated computers), lack of interactive multimedia resources, or insufficient training. It is important to note that four of the teachers added comments to their surveys indicating that they didn't have time to utilize it in class and three others wrote that there were authorization issues such as restricted access to desirable web sites with educational content. The other category included teachers who are not using interactive multimedia because of their attitude toward it. These teachers indicated that

interactive multimedia was inappropriate for their subject matter and/or they were not convinced of its educational merit. There is also a possibility that teachers could have listed responses for both circumstantial and attitude-based reasons for not using interactive multimedia. Unfortunately, this study wasn't able to obtain further information about any correlation that may have existed between both circumstances and attitudes in teacher decisions to not use interactive multimedia.

Table 4.9 displays the deterrents indicated by teachers that responded no and separates them first according to which subject matter they teach, in the same order as they appeared on the survey, and then by which stratum they represent.

Table 4.9

Indicated Deterrents Listed After A No Response According to Subject Matter

R = Rural stratum total, **S =** Suburban stratum total, **U =** Urban stratum total

◆ = Deterrent with the most responses per subject (based on totals from all 3 strata)

Subject Matter Taught	**No Computers**	**No Multimedia**	**No Training**	**Not Appropriate**	**Not Convinced of its Merit**
English / Journalism	**R** 11 **S** 11 **U** 1 ◆	**R** 5 **S** 5 **U** 5	**R** 10 **S** 8 **U** 2	**R** 0 **S** 1 **U** 0	**R** 2 **S** 6 **U** 0
Foreign Language	**R** 0 **S** 0 **U** 0	**R** 0 **S** 1 **U** 0	**R** 0 **S** 1 **U** 0	**R** 0 **S** 1 **U** 0	**R** 0 **S** 4 **U** 0 ◆
Social Studies / History	**R** 1 **S** 4 **U** 0	**R** 0 **S** 4 **U** 1	**R** 5 **S** 3 **U** 0 ◆	**R** 1 **S** 0 **U** 0	**R** 0 **S** 2 **U** 0
Mathematics	**R** 3 **S** 3 **U** 0	**R** 5 **S** 3 **U** 1	**R** 8 **S** 3 **U** 1 ◆	**R** 3 **S** 2 **U** 1	**R** 2 **S** 4 **U** 1
Science	**R** 6 **S** 1 **U** 0	**R** 7 **S** 1 **U** 0 ◆	**R** 5 **S** 1 **U** 0	**R** 0 **S** 0 **U** 0	**R** 0 **S** 1 **U** 0
Other	**R** 1 **S** 3 **U** 0 ◆	**R** 2 **S** 2 **U** 0 ◆	**R** 1 **S** 1 **U** 0	**R** 0 **S** 2 **U** 0	**R** 1 **S** 0 **U** 0
Visual or Performing Arts	**R** 6 **S** 5 **U** 2 ◆	**R** 1 **S** 2 **U** 2	**R** 3 **S** 3 **U** 1	**R** 5 **S** 3 **U** 0	**R** 0 **S** 0 **U** 0
Health / Physical Education (P.E.)	**R** 3 **S** 1 **U** 2 ◆	**R** 0 **S** 1 **U** 0	**R** 0 **S** 2 **U** 0	**R** 2 **S** 2 **U** 0	**R** 0 **S** 0 **U** 0
Business / Vocational	**R** 0 **S** 2 **U** 0 ◆	**R** 0 **S** 1 **U** 0	**R** 0 **S** 1 **U** 0	**R** 0 **S** 1 **U** 0	**R** 0 **S** 0 **U** 0
Special Needs Groups	**R** 3 **S** 2 **U** 0	**R** 3 **S** 2 **U** 2	**R** 7 **S** 4 **U** 1 ◆	**R** 0 **S** 4 **U** 0	**R** 3 **S** 0 **U** 0
Total Responses	**R** **S** **U**	**R** **S** **U**	**R** **S** **U**	**R** **S** **U**	**R** **S** **U**
--per stratum	**34** **32** **4**	**23** **22** **6**	**39** **27** **3**	**11** **16** **1**	**8** **17** **1**
--per choice	**70**	**51**	**69**	**28**	**26**

Note: None of the teachers in the Computer / Technical category gave a no response so that category of subject matter was not included in the table.

When viewing Table 4.9 it is important to reiterate that teachers were allowed to select as many responses as they wanted. It is also important to note that any teacher who reported that they taught multiple subjects would have generated a response for each separate subject matter that they taught.

In Table 4.9, the two deterrents with the most overall responses were no computers and no training. There were many sources in the review of literature that would agree with these results. Table 4.9 is also useful for identifying the most common deterrents that teachers reported per subject matter. Another critical pattern that emerged in Table 4.9 was in the totals at the bottom. It was mentioned previously that the no category comprised of two main types of deterrents. The first three choices of no computer, no multimedia, and no training are mostly circumstantial in nature (but it should be noted that they could also be by choice). The final two choices about interactive multimedia are based on teacher attitudes (not appropriate and not convinced of its merit). When examining the totals as representations of circumstantial and attitude-based categories, the responses definitely seemed to indicate that circumstantial deterrents were much more common explanations of why interactive multimedia was not used. They comprised 80 percent of the response totals for deterrents, only 20 percent were based on teacher attitude.

A final observation of Table 4.9 involves the response indicating that the teacher is not convinced of the educational merit of interactive multimedia. It was the least selected response, representing only 10 percent of all deterrent responses. Table 4.10 examines the no responses according to teaching experience. Totals are listed under each deterrent's column per stratum, as they were in Table 4.9.

Table 4.10

Indicated Deterrents Listed After A No Response According to Teaching Experience

R = Rural stratum total, **S =** Suburban stratum total, **U =** Urban stratum total

◆ = Deterrent with the most responses per level (based on totals from all 3 strata)

Teaching Experience Level	**No Computers**	**No Multimedia**	**No Training**	**Not Appropriate**	**Not Convinced of its Merit**
1 – 3 Years	**R** 5 **S** 1 **U** 0 ◆	**R** 4 **S** 1 **U** 0	**R** 0 **S** 3 **U** 0	**R** 0 **S** 2 **U** 0	**R** 0 **S** 1 **U** 0
4 – 7 Years	**R** 6 **S** 7 **U** 0	**R** 1 **S** 1 **U** 1	**R** 8 **S** 6 **U** 0 ◆	**R** 5 **S** 1 **U** 0	**R** 1 **S** 0 **U** 0
8 – 11 Years	**R** 4 **S** 6 **U** 2 ◆	**R** 3 **S** 4 **U** 3	**R** 5 **S** 1 **U** 1	**R** 0 **S** 3 **U** 0	**R** 0 **S** 3 **U** 0
12 – 15 Years	**R** 1 **S** 2 **U** 2	**R** 1 **S** 3 **U** 2 ◆	**R** 2 **S** 3 **U** 1 ◆	**R** 1 **S** 1 **U** 0	**R** 2 **S** 2 **U** 0
16 + Years	**R** 9 **S** 13 **U** 2	**R** 6 **S** 10 **U** 6	**R** 16 **S** 12 **U** 3 ◆	**R** 5 **S** 8 **U** 1	**R** 3 **S** 7 **U** 1
Total Responses	**R S U**	**R S U**	**R S U**	**R S U**	**R S U**
--per stratum	**25 39 6**	**15 19 12**	**31 25 5**	**11 15 1**	**6 13 1**
--per response	**70**	**46**	**61**	**27**	**20**

When reviewing Table 4.10, it is important to note that the overall totals were significantly less than those in Table 4.9 because Table 4.9 included multiple responses from both the deterrent response as well as each subject matter of teachers who taught multiple subjects.

When viewing Table 4.10 it may be important to note that teachers with over 16 years experience were the largest group for experience level for the entire survey (46% at 133 out of 287). The most significant data displayed in Table 4.10 is that all teachers with 12 or more years

of teaching experience reported lack of training as the most common deterrent keeping them from using interactive multimedia. Although this has several implications, it seems to support concepts expressed in the literature review. Teacher training is seen as a critical issue when implementing technology. One aspect of that issue is the common argument that preservice teachers should also become trained on how to integrate technology while still in their undergraduate degree programs at colleges and universities. Veteran teachers with over 12 years of teaching experience probably did not receive that kind of preservice training, considering that the arguments for training preservice teachers on integrating technology are themselves a fairly recent phenomenon in higher education (Romano, 2003).

The final grouping to be observed in the no responses category is the gender category. Table 4.11 displays the deterrents as listed by the gender of teachers.

Table 4.11

Indicated Deterrents Listed After A No Response According to Gender

R = Rural stratum total, **S =** Suburban stratum total, **U =** Urban stratum total

◆ = Deterrent with the most responses per gender (based on totals from all 3 strata)

Gender	**No Computers**	**No Multimedia**	**No Training**	**Not Appropriate**	**Not Convinced of its Merit**
Male	**R** 4 **S** 6 **U** 0	**R** 3 **S** 5 **U** 1	**R** 6 **S** 8 **U** 0 ◆	**R** 4 **S** 3 **U** 0	**R** 3 **S** 5 **U** 0
Female	**R** 17 **S** 20 **U** 2 ◆	**R** 10 **S** 14 **U** 6	**R** 23 **S** 17 **U** 2 ◆	**R** 4 **S** 9 **U** 1	**R** 1 **S** 10 **U** 1
Total Responses	**R**	**S**	**U**	**R**	**S**	**U**	**R**	**S**	**U**	**R**	**S**	**U**	**R**	**S**	**U**
--per stratum	**21**	**26**	**2**	**13**	**19**	**7**	**29**	**25**	**2**	**8**	**12**	**1**	**4**	**15**	**1**
--per response	**49**			**39**			**56**			**21**			**20**		

When reviewing Table 4.11, it is important to note that teachers who withheld their gender were not part of the totals displayed in that table. When viewing Table 4.11 it may be important to remember that female teachers outnumbered male teachers 3 to 1 in the responses collected for the survey. Table 4.11 did not reveal any new trends. The most common deterrents were still no computers and no training for both genders.

In summary of the no responses, a few significant observations were made. The response choices provided to teachers about why they do not use interactive multimedia were essentially either circumstantial or attitude-based. Eighty percent of teacher responses in the no category gave reasons that were circumstantial such as no computer, no multimedia, and no training. Only 20 percent of the teachers' responses were based on their attitudes that interactive multimedia was not appropriate for their class, or that they were not convinced of its educational merit. The response for not convinced of its merit yielded only 10 percent of all responses given. When examining the reasons reported for not using interactive multimedia, the two most common responses were no computers, and no training. When teaching experience was reviewed, it was discovered that the most common response for teachers with over 12 years of experience was no training. This may be tied to comments in the literature review that colleges and universities are only starting to train preservice teachers on how to integrate technology, so veteran teachers may lack that fundamental training since it was probably not offered while they were in preservice training themselves.

Figure 4.4 is a diagram that summarizes the distribution for the overall set of responses regarding whether or not the teachers use interactive multimedia.

No, Do Not Use Interactive Multimedia **44.4%**		**Yes, Do Use Interactive Multimedia** **55.6%**		
Deterrents:		**Frequency of Use**		
Attitude **20%***	**Circumstantial** **80%***	**Seldom** **50%***	**Often** **42%***	**Daily** **8%***
Not Suitable for Subject Not Convinced of its Merit	No Computers (or few) (Top response) No Training (Second top response) No Interactive Multimedia Resources	1 to 5 times per semester 1 to 5 times per year	1 to 5 times per week 1 to 5 times per month	

*Percentages are approximated
Note: The columns are not exact proportions; they have been arranged for representational purposes only

Figure 4.4

Representational distribution of yes and no responses with follow up categories.

Figure 4.4 helps visually organize all of the teachers' responses into a format that shows the entire range of responses and how they were broken down. One observation of Figure 4.4 is that its structure is loosely similar to a Likert scale, at least when considering the extreme responses. Responses on the left side of Figure 4.4 indicate a group of teachers who do not seem to be wholly interested in or impressed by interactive multimedia. The right side shows teachers who appear to be enthusiastic supporters, as evidenced by their daily use. However, as the columns show, most respondents seem to have a less extreme viewpoint, based on their overall responses.

CHAPTER V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter will cover the following topics: Summary of the Data, Conclusions, and Recommendations for Future Studies.

Summary of the Data

The researcher distributed surveys to teachers at nine public junior high schools and middle schools throughout nine communities and four counties in northwest Ohio. The original sample was stratified into three main categories of urban, suburban, and rural schools, with four schools in each category. Each school was selected by criteria that made it a unique representation to its stratum (student diversity, community population size, geographic distribution, etc.). The urban category proved to be a challenge because only one of the four selected junior high schools agreed to participate, while the other three indicated they would participate only with authorization from the school district. Multiple attempts to contact the designated district personnel in hopes of being approved to proceed with the survey turned out to be futile within the time allocated to the survey process.

At the end of the study, 287 surveys had been collected from 408 teachers at all nine schools that participated, which was a 70 percent response rate. The data was recorded per stratum, and also according to whether or not each teacher used interactive multimedia, what subject matter the teacher taught, how many years of experience the teacher had, and the teacher's gender (optional response). Responses for nearly half of the category for teaching experience were comprised of veteran teachers with 16 or more years of teaching experience, and almost 70 percent of all responders were female teachers. Most data that was reported was offered with a breakdown of responses from each of the three strata, but the strata were usually not compared to each other for results because the researcher felt that numerical averages were either similar or fluctuated in random enough patterns that no definitive conclusion could be

drawn from those comparisons. When the yes and no responses were tallied for all completed surveys, 55.6 percent of all teachers had responded yes. This statistic may have been inflated by the fact that the suburban stratum had the highest number of respondents, and it was the only category that had more yes responses (62%) than no responses. The fact that the suburban stratum had a higher response rate in favor of using interactive multimedia implies that perhaps northwest Ohio is somewhat representative of the digital divide where the suburban schools have certain advantages over urban and rural schools that allow them to acquire better resources in technology.

When examining all yes responses, the frequency of use was of primary interest. Options ranged from daily to 1 to 5 times per year. The researcher discovered that almost 50 percent of all teachers who responded yes were actually only using interactive multimedia 1 to 5 times per semester or less. In order to rank usage by members within the three main groups (subject matter taught, teaching experience, and gender), a hypothetical scoring system was devised to create estimated averages of how often interactive multimedia was being used on an annual basis by the teachers who had responded yes. When the teacher responses were compared according to which subject matter they taught, a definite hierarchy seemed to emerge. The scores produced an anomaly where teachers in the Computer and Technical category were by far the highest scorers, but the most likely reason was that since teachers in this category probably have consistent or daily access to computers, they would be more likely to use tools that included interactive multimedia. It is also important to note that all teachers in the Computer and Technology category responded yes when asked if they use interactive multimedia, and upon reviewing the responses listed in Table 4.6, it was also verified that they were the category with the most responses in the daily response category. When teachers were compared by their teaching experience, teachers who had taught from 4 to 11 years scored the highest for frequency

of use. This raises a question about why that group seems to be more involved with interactive multimedia than the others. Perhaps teachers in this group enjoy a combination of professional experience that boosts their confidence, along with a notable comfort level in using computer technology to teach their classes. Teachers with 16 or more years of experience actually scored a higher level of usage than teachers with 1 to 3 years of teaching experience (they actually had the least usage). That statistic undermined any notion that more experienced teachers would be less inclined to use interactive multimedia while less experienced teachers would be more likely to use it. This leads to questions about what type of technology training is being offered to current preservice teachers, and it also poses a question about why the group with 4 to 11 years of experience had the highest levels of use. When teachers' responses were compared according to gender, the averages were very similar, implying that neither gender uses interactive multimedia more than the other.

When examining the no responses, the primary interest was to find out what deterrents were keeping the teachers from using interactive multimedia. Out of five possible responses, three of them were circumstantial (no computers, no interactive multimedia and no training). Some teachers added comments to their surveys indicating that time was also a factor, along with technical issues like restricted access to the Internet. The other two possible responses were based on teacher attitude where they either did not think interactive multimedia was appropriate for their subject matter, or they were not convinced that interactive multimedia has educational merit. When the no responses were tallied, almost 80 percent of the responses were based on the circumstantial deterrents, while only 20 percent were based on teachers' attitudes. Lack of computers and lack of training were the two most common responses. The issue of lack of computers was addressed by Wendol and King (2004), May (2003), and Rother (2004) and most likely it is a symptom of ongoing budget restrictions within the schools, as mentioned by Charp

(2003a). The issue of teacher training was also addressed by Romano (2003) and Rother (2004) and it is certainly important to whether or not integrating technology is successful in the classroom. Because 80 percent of the no responses were affiliated with circumstantial deterrents, the implication is that some of those teachers actually might use interactive multimedia if there were no deterrents. Unfortunately, the survey's existing questions did not produce any data that could help examine that issue more thoroughly. With this study's survey, it is not possible to interpret why 20 percent of the teachers believe that interactive multimedia is inappropriate for their subject matter or why they are not convinced of its educational merit. Teachers' attitudes are based more on personal experience and preference, and it would require a more specific study to explore each these teachers' line of reasoning. A review of Table 4.9 revealed that only 10 percent of all no responses were accompanied by a response indicating that the teacher was not convinced of the educational merit of interactive multimedia. It was the least selected response. One way to interpret this outcome is that apparently most teachers believe that interactive multimedia has some educational merit, even if they do not use it in their own classroom.

Conclusions

A general observation is that the National Research Council and U.S. Department of Education may have had reliable enough data to make the general assessment that the use of technology for instructional purposes is still not being realized at its full potential. The results from this study's regional exploration of northwest Ohio seemed to be in alignment with the findings from the NRC (2003). What is not clear about the NRC's assessment is that it was stated in a narrative context, but not with definitive statistics. This study's survey generated slightly more yes responses from teachers that were asked whether or not they use interactive multimedia as part of their classroom instruction, so that would indicate that the NRC's

assessment of technology use is only partially accurate in northwest Ohio. Upon deeper inspection, almost half of those teachers listed usage frequencies of 1 to 5 times per semester or less, so it reinforces the NRC's statement after all. There is certainly a gray area between the yes and no responses that should be clarified. A yes response indicated that a teacher at least saw some benefit in using interactive multimedia in the classroom, but if they only use it 1 to 5 times per year, this still might be considered non-use. A no response infers that there is some deterrent, whether attitude-based or due to circumstances, however, if the deterrent is circumstantial, then it is possible that some teachers would like to use interactive multimedia but really are not able to.

A final observation is that the schools and teachers that participated in this study seemed to be diverse enough to generate very distinct sets of responses. Despite many of the patterns located throughout the results, the responses fluctuated significantly enough among teachers, schools, and strata that no overwhelming trend seemed to emerge in the data. Thus, it was concluded by the researcher that northwest Ohio does seem to represent the national model where the topic of computer technology in education is still prone to multiple influences, opinions, and practices.

Recommendations for Future Studies

The protocol of communicating directly with the schools to establish a designated contact person, along with offering an incentive reward for participation, seemed to be a successful combination for boosting responses to the survey. Another benefit of the survey may have been its brevity. The researcher decided to keep the survey basic and brief (four questions) in hopes of making the survey experience simple and quick for busy teachers. Although this brevity may have contributed to a better response rate, there were critical pieces of information were not asked for in the survey. For teachers that responded yes about whether or not they used

interactive multimedia, the researcher should have included a response for what source the teachers were using, such as the Internet, CDs, or software supplied by the school or district. It also might have helped to identify other factors such as how often they felt their peers were using the same items or same types of materials, and what their satisfaction level was. For teachers who responded no with reasons due to circumstances, it would have been useful to know if they actually would have used interactive multimedia if the circumstantial deterrents were not an issue. At some point, future researchers would have to decide if the brevity in this study will suit their needs or will undermine their efforts to get more specific information.

The next recommendation would be that if a future study involved conducting surveys in a larger urban district, the researchers should communicate with the district first, well ahead of the allocated survey phase, and sort out all details regarding how to obtain authorization. It might require persistence, networking, and exact protocol, but if the district cooperates, then results will be much better.

Another recommendation is that if the survey involves subject matter taught, the researcher should have a response option for teachers who teach multiple subjects, and the researcher should predefine how to record responses from teachers in that category.

The final recommendation is that if strata are used (e.g., the rural, urban, and suburban stratum in this study), perhaps each strata should be compared as often as possible in order to provide for a more descriptive analysis of the entire sample and its interrelated components.

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Appendix A

HSRB Approval Letter

BGSU
Bowling Green State University

Office of Research Compliance
201 South Hall
Bowling Green, OH 43403-0183
Phone: (419) 372-7716
Fax: (419) 372-6916
E-mail: hsrb@bgnet.bgsu.edu

December 20, 2005

TO: Casey J. Cook
College of Technology

FROM: Richard Rowlands
HSRB Administrator

RE: HSRB Project No.: H06T098GX2

TITLE: *Exploring the Use of Interactive Multimedia as an Instructional Resource in Middle Schools of Northwest Ohio*

You have met the conditions for approval for your project involving human subjects. **As of December 20, 2005, your project has been granted final approval by the HSRB**. This approval expires on November 1, 2006. You may proceed with subject recruitment and data collection.

The final approved version of the consent document(s) is attached. Consistent with federal OHRP guidance to IRBs, **the consent document(s) bearing the HSRB approval/expiration date stamp is the only valid version and you must use copies of the date-stamped document(s) in obtaining consent from research subjects.**

You are responsible to conduct the study as approved by the HSRB and to use only approved forms. If you seek to make any changes in your project activities or procedures (including increases in the number of participants), please send a request for modifications immediately to the HSRB via this office. Please notify me, in writing (fax: 372-6916 or email: hsrb@bgnet.bgsu.edu) upon completion of your project.

Good luck with your work. Let me know if this office or the HSRB can be of assistance as your project proceeds.

Comments/ Modifications:
Stamped original consent documents are coming to you via campus mail.

c: Dr. Terry Herman

Appendix B

Letter to Contact Person

Bowling Green State University

Office of Graduate Studies
College of Technology
Bowling Green , OH 43403-0303
(419) 372-7613
Fax: (419) 372-7570

Dr. Terry Herman
College of Technology
Bowling Green, OH 43403-0303
(419) 372-7265 (hermant@bgnet.bgsu.edu)

Chair of the Human Subjects Review Board
Bowling Green State University
(419) 372-7716 (hsrb@bgsu.edu)

Dear, <<Contact Name>>

My name is Mr. Casey J. Cook, and I am a graduate student from the College of Technology at Bowling Green State University. I have selected your school to participate in a study that will explore the use of interactive multimedia as an instructional resource in the classrooms of middle schools throughout northwest Ohio. The results of the study will be compared to recent projections made at the national level through the U.S. Department of Education and the National Research Council. The targeted population for the study includes approximately 500 full-time teachers from twelve middle schools located in northwest Ohio.

Participation in the study is voluntary. It simply requires that full-time faculty complete and return a brief survey containing four questions (individual forms and pencils are included). The survey does not request any sensitive information from teachers, and it is an anonymous survey. By completing and returning a survey form, each teacher is confirming their individual consent to participate in this study. Each survey form includes a cover letter with detailed information should any teacher have questions about this study and their rights as a participant.

In hopes of acquiring higher response rates for the survey, I am offering an incentive. Each school that submits completed surveys for 85% or more of the school's full-time faculty before the postmarked deadline of Friday, January 27th, will be awarded their choice of one of the following two prizes:

A $60 purchase of pizza gift certificates for use at your school for faculty or for a student pizza party. (Vendors vary per community and will be selected by this study's contact person at each school) **OR**
A $60 donation to your school's library funds. Schools who meet the incentive will receive their awards no later than March 31st of 2006.

If you would like further information about this study, feel free to contact either myself, or my faculty advisor, Dr. Terry Herman:

Casey Cook
College of Technology
Bowling Green State University
(419)944-7265 (ccook@bgnet.bgsu.edu)

Dr. Terry Herman
College of Technology
Bowling Green State University
(419)372-7265 (hermant@bgnet.bgsu.edu)

If you have any questions regarding the conduct of this study or your rights as a participant in this study, please contact the Chair of the Human Subjects Review Board at Bowling Green State University:

Chair of the Human Subjects Review Board
Bowling Green State University
419-372-7716 (hsrb@bgsu.edu)

Thank you in advance for your cooperation and any participation you can provide!

Mr. Casey J. Cook

Appendix C

Survey Cover Letter

Bowling Green State University

Office of Graduate Studies
College of Technology
Bowling Green , OH 43403-0303
(419) 372-7613
Fax: (419) 372-7570

Dr. Terry Herman
College of Technology
Bowling Green, OH 43403-0303
(419) 372-7265 (hermant@bgnet.bgsu.edu)

Chair of the Human Subjects Review Board
Bowling Green State University
(419) 372-7716 (hsrb@bgsu.edu)

Dear teacher,

My name is Mr. Casey J. Cook, and I am a graduate student from the College of Technology at Bowling Green State University, completing my Master's degree in Career and Technology Education. I have selected your school to participate in a study exploring the use of interactive multimedia as an instructional resource in the classrooms of middle schools throughout northwest Ohio. The results of the study will be compared to recent projections made at the national level through the U.S. Department of Education and the National Research Council. The targeted population for this study includes approximately 500 full-time teachers from twelve middle schools located in northwest Ohio.

Participation in this study is voluntary. It simply entails that full-time faculty complete and return the attached survey, which contains four questions. The survey does not request any sensitive information from teachers, and it is an anonymous survey. Your decision to participate or not participate in this survey will not have any impact on your relationship with your school, your school administration, or any other official agency representing education in the state of Ohio. By completing and returning a survey form, you are confirming your individual consent to participate in this study. Rejecting participation in this survey at any time will only result in the absence of your input, and will not have any future bearing on you or your position as a teacher.

If you would like further information about this study, feel free to contact either myself, or my faculty advisor, Dr. Terry Herman:

Casey Cook
College of Technology
Bowling Green State University
(419)944-7265 (ccook@bgnet.bgsu.edu)

Dr. Terry Herman
College of Technology
Bowling Green State University
(419)372-7265 (hermant@bgnet.bgsu.edu)

If you have any questions regarding the conduct of this study or your rights as a participant in this study, please contact the Chair of the Human Subjects Review Board at Bowling Green State University:

Chair of the Human Subjects Review Board
Bowling Green State University
419-372-7716 (hsrb@bgsu.edu)

Thank you in advance for your cooperation and any participation you can provide!

Casey J. Cook

Appendix D

Instrument

Definition of Interactive Multimedia:

For the purposes of this survey, the definition of Interactive Multimedia requires three criteria:

- It is a presentation viewed on a computer
- Presentations contain combinations of sound, video, animation, or graphics AND
- The presentation has games, puzzles, educational activities, or simulations.
  (Please note that this definition *excludes* PowerPoint slide shows)

Survey Questions:

#1 Based on the definition of interactive multimedia listed above, do you currently use any form of interactive multimedia as part of your instructional methods in your classroom? (Please decide if 'Yes' or 'No' applies then mark the box or boxes next to the most appropriate responses below)

YES…
How often during the school year?

- ☐ Daily
- ☐ 1 to 3 times per week
- ☐ 1 to 5 times per month
- ☐ 1 to 5 times per semester
- ☐ 1 to 5 times per year

NO…
Reasons for not using interactive multimedia: (you may select more than one response)

- ☐ No computers available in the classroom
- ☐ No interactive multimedia resources available
- ☐ I lack sufficient training to use it properly
- ☐ It's not appropriate for my subject matter
- ☐ I'm not convinced of its educational merit

#2 What topic do you currently teach? (mark the box next to the most appropriate response)

- ☐ English / Journalism
- ☐ Foreign Languages
- ☐ Social Studies / History
- ☐ Mathematics
- ☐ Science
- ☐ Traditional Fine Art / Music / Drama
- ☐ Computer / Technical
- ☐ Health / Physical Education
- ☐ Business / Vocational
- ☐ Special needs groups

#3 Including the current school year, how many years have you been teaching?

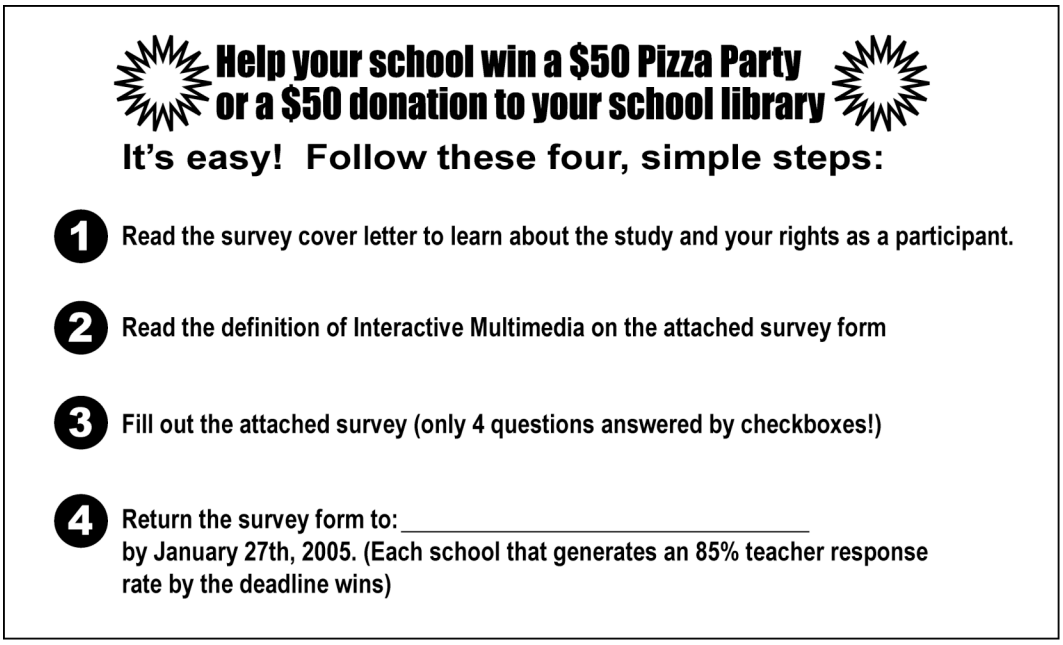
☐ 1 to 3 yrs	☐ 4 to 7 yrs	☐ 8 to 11 yrs	☐ 12 to 15 years	☐ 16 years or more

#4 (Optional) -- Your gender: ☐ Female ☐ Male

Thank you for your participation. Please return this form to _____ before December 13th. This s is part of a thesis being completed by Mr. Casey Cook from the College of Technology at Bowling Green State University. For more information about this study, you may contact Mr. Cook personally at ccook@bgsu.edu or call 419-944-7158.

Appendix E

Sample of Incentive Form



Appendix F

Survey Return Forms (page 1 of 2)

Dear <<Name>>,

Thank you very much for offering to assist my study as the designated contact person for your school. Here is a breakdown of items you will need to know while you are managing the surveys at your school:

Included Materials:

- A results sheet for your use when returning the completed surveys to me
- A self-addressed stamped envelope addressed to me for returning the surveys
- An official cover letter addressed to you for your own records
- <val> survey forms with supporting documents and attached pencils

Distribution of surveys:
For the purposes of the study, *full-time teachers* are the primary sample, however, if you determine that certain course subjects are handled by part-time teachers only, then feel free to include them in the survey. The method of distribution should have minimal impact on the study, so it is up to you if you wish to distribute the surveys via mailboxes, hand delivery, or at a staff meeting.

The incentive reward:
In order to qualify for the $50 incentive reward, your school needs to generate an 85% teacher response rate on the survey by the deadline (listed below).

Your total full-time teaching staff was recorded as __(#)__ so in order to earn the

$50 incentive reward, you must return a minimum of __(#)__ surveys.

The rewards will be in the form of $50 worth of pizza gift certificates from a vendor of your choice, or as a check made out to your school library or other designated department, and will be sent to you by March 31st, 2006.

Returning completed surveys:
Regardless of response rate, it is imperative that I receive the results of the survey by the postmarked deadline of **Friday, January 27th, 2006**. When returning the surveys, please fill out the Results form (next page) and include it with the surveys. Since the postage rate for the return envelope was pre-paid based on a determined paper count, please only include the teachers' actual survey forms (their cover letters, etc. need not be included).

Thank you again for your help! Please contact me if you have *any* questions or concerns.

Casey Cook – ccook@bgsu.edu

Appendix F

Survey Return Forms (page 2 of 2)

Survey Results

(please fill out this sheet and include with the surveys in the self-addressed envelope)

School Name: **Designated contact person:**

Did you receive enough survey forms to distribute to all of your full-time teachers?

☐ **Yes** ☐ **No**

Based on your own count / estimate, have you collected enough surveys to earn the incentive reward by meeting the 85% teacher response rate?

☐ ***Yes** ☐ **No**

*if yes, please specify which type of reward you would like to receive below:

☐ Gift certificates for a pizza party at your school.
(please specify the vendor you would like to receive the gift certificates for)

☐ Monetary donation to your school library or other school department
(please list the party's title and physical address that a check should be made payable to)

Would you or anyone at your school like to receive a report that shows the results of this survey once it is has been finalized?

☐ **Yes** ☐ **No**

If for some reason you do not have the original self-addressed stamped envelope that was provided, please send this form and your completed surveys to:
Casey Cook, XXXXXXXXXX, Toledo, OH 43614
or contact Casey Cook to retrieve the surveys in person:
Cell Phone: XXX-XXX-XXXX e-mail: ccook@bgsu.edu

To maintain the sampling process for this study, you may receive more survey forms to distribute if any of the following apply:

- The researcher does not receive your school's surveys by February 10th, 2006
- Your school generates a notably low response rate for this survey
- The surveys submitted but are incomplete or otherwise unusable for the study

If there were any problems with this survey, please write comments on the back of this sheet, or contact me personally.