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A Study of the Use of Computer Technology  
By Students with Special Needs

By  
Debra A. Mercincavage

A Thesis

Submitted in partial fulfillment of the requirements of the  
Master of Arts Degree  
of  
The Graduate School  
at  
Rowan University  
May 6, 1999

Approved By

Date Approved 4/29/99

## **ABSTRACT**

Debra A. Mercincavage

A Study of the Use of Computer Technology  
by Students with Special Needs

1999

Thesis Advisor: Dr. Jay Kuder  
Special Education

A study was conducted to investigate the use of computer technology during the instruction of students with special needs. The study examined how computer technology was used during instruction by special education teachers and by students with mild disabilities and students with severe disabilities. The relationship between the category of student with special needs, the academic areas of Language Arts and Mathematics and the computer application used during instruction were the focus of the research. Special education teachers of students with mild and students of severe disabilities teaching in a variety of classroom setting were surveyed. Teachers of students with severe disabilities were found to use the computer as frequently as teachers of students with mild disabilities. The computer was utilized more often during Language Arts instruction for students with mild disabilities and during Math instruction for students with severe disabilities. The computer application of drill and practice was

found to be used most often during instruction by students with special needs. Special education teachers considered the computer to be an effective instructional tool, but teachers of students with mild disabilities were found to consider the computer to be more effective than teachers of students with severe disabilities. This research suggests that the computer is a viable and effective mode of instruction that is being utilized by special education teachers to instruct students with mild disabilities and students with severe disabilities.

## **MINI-ABSTRACT**

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1999

Thesis Advisor: Dr. Jay Kuder  
Special Education

A study of the use of computer technology during the instruction of students with special needs was conducted. The study examined how the computer was used during instruction by special education teachers and by students with mild disabilities and students with severe disabilities. Teachers of students with severe disabilities were found to use the computer during instruction as frequently as teachers of students with mild disabilities. The computer was utilized more often during Language Arts instruction by students with mild disabilities and during Math instruction by students with severe disabilities. Special education teachers considered the computer to be an effective instructional tool, but teachers of students with mild disabilities considered the computer to be more effective than teachers of students with severe disabilities.

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## **Chapter 1**

### **Introduction**

I was a substitute teacher in three southern New Jersey school districts for three years. During my first year as a substitute teacher, I entered many classrooms which contained computers usually located in a back corner of the classroom. Many of these computers were covered with protective plastic dust covers and many of the computer stands were stacked with books and papers surrounding the covered computer. I would often ask the students if the computer was every used. Most of the time, the replies would be "Never", "Sometimes, we get to play on it". Occasionally, the replies described using the computer to reinforce a lesson or to do research for an assignment. The students rarely described using the computer during instruction. During my second and third years as a substitute teacher, I began to notice a change with the computers. They were still located in a back corner of the classroom, but they were not covered with plastic. When I would ask the students if they used the computer, the answers would most often be a, "Yes". They would describe using the computer to reinforce a lesson, to do research, to work on a group project, or in a tutorial fashion. Sometimes, they told about the teacher using the computer to show information about what they were learning. Computers were being used not only as stacking stations but also as a part of the learning and instructional process.

Research shows that the effective use of computer technology as an instructional strategy increases performance, improves attitude and confidence - especially for "at risk" students, increases student collaboration on projects, improves problem solving skills, and improves writing skills and attitudes about writing (Cradler, 1996). There is also research showing that special education teachers are more likely to use computer technology than regular education teachers (Saks, 1993). Saks' research further suggests

that special education teachers dealing with students, namely the severely disabled, who use a variety of devices and appliances are more likely to use computer technologies (Saks, 1993). My awareness of the increase of computer use in the regular education classrooms coupled with the research on the positive effects of the use of computer technology on instruction and the likelihood that special education teachers will use technology led me to question if special education teachers are using computers during instruction. And if special education teachers are using computers, are teachers of the severely disabled more likely to use computers during instruction than teachers of the mildly disabled?

### **Hypotheses**

Teachers of students with severe disabilities are more likely to use computers during instruction than teachers of students with mild disabilities.

Computers are more likely to be used during Math instruction than Language Arts instruction by students with special needs.

### **Purpose**

The purpose of this study is to examine the use of computer technology by students with special needs. This study will be accomplished by comparing the use of computer technology by teachers of students with severe disabilities and teachers of students with mild disabilities and by comparing computer use during Language Arts instruction to Math instruction of students with special needs. It will be important to determine in what instructional capacity (assistive, instruction, reinforcement or enrichment) computer technology is used, and how it can be used within the classroom.

The results of this study will be useful to anyone involved in the development of instruction for students with disabilities. The results can be the basis for the development or increase of instructional use of the computer in the special education classroom. Classroom teachers, resource room teachers, department chairs, child study teams and administration can use the results as a comparative measure. A child study team member

could use the results to determine the kinds of assistive computer technology to recommend for use by a special needs student. A curriculum developer could use the results to determine the kinds of computer technology that could be used with existing or developing curriculum. The special education teacher could use the results in developing lesson plans and in writing goals and objectives for the special needs student.

### **Overview**

In the next chapter, I will review the literature on computer technology used during classroom instruction. Two subject areas, Language Arts and Math, will be the focus of the review. The subject of Language Arts will include reading, writing and spelling. The subject of Math will include shape recognition, adding, subtracting, dividing, multiplying and problem solving. The uses of computer technology by severely disabled and mildly disabled students will also be a focus.

Subsequent to the literature review, a cross-sectional survey of special education teachers will be conducted to ascertain the type of students that they teach, how computer technology is used in their classrooms, the academic subjects for which the computer technology is used, and the specific software that is used for instructional purposes.

### **Limitations**

There were few studies found on the instruction of the severely disabled. One limitation of this study is the lack of published research involving the severely disabled. A second limitation of this study is the lack of published research involving the actual time the computer is used for instructional purposes. A third limitation of this study is the size and composition of the random sample completing the survey.

## **Chapter 2**

### **Literature Review**

#### **Why Use Computers With Students with Special Needs?**

Cain (1984) cites that the rationale and focus for the use of computer technology in special education is individualized instruction which can provide an effective means of educating the student with special needs. Because the computer is patient, always waits for a response, and repeatedly gives the same explanation, it is an ideal tool for individualized instruction and remediation. The emphasis is towards more student centered learning in which the teacher guides the student using computer technology as a tool to acquire knowledge. Lessons become more interactive which can promote student exploration of content areas (Fisher, 1997). Computer technology can help students with special needs develop positive attitudes toward learning by providing opportunities for success instead of failure. Students can work on vocabulary, writing skills, and math at their own pace allowing for incremental steps of success because the computer can meet their individualized needs.

In a classroom where computer technology is utilized the emphasis shifts from teacher taught to student centered learning (Fisher, 1997). Because information can be presented in many different modes taking into consideration diverse learning styles and computer technology resources can be matched to the individual learner's needs, the student gains confidence in his skills because the instructional program allows him to correct his own mistakes which reinforces his self-esteem (Ryba, Selby, & Nolan 1995). A meta-analysis of 133 studies about the potential of computer technology compiled by the Software Publishers Association for its Report on the Effectiveness of Technology in Schools, 1990-1994, found that when schools use computer technology effectively, students show improvement in achievement, attitude, self-concept and student-teacher

relationships. Technologies which provided for student improvement were interactive video, networking and collaboration tools (Fawcett & Snyder, 1997).

Because computer technology is helping students with special needs to achieve success, educators are discovering that computer technology is facilitating learning, enhancing social interaction and building self-esteem among students with special needs (Holzberg, 1995). Cradler (1996), in a meta-analysis of research studies and reports, found that the effective use of computer technology a) improves attitude and confidence, b) increases performance, c) increases opportunities for interactivity with instructional programs, d) provides instructional opportunities otherwise not available, e) increases opportunities for student-constructed learning, f) increases student collaboration on projects, g) significantly improves problem solving skills of learning handicapped students and, h) improves writing skills and attitudes about writing for students with special needs. Lewis, Dell, Lynch, Harrison, and Saba (1987) also concluded that the effective use of computer technology by a student with special needs increases teacher perceptions of student capabilities.

Computers provide opportunities for students to participate cooperatively and to contribute at their level of competence (Holzberg, 1995). Ryba, Selby, and Nolan (1995) assert that because computers naturally lend themselves to cooperative learning approaches, social development can be linked to any curriculum regardless of the extent and type of the student's disability. Clements and Nastasi (1988) conducted a study of computing environments that found that students learning in computing environments exhibited an increase in three social behaviors - conflict resolution, rule determination and self-directed work. The study included 48 students whose social behaviors were observed while they worked in pairs. The students were divided into two groups in which students received training for fourteen weeks in Logo programming or computer-assisted instruction - drill and practice. Both groups of students showed increases in conflict resolution, rule determination and self-directed work. The Logo group showed

significantly higher percentage of increases in rule determination and self-directed work than the drill and practice group. These differences were attributed not to the social interactions or cooperative work occurring within the environments but to the type of cooperative work in which the students participated. The Logo environment provided for the use of higher level cognitive skills and the drill and practice environment provided for teacher-assigned, machine directed work. Student's self esteem was also enhanced when using a computer because learning was self-paced and self-correcting allowing confidence in one's abilities to build.

Cain (1984) also declares that individualized instruction is not the only reason to use computer technology with students with special needs. The ultimate goal of special education is to assist students with special needs to reach "their maximum potential through the provision of a free and appropriate education and to prepare them to the highest degree possible to be productive members of society" (p. 7). He noted that the society for which we are preparing students is based upon increasing levels of technological sophistication and specialization. If students with special needs are going to function in such a society, students must be familiar with and be able to use the technology of the society. The classroom, where students are prepared for their futures, is the most logical place for students with special needs to become familiar with, to learn about, and to learn to use computer technology.

### **Computers As Assistive Technology**

Computers are a type of assistive technology that is defined by the Technology-Related Assistance for Individuals with Disabilities Act of 1998 as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain or improve the functional capabilities of individuals with disabilities." [Part A, Sec. 602 (1)]. Assistive technology devices, by replacing an ability that is missing or impaired, enable students with special needs to participate within the classroom making them feel "normal" (Fisher, 1997). According

to Lewis (1998), assistive technology has two major purposes. First, technology can augment an individual's strengths so that his or her abilities counterbalance the effects of any disabilities. Second, disabilities are compensated for or bypassed entirely by technology providing an alternate mode of performing a task.

The ability of computers to offer visual, auditory and interactive modes of teaching helps students with special needs to compensate for their disability (McCarthy, 1994). Motor skill and visual coordination may be improved for students with neuromuscular diseases through adaptive switches that provide student control over their learning environment. Gravity, toggle, or air-pressure switches allow students with special needs to give manipulative responses through any voluntary movement. For the student with special needs who is blind or visually impaired, Braille keyboards and printers, optical scanners, screen displays in very large print, and synthesizers that convert output to speech can be used during learning. For students who cannot use a standard keyboard, touch sensitive screens, oversized keyboards and adapted keyboards that are operated with a finger touch or a joystick are available (Feichtner, 1989). The ability of computers to interface with audiovisual equipment allows the computer to read to students with visual impairments, write for students with motoric impairments, and speak for students with speech impairments (Howard & Busch, 1991).

Lahm and Morrissette (1994) outlined seven areas of instruction where assistive technology could assist students with mild disabilities. These areas included organization, note taking, writing assistance, productivity, access to reference materials, cognitive assistance, and materials modification. A computer word processor can be used by the student to outline major ideas or topics and then add subcategories of information. A computer scanner allows information to be transferred. Computers can be used in the notetaking process. Computer word processors can assist students in the writing process by helping students with the mechanics of writing: spelling, grammar, punctuation errors; with the process of writing: generating ideas, organizing, drafting,

editing and revising. A student's productivity can be enhanced by using computer spreadsheets, databases, and graphic software enabling students to work on math and other subjects that require calculating, categorizing, grouping and predicting. A computer and a modem allows students to access information on the Internet. Cognitive assistance is provided by computer programs in which instruction through drill and practice, tutorials, problem solving, and simulations are available. Computers can be used to create instructional materials or customized materials to meet the varied needs of students with special needs.

Taymans and Malouf (1984) discuss optional ways in which computers can be of benefit to students with special needs who exhibit certain behaviors that may inhibit learning. For a student who is slow when making responses, the computer can provide prompts to elicit participation. If the student is impulsive when responding, the computer can delay portions of the text presentation. If a student has difficulty spelling, the computer can be programmed to accept abbreviated spellings or anticipated errors. Computers can enhance learning through word processing which can ease the physical burden of writing and revising and helps the student to write better (Feichtner, 1989). The computer can facilitate the writing process in a variety of ways for students with special needs. A speech recognition system has special hardware and software that allows oral language input to be combined with the word processor to produce written output. Instead of typing as a means of input, the voice becomes the input medium into the computer (McCullough, 1995). A computer word processor can also be programmed to read the text aloud to the student. The student can choose to hear individual letters, words, sentences, paragraphs or the entire text allowing the student the ability to monitor his writing (Lewis, 1998). A legible printed work product is a significant outcome for many students with fine motor skill deficits. Composing is made easier when using the computer because students can compose and write/type at the same time. One of the most important advantages of computer word processing for students with special need is



the ease with which text can be altered. The ability to rearrange sentences in paragraphs, to delete unwanted text and to add detail to draft versions is simplified when using a computer (Storeygard, Simmons, Stumph, & Pavloglou, 1993). For a student who has motoric difficulties, a light pen, toggles, air-pressure switches or a mouthstick can be used to indicate answers on the computer screen. Students with perception and attention problems can benefit from a computer's enhancement of verbal cues, animation, directive arrows and highlighting which helps to draw their attention and focus. For students with memory deficits, instruction can be delivered in small incremental steps with the computer program's sound, motion and color cues serving as memory aids (Tymans & Malouf, 1984). Hypermedia, hypertext, or responsive text can assist with decoding and comprehension skills. A student using a pointer device and highlighting a word or part of a graphic illustration can be linked to a textual definition, a graphic illustration, or a digital speech pronunciation (McCullough, 1995). CD-ROM encyclopedias can help students do research who have difficulty finding information in the library. Spreadsheets and databases help students to collect, organize and modify information quickly and easily. The Internet is an endless resource of factual information to virtual tours that can be used for and supplemental to instruction (Fisher, 1997).

### **Computer Applications During Instruction**

Computer assisted instruction is one of the most popular technological alternatives to direct instruction. It can be used as a replacement of as well as a supplemental support to direct instruction by the teacher. Well designed computer programs offer students carefully sequenced, individualized activities and frequent, informative feedback on their responses (Lewis, 1998). Computer assisted instruction can be used in a variety of ways by students with special needs during the learning process. Computers can be applied instructionally as drill and practice, as tutorial, and as simulation (Fiechtner, 1989). Drill and practice programs are most appropriate for subject matter that needs to be mastered. Drill and practice can be

formatted as a game or problem solving experience that can be used to reinforce information that has been previously taught by the teacher. Tutorial instruction is programmed instruction of new information that is organized in a sequential and hierarchical manner (introduction, objectives, pretest, interactive lesson, review and posttest) that is most useful for individualized instruction within the regular classroom (Hofmeister, 1984).

Torgeson (1984) reported computers to be suited to the delivery of large amounts of monitored information and to individualized practice in basic skills. He also stated that computers are beneficial to special needs students when coupled with regular classroom instruction. Connors and Detterman (1987) demonstrated the use of computer instruction with children having cognitive delays by developing a word-recognition program using a voice synthesizer that provided instruction through repetitive trials and overlearning. Lieber and Semmel's study (1986) found that students who received computer aided mathematics instruction showed significant posttest gains when compared to a control group who received only traditional mathematics instruction. These traditional uses of computer technology are forms of the rote method of learning of material that does not encourage the use of higher level thinking skills by students. In today's society with the exponential increases in information occurring the rote method of learning is not feasible for all educational endeavors. Students must learn to use their higher order cognitive skills of observing, measuring, predicting and inferring. With the development of the Internet and more interactive software, new ways to integrate computer technology are being adapted for curriculum use in which students can use their higher order thinking skills.

Computers can also be used as simulations which help students to understand abstract concepts in specific content areas (Feichtner, 1989). Computer simulation is an interactive medium which allows for student creativity, continuous feedback, and self-monitoring (Cain, 1984). Simulations, showing cause and effect, can mirror

how a learned concept can be applied in daily living with little risk to the individual. Computers can provide real life experiences to students with special needs while they are still in school which can be used to promote skill generalization to real life situations. The computer serves as the perfect venue for challenging simulations and problem-solving. In the science program, *Decisions, Decisions: Environment*, students of all abilities work together to solve the problem of pond pollution. The computer provides the visual stimulus and a storyline and motivates the students to think critically about issues while providing opportunities for decision-making (Holzberg, 1998). The emphasis is towards more student centered learning both individually and in groups in which the teacher guides the students in acquiring new knowledge, thus allowing students to take a more active role in the educational process (Fisher, 1997).

Computer technology can also be used as a motivational tool to make learning interesting and fun for the student with special needs. While participating in the resource room pull-out program, "Wonder of the Woods" in which student took field trips to their local woods, third and fifth graders in an Indiana elementary school used a CD-ROM encyclopedia to research information for a unit on ants. They used a computer's word processor to write reports onto which they transferred clip art for purposes of illustration. They also collaborated on a "Where's Waldo Ant" book where Waldo Ant was hidden in pages of ant lookalikes created by using the computer (Holzberg, 1995).

Computers in special education classrooms can help teachers teach and students learn in three ways a) they are intrinsically motivating for most students, b) learning activities with computers can be structured so that students with special needs feel in control and non-threatened and, c) with appropriate computer activities and teaching strategies such as collaborative learning and peer tutoring the students and the teacher can create learning environments where students need and want to communicate (Freedman, 1991). A meta-analysis by Khalili and Shashaani (1994) of 36 independent studies showed that computer applications during instruction has a positive effect on

students' academic achievement. The average effect size from the 151 comparisons of students who participated in the study indicated that use of computer applications raised student's examination scores. The effect size differed depending upon: a) the mode of application (drill and practice, tutorial, or simulation), b) the study setting (regular classroom or computer lab), c) grade level (elementary, middle school, or high school), and d) the instructor (same teacher or different teacher).

## **Curricular Applications**

### ***Language Arts***

Language Arts instruction is usually devoted to helping students understand language critically and to express themselves in speech and writing. However, individual student's strengths differ, some students have little difficulty expressing their ideas and can write fluently, while others struggle with the mechanics of handwriting. Spelling can be difficult for some students and effortless for others. Some students like to write and will write a great deal, while other students do not like to write and will avoid expressing their ideas. This diversity among students has facilitated the use of the computer as a tool in many classrooms because it can present and monitor individualized instruction to many students at their own pace. Daiute (1985) suggests that the best way to integrate computers into the language arts curriculum is to focus on the student and the curriculum and not on the computer. She further states that the key to using the computer wisely is to consider it in relation to the student's goals and needs.

Salvage and Brazee (1991) describe a language arts curriculum for students with special needs based on a whole language approach in which sensitivity to the students' learning styles and the students' needs for more time and structure and safety in order to take the risks necessary to learn are integrated into their teaching. Some students, in their class, had severe problems with both handwriting and expressive language, so a computer word processing program was used during the writing process as an adaptive device to circumvent these deficits. Salvage and Brazee acknowledge that the use of the computer

allowed the students to experience success when writing because they could compose directly without being bogged down with penmanship and the mechanics of handwriting, and produce clear printed final copies of their work. The expressive language of the students was enhanced because they could revise mistakes easily using the editing commands of the word processing program. Salvage and Brazee found that their students participated at a higher level of involvement when using the computer word processing program to complete their writing assignments. There is evidence in research to suggest that computer word processing leads to changes in the quality of writing, in the quantity of written text and, in the accuracy of written language, such as spelling and grammar (Lewis, 1998).

According to MacArthur (1996) word processors have several capabilities that may influence the writing process. First, the editing features of the word processor allow the writer to make frequent revisions without tedious recopying. Second, word processors gives the student the power to produce neat, printed work and to correct errors without messy erasures. Third, the visibility of the text on the screen and the use of typing can facilitate collaborative writing among peers and scaffold interactions between the teacher and students. Peers work together sharing responsibility for generating ideas, typing and, revising because both partners can see and read the text. The teacher can easily view the text on the screen and observe the students' writing process and intervene when appropriate. Fourth, typing is much easier than handwriting for students with handwriting difficulties.

These four capabilities were discussed by Storeygard, Simmons, Stumph and Pavloglou (1993), in an article about a "Computers and Writing" course for students with special needs at the middle school level. They found that using a computer facilitated the writing process in various ways and documented students' and teachers' reactions to using the computer. Students were impressed with how easy it was to revise on the computer. Many students felt that word processing helped them to express their thoughts.

Producing legible work on the computer was a significant outcome for many students with handwriting difficulties. Teachers noted that the legible printouts facilitated peer conferencing. And students, who characterized themselves as poor spellers, pointed out the spellchecker as an extremely useful feature. The spellchecker was noted by MacArthur (1996) as the most widespread and generally useful tool to support transcription.

Erickson and Doppenhaver (1995) using computer technology and child-centered instruction also developed a language arts curriculum in which students with severe disabilities could participate actively in reading and writing. Students used the computer to write short statements about the weather, date, and anything else they thought was important. One student used a communication device called the Touch Talker which is a programmable system with a keyboard composed of icons and letters. The student became so proficient in its use that she narrated a class play. Another student used the Unicorn Board, which is a large touch sensitive membrane that can be programmed to represent one key or as many as 128 keys, that allowed the student to produce a written response on the computer monitor and a spoken response through the speech synthesizer. The class also used the computer program Spell-Word which provided a means for teaching spelling and word patterns in an interactive way. As they typed, letters were spoken by a speech synthesizer as they appeared in bold print on the screen. The program allowed the students to use and hear words spelled and then spell the words themselves. Through the use of the computer and the assistive devices, the students were able to participate more directly in their own literacy learning.

In a Language Arts program developed jointly by the Orange County, Florida, schools and the Peabody College of Vanderbilt University, students with special needs are improving their reading and writing skills by using computer technology. In a multimedia software program, students are led through instructional activities by Melvin, an animated tutor. He guides them through the reading lab, the work lab, and the spelling

lab. In the reading lab, students view a video and read a passage about the topic of the video. Melvin provides individualized help on an as-needed basis. If asked, he will read the passage slowly (word by word) or fluently (sentence by sentence) or will help with pronunciation and definition. In the word lab, a word list is developed from the reading passage and the student clicks on the word Melvin pronounces. The computer records accuracy and speed and keeps track of individual assessment and performance data. When the assessment is complete, a word list is developed of the words that the student needs to practice and the computer begins a series of interactive exercises to help the student become fluent in decoding and recognizing the words. The student then moves to the spelling lab, where words are spelled that were presented in the reading and word labs. Following a pretest, Melvin pronounces each word, uses it in a sentence, breaks it into parts, and then pronounces it again. Students then type the word which is analyzed by the computer, and if incorrect, specific corrective feedback is provided to the student. Errors must be corrected to continue. Students do additional practice and see a graph of their results. When all words are mastered, comprehension activities occur back in the reading lab. Data collected over the first two years of the pilot study show significant gains in vocabulary and reading comprehension, overall school achievement, and positive increases in student attitudes and self-esteem (Hasselbring, Goin, Taylor, Bottge, Daley, 1997).

Philosophies and practices about reading instruction vary, but research strongly supports an early emphasis on letter-sound correspondence. Reading methods that include explicit, synthetic phonics instruction result in higher achievement in word recognition and spelling that permeate to comprehension, reading rate and vocabulary (O'Connor, Jenkins, Cole, & Mills, 1993). Research studies have found that computer synthesized speech feedback has been shown to be effective in training phonological awareness skills in prereaders as well as improving phonological decoding, word recognition and spelling skills of disabled readers (McCullough, 1995).

Wise and Olson (1992) reported significant improvement in disabled readers' phonological decoding and word recognition using synthesized speech feedback. Students who displaced part of their language arts instruction for computer instruction showed gains in phonological decoding four times larger than the control students who followed their normal course of language arts instruction. Data also showed that the students using the computer instruction had nearly twice the gain in word recognition than the control students.

Brewer, White, and Brand (1991) conducted a study using computerized instruction in which whole-word stimulus fading procedures were used to teach functional word discrimination to young mildly-severe cognitively impaired students. Fourteen of the students in the study achieved word discrimination skills that would allow for adaptive performance in the external environment. It was also noted that the students attended and behaved well throughout the study. Brewer, White, and Brand confirmed that computerized instruction provided a medium by which mildly-severe cognitively impaired students could acquire functional word discrimination skills. In a study (Karsh, 1996) in which a) functional words and symbols, b) coin and bill recognition, and c) time telling was the basis for the computerized instruction of ten severely cognitively impaired students, the students exhibited more active engagement time during computer aided instruction than teacher instruction and six of the students could generalize learned information.

Dube, McDonald, McIlvane, and Mackay (1991) conducted a study with two severely cognitively impaired students using a computer assisted spelling program applying a constructed-response matching-to-sample procedure. Students were taught spelling by picture-picture, picture-word, word-word progression using a touch sensitive screen computer that recorded and monitored their spelling mastery. The researchers cited that the performance of the two students increased because the computer supplied



an individualized program by creating a review and practice battery for each student and immediate and continuous feedback.

### ***Mathematics***

Computer technology is also being use to facilitate mathematics instruction in computation. Studies have reported that the most frequent use of computer technology in special education classrooms is for mathematics drill and practice activities. The repetitive design of mathematics instruction and the immediate feedback offered by the computer allows students to control their learning experience which enhances student motivation to learn and increases self-esteem (Howard & Busch, 1991). Review of the literature on computer technology for teaching computational mathematics instruction has not produced conclusive findings. Most studies involve the use of computer software programs providing computational practice in the form of drill and practice or comparing computer use to traditional mathematical instruction. However, some studies do suggest that computer based instruction is effective in increasing students' knowledge of math facts (Babbit & Miller, 1996).

In a study conducted by Allinder (1996) the effect of curriculum-based measurement (CBM) on math computation of students with mild disabilities was examined. Allinder found that students whose instruction was based on computer-based measurement showed improvement in performance. The study also showed that students whose teacher implemented CBM more accurately, which was defined as measuring students frequently, complying with decision rules for modifying instructional plans and raising goals and, setting ambitious goals, made significantly greater math gains than did students whose teachers implemented CBM less accurately or did not use CBM.

In a study (Woodward, Gersten, 1992), in which a computer with a videodisc was used to teach the concept of reducing fractions in seven special education classrooms, students performance was shown to improve on post-tests. The study

also examined students' and teachers' attitudes towards using the computer technology. Students were very positive about the instruction and indicated that they felt more self-assured about their ability to work fractional problems. Teachers' attitudes were also positive about the method of instruction. They felt that it was an effective way to teach the concept of reducing fractions because they could still teach the entire group, monitor seatwork, assist students having difficulties, check for understanding and motivate students.

Several national initiatives in recent years have advocated the importance of teaching mathematics through a problem-solving perspective and emphasis on finding mathematical application in everyday situations. Problem-solving can be defined as a problem solving activity within the context of word problems in mathematics. The problem solving activity should include problems that require analysis of the unknown; provide too much, too little, or incorrect data; can be solved in more than one way; have more than one correct answer, and require an extended effort (Parmar, Cawley, Frazita, 1996). Word problems are challenging for many students but word problems are particularly difficult for students with special needs. Students with special needs have difficulty in reading the problem, identifying and ignoring extraneous information, determining what operational process will solve the problem, completing all the steps necessary to complete the problem, and computing basic facts (Babbit & Mill, 1996).

In a study conducted by Parmar, Cawley and Frazita (1996) students in grades three through eight with and without special needs were compared. It was found that students with special needs performed at a significantly lower rate of performance in solving word problems except for those problems involving one step addition. The students in this study, spent a high proportion of their mathematics instructional time practicing basic computational operations of addition, subtraction, multiplication and division. The authors of the study suggest that the results highlight the need for mathematics instruction to move from a focus on computation to problem-solving.

Mastropieri, Scruggs, and Shiah (1997) conducted a study in which four mildly cognitively impaired students successfully learned problem-solving skills using an instructional animated tutorial computer program containing three components - tutorial, guided practice and independent practice. The students in the tutorial component were taught a seven step problem-solving strategy. The seven steps included: 1) read the problem, 2) think about the problem, 3) decide the operation sign, 4) write the math sentence 5) do the problem, 6) label the answer, and 7) check every step. The guided practice component included eight problems with the seven steps visually displayed, accompanied with animation and corrective feedback. The independent practice component contained twenty problems with a reminder of the seven step strategy. Pre and posttesting on the computer showed significant improvement in performance by the four students. However, the students were less successful at transferring the problem-solving skills to paper and pencil tasks.

#### **Affects of Computer Use on Instruction**

The application of computers for the instruction of students with special needs is also facilitating changes in the teaching strategies used by special educators. Teachers are becoming facilitators, collaborators, and brokers of resources. The computer has the information, but the students need a guide, the teacher, to help them access and assimilate that information. Special educators are using strategies such as mediated instruction which has been defined as top-down learning, where the "big picture" guides the learning experiences along with modeling by the teacher. Scaffolding, described as bottom-up, is another type of instruction being used in which the teacher models orally the steps to reach a specific conclusion. As the students understand the process the teacher's participation fades to that of a coach, providing prompts only when needed (Polloway & Patton, 1997). Comprehension monitoring is a metacognitive strategy that is used by the teacher in which the student is required to explain his/her thought process

as a way of determining next steps and as a method used to evaluate the student's completed work (Howard & Busch, 1991).

Teacher attitude and beliefs about the unique potential that computers can play in the educational process of students are determinants of the actual uses of the computer in the classroom. In a study of computer use by four Special Education teachers conducted by Macarthur (1991), he found that teacher's goals for computer use were consistent in several ways with their overall educational philosophy and methodology used within their classrooms. The computer was viewed as a flexible educational tool that could be used in a variety of ways to meet a variety of goals. The effectiveness of the computer depended on how the computer could be integrated with the educational goals and activities and the organizational patterns of their classrooms. Some of the computer beliefs were directly related to the teacher's expressed educational goals for their students such as developing self-esteem, increasing motivation, compensating for the student's disability and fostering computer literacy. The teachers exhibited strong intent on integrating the computer into their classroom. The major applications used by the four teachers were word processing and drill-and-practice but the applications were reflective of the established structure and organization already present and utilized in their classrooms. The application for one of the teachers emphasized structure and academics. Another teacher emphasized self-esteem and social interaction reflective of the cooperative learning taking place within the classroom. Another teacher used the computer as a supplemental tool to foster multisensory learning, and most importantly, all four teachers believed that computer skills would give their students a competitive edge over other students.

Cosden (1988) conducted a study in which she surveyed one hundred elementary school special and regular education (31 special day class (SDC), 25 resource room (RR), and 44 regular) teachers who used computers. She found that almost all of the teachers (97%) had positive feelings about computer use during instruction. Drill and practice

was the dominant form of instructional application for both the special and regular education teachers. Word processing and tutorial applications were used by half of the teachers. Problem solving, programming, and data base management were used by a small percentage of the teachers. Drill and practice was rated as most effective, followed by problem-solving, word processing, tutorial and simulation applications. In terms of academic benefits, most teachers reported increased mastery of basic skills by their students. One-fifth of all teachers noted improvement on computer test scores and 46% of RR teachers, 30% of SDC, and 21% of the regular teacher reported improvement on noncomputer test scores. The majority of the teachers in each setting reported that computer instruction was effective in math. Reading was seen as an effective computer instruction area by 56% of SDC, 43% of RR, and 30% of the regular teachers. As a result of computer instruction, most teachers reported improved self-esteem, improved attitude toward learning, improved attention span, improvement in peer interaction, and improved student-teacher interactions.

## **Chapter 3**

### **Methodology**

#### **Introduction**

A cross-sectional survey was conducted of Special Education teachers to ascertain the use of computer technology during instruction for students with special needs. The data collected examined two hypotheses pertaining to the use of computer technology during instruction. The first hypothesis examined the use of computer technology during instruction by teachers of students with mild disabilities and teachers of students with severe disabilities. The second hypothesis examined the use of computer technology during Math and Language Arts instruction by students with special needs.

#### **Survey Sample**

The subjects of this study included a random sample of Special Education teachers attending graduate courses in Special Education at Rowan University in the Spring semester of 1999 and Special Education teachers teaching at a private school in Southern New Jersey. The sample of this study included teachers of students with mild disabilities and students with severe disabilities. The sample of teachers were teaching in public, private, and alternative educational settings in a variety of classroom settings which included self-contained, regular, resource, inclusive, class support, and various combinations of those classroom settings.

#### **Design**

A cross-sectional survey was used drawing a sample that included four different grade levels, three different educational settings, a variety of classroom settings, and teachers who taught students with mild disabilities and students with severe disabilities. The survey focused on three categories (a) questions of a general nature, (b) questions

pertaining to the application of computer technology utilized in the classroom, and (c) questions pertaining to the instructional uses of computer technology utilized in the classroom. Questions of a general nature ascertained the type of educational and classroom setting and the category of student taught. Questions pertaining to the uses of computer technology ascertained the application and instructional utilization used by the teacher and special needs student in the classroom. The data collected from the questionnaire pertaining to the uses of computer technology was applied in a comparative mode to determine if teachers of students with severe disabilities use computer technology more than teachers of students with mild disabilities and if computer technology was used during Math instruction more than Language Arts instruction by students with special needs.

### **Procedure**

With permission of several Rowan professors, a copy of the survey was personally distributed to Special Education teachers attending five Special Education graduate courses and collected upon their completion. The survey was also distributed by an assistant to the teaching staff of a private special education school and returned to me upon their completion. A cover letter provided instructions, a request to return the completed survey, and an offer to provide the results to any interested party.

## **Chapter 4**

### **Results**

#### **Review of Research Design**

The purpose of this study was to investigate the use of computer technology during the instruction of students with special needs. The study examined how computer technology was used during instruction by special education teachers and by students with mild disabilities and students with severe disabilities. The study focused upon the relationship between the category of the student with special needs, the academic areas of Language Arts and Mathematics and the use of computer technology for instruction. Two questions formed the premise of the study. Do teachers of students with severe disabilities use computers more during instruction than teachers of students with mild disabilities? Are computers used more during Math instruction than Language Arts instruction by students with special needs? A survey yielded data pertaining to questions of a general nature ascertaining the type of educational and classroom setting and the category of student taught, and questions pertaining to the application and instructional utilization of the computer by teachers of students with mild disabilities and students with severe disabilities.

#### **Survey Sample**

Surveys were distributed to a random sample of teachers attending five special education graduate classes which are academic requirements for a graduate degree in the Graduate Programs of Special Education and Learning Disabilities at Rowan University. Surveys were also distributed to the staff of one private special education school in Southern New Jersey with a school population of three hundred and thirty-six students and forty-nine teachers. Seventy-nine surveys were distributed to the two sampling groups. Seventy-one surveys were returned. Sixty-five surveys were completed by



participants teaching students with special needs and used to conduct the study. Six surveys were excluded from the study because the participants were not teaching students with special needs.

As Table 1 shows, teachers responding to the survey reported teaching students with special needs in several educational settings in public schools, in private schools, and an alternative school. Teachers indicated teaching in four different grade levels at the preschool, the elementary, the intermediate, and the secondary levels. As shown in Table 2, the teachers reported teaching in various classroom settings. Most teachers (63 %) responded as teaching in self-contained classrooms followed by regular education classrooms, resource rooms, inclusive classrooms, as class support, and combinations of resource, class support, regular, inclusive and self-contained classrooms. Of the sixty-five teachers participating in the study (Table 3), eighteen teachers taught students with mild disabilities (M); twenty-one teachers taught students with severe disabilities (S); eleven teachers taught students with mild and severe disabilities (M/S); ten teachers taught students with mild disabilities and regular education students (M/R); and five teacher taught students with mild and severe disabilities and regular education students (M/S/R). Survey data was analyzed according to the following criteria, teachers of students with mild (M) disabilities included teachers teaching students categorized as mild and mild and regular; teachers of students with severe (S) disabilities included teachers teaching students categorized as severe, mild and severe, and mild, severe and regular.

### **Computer Utilization Results**

Most of the teachers surveyed indicated that a computer was located in their classroom and that the computer was used during instruction. As shown in Table 4, fifty-one of the teachers indicated that a computer was located in their classroom and forty-six teachers (71 %) reported using the computer during instruction. Of the forty-six

teachers using the computer during instruction, (22 %) used the computer daily, (63 %) used the computer weekly, (13 %) used the computer monthly.

For analysis of the data of this study, the number of teachers of students with mild disabilities was the summation of teachers who indicated teaching mild and mild and regular students and teacher of students with severe disabilities was the summation of teachers who indicated teaching severe, mild and severe, and mild, severe and regular students. Of the sixty-five teachers surveyed for this study, twenty-eight teachers [18 (M) + 10 (M/R)] taught students with mild disabilities and thirty-seven teachers [21 (S) + 11(M/S) + 5 (M/S/R)] taught students with severe disabilities. As shown in Table 4, twenty teachers (71 %) of the twenty-eight teachers teaching students with mild disabilities, and twenty-six teachers (70 %) of the thirty-seven teachers teaching students with severe disabilities indicated using the computer during instruction. This data shows no significant difference in the use of computers during instruction by teachers of students with mild disabilities and teachers of students with severe disabilities. In private and public school settings (Table 5), a higher percentage of public school teachers had a computer in their classrooms but a higher percentage of private school teachers used the computer during instruction.

Teachers answering the survey indicated that students used the computer in several capacities. The computer was used educationally most often as a word processor, as a calculator, as reinforcement using educational programs, as a database, a spreadsheet and as a research tool using a CD Rom and the Internet. Teachers of students with severe disabilities reported that their students used the computer to develop fine motor skills, to maintain visual tracking, to increase attention, and to learn basic computer skills such as moving the mouse. A number of teachers also indicated that the computer was used as a reward for students.

Many teachers surveyed indicated that their students used the computer during the instruction of Language Arts and Math. Language Arts and Math data shows significant difference in the use of computers during Language Arts instruction and Math instruction by students with special needs. Data on all students (Table 6) indicates that computers are used more during Language Arts instruction (80 %) than Math instruction (65 %) by students with special needs. Fifty-two teachers surveyed indicated that their students used the computer during language arts instruction. The instruction (Table 7) was most frequently in the form of drill and practice, tutorials, CD Rom research, and Internet use in the classroom. Several teachers indicated using specific educational programs such as Jumpstart-Kindergarten, Jumpstart-1st-5th Grades and Animated Story Books. Forty-two teachers responding to the survey indicated that their students used the computer for math instruction. Math instruction was most often delivered through drill and practice and tutorial programs on the computer. Programs which teachers indicated that are used during math instruction were Jumpstart and Time and Math Blaster Grades 6-9. As shown in Table 6, when computer use is compared between mild and severe students during Language Arts instruction, students with mild disabilities use the computer more often during instruction. When a comparison of computer use during Math instruction is made between mild and severe students, students with severe disabilities use the computer more often during instruction. Computer use during instruction occurs more during Language Arts instruction than Math instruction (Table 8), when categories of students are mixed within the classroom. When Language Arts and Math instruction (Table 9) is compared within educational settings, Public/ Private, computer use during Language Arts and Math instruction shows significant difference. Language Arts and Math instruction compared across educational setting, Public/Private, shows no significant difference in usage.

As shown on Table 10, (62.5 %) of the teachers responding to the survey indicated that they considered the computer to be an effective instructional tool, (35.9 %)

indicated that it was somewhat effective, and (1.6 %) indicated that it was not effective. Teachers of students with mild disabilities (Mild and Mild/Regular) considered the computer a more effective instructional tool than teachers of students with severe disabilities (Severe, Mild/Severe, and Mild/Severe/ Regular). In private and public school settings, public school teachers indicated that the computer was a more effective instructional tool than private school teachers. When effectiveness was examined per the five student categories, teachers who taught students with mild disabilities and regular students indicated that the computer was a more effective instructional tool followed by teachers teaching students with mild disabilities, teachers teaching students with mild disabilities, severe disabilities, and regular students, teachers teaching students with severe disabilities, and teachers teaching students with mild and severe disabilities.

## **Chapter 5**

### **Discussion**

#### **Review of Hypotheses and Results**

This study investigated the use of computer technology during the instruction of students with special needs. The study examined how computer technology was used by special education teachers and by students with mild disabilities and students with severe disabilities. The study focused upon the relationship between the use of computer technology during instruction by the categories of students with mild disabilities and students with severe disabilities, and in the academic areas of Language Arts and Mathematics. The two hypotheses that formed the basis of the study were: (1) teachers of students with severe disabilities are more likely to use computers during instruction than teachers of students with mild disabilities, and (2) computers are more likely to be used during Math instruction than Language Arts instruction by students with special needs.

Sixty-five teachers of students with special needs participated in the study. Twenty-eight teacher whose class rosters contained students categorized as having mild disabilities were considered to be teachers of students with mild disabilities. Thirty-seven teacher whose class rosters contained students categorized as having severe disabilities were considered to be teachers of students with severe disabilities. The results indicated that there was no significant difference in the use of computers during instruction by teachers of students with mild disabilities and teachers of students with severe disabilities. However, teachers of students with severe disabilities felt the computer was less effective than teachers of students with mild disabilities. The results do show a significant difference in the use of computers during Language Arts instruction and Math instruction by students with special needs.

## **Discussion of Results**

Although Saks (1993) indicates that teachers of students with severe disabilities are more likely to use computer technology, this study found that there was little difference in the use of the computer during instruction by teachers of students with mild disabilities and teachers of students with severe disabilities. Advances in computer hardware and software, the increased and easy access to information on the Internet, the increased knowledge and personal use of computers by teachers coupled with the emphasis in the educational system on computer use within the classroom can be used to account for the equally comparative use of computers by teachers of students with mild disabilities and teachers of students with severe disabilities during instruction.

Although most teachers surveyed indicated that a computer was located in their classroom and that the computer was used during instruction, a discrepancy in perceived effectiveness and actual use did occur. Sixty-three teachers indicated that the computer was effective or somewhat effective as an instructional tool. However, only ten teachers responded as using the computer daily during instruction. Teacher comments about computer use and effectiveness indicated that problems existed with the number of computers that were available for their students to use, with the appropriateness of the available software with regard to age, grade level, and disability constraints, and with the monitoring of students while they worked on the computer(s). These results support the research by Cosden (1988) and Cosden and Abernathy (1990) that found computers are believed to be an effective instructional tool by teachers but that teachers have difficulties incorporating computer use into instruction due to hardware and software availability and difficulties in managing classroom activities during computer use. Survey data also showed that teachers of students with mild disabilities indicated that the computer was a more effective instructional tool than teachers of students with severe disabilities. Comments of teachers of students with severe disabilities more often indicated difficulties with finding computer software that was age and grade level

appropriate for their students. Therefore, it is the supposition of this researcher that the lack of appropriate software has directly influenced the belief in the effectiveness of the computer as an instructional tool by teachers of students with severe disabilities.

Teachers also responded that the computer was effective because it was motivating for students; it provided help with handwriting; it helped students to understand concepts and ideas; it provided reinforcement; and it provided for success that boosted self-esteem. Many of the research studies found in the literature review of this study indicated that these are some of the positive outcomes for students who use computers during instruction.

The hypothesis that computers would be used more during Math instruction than Language Arts instruction by students with special needs was not supported by this study. Analysis of the data obtained for this study indicated that computer use occurred most often during Language Arts instruction. Analysis of the data reveals that (57 %) of the teachers responding to the survey indicate teaching at the elementary level. Therefore, it is the supposition of this researcher that because Language Arts instruction, Reading, Writing and Spelling, is the primary focus of instruction at the elementary level, the data of this study reflects that focus. Computer use during Math instruction may reflect the lack of appropriate age and grade level software that is available for instructional use.

In the literature review for this study, no research study was found comparing the use of the computer during Language Arts and Math instruction. However, many research studies were found that examined the computer applications used during Language Arts and Math instruction. These studies showed how the computer can be used as an assistive tool; how the computer applications of drill and practice, tutorial and simulation provided supplemental and direct instruction; how the computer word processor can aid students during the writing process; and how the computer can be used as a research tool. Data from teachers responding to the survey of this research study correlated with these applications. Teachers indicated that drill and practice was

used most frequently during both Language Arts and Math instruction followed by tutorial and word processing computer applications. These results are supported by research done by Cosden (1988) that found drill and practice, tutorial, word processing, and simulation to be the types of computer software most often chosen and used by teachers of students with special needs..

### **Limitations of Study**

The major limitation of this study was the survey instrument used to gather the data. Difficulty in data analysis resulted from the way in which the participating teachers responded to the survey questions. The wording of the questions were definitive and three types of responses were included in the survey: (1) checking an appropriate choice, (2) indicating a numerical answer and, (3) checking and circling the appropriate response. Throughout the survey most teachers only checked their responses. Therefore, the analysis of the responses to the questions pertaining to the number of students taught in each category and the number of times the computer was used were restricted because the actual number of students and time increments were not indicated by most teachers. The data concerning computer applications used during Language Arts and Math instruction was restricted because not all teachers indicated the computer's frequency of use.

One of the hypothesis of the study was based on the category of student which the special education teacher taught. The question pertaining to the category of student was to delineate where the teacher would be placed for analysis and interpretation of the data. This researcher did not anticipate that many teachers would indicate teaching two or all three of the categories of students listed and in varied combinations. For analysis purposes of this study, the number of teachers of students with mild disabilities was arrived at by combining teachers who indicated teaching mild and mild and regular students and the number of teachers of students with severe disabilities was arrived at



by combining teachers who indicated teaching severe, mild and severe, and mild, severe and regular students. This manipulation of the data certainly affected the analysis and interpretation of the data pertaining to students with mild disabilities and students with severe disabilities. Other responses should be added to several of the survey questions. Alternative should be added to the responses concerning the school setting question. The Preschool level and numerical differentiation's of grade levels should have been indicated in the responses concerning grade level.

Another limitation of this study was the survey sample. The size of the survey sample was small and included only special education teacher from Southern New Jersey, which does not allow for broad generalizations regarding the use of computer technology by special education teachers of students with mild disabilities and students with severe disabilities. The sample's composition is a combination of random participants of Rowan University graduate students attending special education classes and controlled participants from a private special education school, the majority of who taught students with severe disabilities. The survey sample was manipulated to include teachers of students with severe disabilities. The number of teachers of students with severe disabilities was directly effected by the inclusion of the controlled participants' data. The study's data is limited to interpretation by only percentages not statistical analysis.

This study was also limited by the lack of published research concerning the use of computer technology during the instruction of students with severe disabilities. Five studies using computer technology, one dealing with functional word identification, a second using the computer during the writing process, a third dealing with spelling mastery, a fourth concerning perception and eye-hand coordination, and a fifth concerning computer assisted instruction examining software based on stimulus response were found when doing the literature review for this study.

## **Implications for Future Research**

The results of this study indicate that teachers of students with mild disabilities and severe disabilities can and do use the computer during instruction. The results suggests that teachers find the computer to be a viable form of instruction for students with special needs in all categories. The data suggests that the computer's perceived effectiveness and actual use is directly influenced by difficulties in the availability of hardware and with software in regard to age and grade level appropriateness and not to the category of the student taught.

The results of this study can be useful to anyone involved in the development of instruction for students with special needs. The results can be used as the basis for the development of or the increase to the instructional use of the computer in the special education classroom. Computer hardware and software developers can use the results of this study when developing educational computer hardware and software to be used during the instruction of students with special needs. The results of this study indicate a need for the development of software age, grade, and skill level appropriate for use during math instruction. The development of appropriate software will have a direct influence on the perceived functional effectiveness of the computer as an instructional tool by teachers. A curriculum developer can use this study's results to determine the kind of computer application(s) that can be used with existing or developing curriculum. The district or school technologist can use the study's results when purchasing computer hardware and software and when advising teachers on the computer's instructional uses. Inservice coordinators can use the study's results when proposing and establishing agendas for teacher inservice workshops and discussions. Classroom teachers and resource room teachers can use this research when developing instructional activities using the computer for their students. Classroom teachers can also use the results when developing lesson plans and in the writing of goals and objectives for their special needs students.

One of the unique aspects of this study was that students with severe disabilities were included as subjects of the research. Most studies concerning the use of computer technology in educational research have been conducted in which the subjects are regular education students and/or students with mild disabilities. There is a definite lack of research representing the educational uses of computer technology by students with severe disabilities. Advances in computer technology hardware and software are enabling students with severe disabilities opportunities to use computers both assistively and during instruction. These advances will directly influence the kinds of computer usage by students with severe disabilities and as well as the perceived effectiveness of the computer as an instructional tool by teachers. These uses will also provide opportunities for educational researchers to investigate the effects of computer technology on the learning process of students with severe disabilities.

### **Conclusion**

This study investigated the use of computer technology during the instruction of students with special needs. The study examined the use of the computer during instruction by special education teachers of students with mild and students with severe disabilities and computer use during the academic areas of Language Arts and Math. The study found no significant difference in the use of the computer during instruction by teachers of students with mild and teachers of students with severe disabilities. The results also indicated that the computer is used more during Language Arts instruction than Math instruction by students with special needs. The results of this research provides helpful information for educators involved in the development of instruction for students with special needs.

This research also suggests that the computer is a viable and an effective mode of instruction that is being utilized by special education teachers to instruct students with mild and severe disabilities. Advances in computer technology hardware and software are providing increased educational opportunities for all students but, in particular,

students with severe disabilities are being engaged in the learning process by using computers both assistively and as an instructional tool. The increased educational engagement of students with severe disabilities should drive educational researchers to investigate the computer's effect on students with severe disabilities.

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**TABLE 1**  
**Settings**

**School Settings**

<u>Type of Schools</u>	<u>TOTAL</u>	
	Number of Teachers	Percent
Public	38	58.5%
Private	26	40.0%
Public/Private	1	1.5%

**Educational Settings**

<u>Educational Level</u>	<u>TOTAL</u>	
	Number of Teachers	Percent
Preschool	1	1.6%
Elementary	36	57.1%
Intermediate	9	14.3%
Secondary	15	23.8%
Elementary/Intermediate	2	3.2%

NOTE: Two teachers did not indicate educational level.

**TABLE 2**  
**Classroom Settings**

<u>Type of Classroom</u>	<u>TOTAL</u>	
	Number of Teachers	Percent
Regular	8	12.0%
Inclusive	2	3.0%
Class Support	0	0.0%
Resource	5	7.0%
Self Contained	41	63.0%
Vocational	1	1.5%
Regular/Class Support	2	3.0%
Regular/Class Support/Self Contained	1	1.5%
Resource/Self Contained	1	1.5%
Inclusive/Self Contained	1	1.5%
Inclusive/Resource	3	5.0%
Resource/Class Support	1	1.5%

**TABLE 3**  
**COMPUTER USAGE by STUDENT CATEGORY**

N	TYPE OF STUDENT	<u>Computers in the Classroom</u>				<u>Computers used during Instruction</u>				<u>Computer used during Instruction Usage Level</u>					
		(Yes) N	(No) N	Percent		(Yes) N	(No) N	Percent		(Daily) N	(Weekly) N	(Monthly) N	Percent		
18	MILD (M)	17	1	95%	5%	10	8	55%	45%	3	7	0	30%	70%	0%
21	SEVERE (S)	17	4	81%	19%	15	6	71%	29%	4*	10	0	27%	67%	0%
11	MILD & SEVERE (M/S)	6	5	55%	45%	9	2	82%	18%	2	6	1	22%	67%	11%
10	MILD & REGULAR (M/R)	10	0	100%	0%	10	0	100%	0%	1	5	4	10%	50%	40%
5	MILD & SEVERE & REGULAR (M/S/R)	1	4	20%	80%	2	3	40%	60%	0	1	1	0%	50%	50%

**Legend: N** = Number of Teachers

\* One teacher did not indicate usage level

**TABLE 4**  
**Computer Usage - All, Mild and Severe Students**

N	TYPE OF STUDENT	Computers in the Classroom		Computers used during instruction		Computer used during Instruction Usage Level									
		(Yes) N	(No) Percent	(Yes) N	(No) Percent	(Daily) N	(Daily) Percent	(Weekly) N	(Weekly) Percent	(Monthly) N	(Monthly) Percent				
65	ALL STUDENTS*	51	78%	14	22%	46	71%	19	29%	10	22%	29	63%	6	13%
28	MILD	27	96%	1	41%	20	71%	8	29%	4	20%	12	60%	4	20%
37	SEVERE	24	65%	13	35%	26	70%	11	30%	6	24%	17	68%	2	8%

Legend: MILD = MILD + MILD & REGULAR  
 SEVERE = SEVERE + MILD & SEVERE + MILD & SEVERE & REGULAR  
 N = Number of teachers  
 \* One teacher did not indicate Daily/Weekly/Monthly

**TABLE 5**  
**Public/Private School Settings**  
**Computers/Classroom/Instruction/Effectiveness**

<u>TOTAL TEACHERS</u>	<u>Computers used during Instruction (Yes)</u>		<u>(No)</u>		<u>Computers in the Classroom (Yes)</u>		<u>(No)</u>		<u>Effectiveness Rating Somewhat Effective</u>		<u>Not Effective</u>					
	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent				
Public	38	63%	24	63%	14	37%	21	88%	3	12%	19	79%	5	21%	0	0%
Private	26	81%	21	81%	5	19%	17	81%	4	19%	9	43%	12	57%	0	0%

**Legend: N = Number of Teachers**

**TABLE 6**  
**Computer Usage - All, Mild and Severe Students**

N	TYPE OF STUDENT	Computer used during Language Arts				Computer used during Math			
		(Yes) N	(Yes) Percent	(No) N	(No) Percent	(Yes) N	(Yes) Percent	(No) N	(No) Percent
65	ALL STUDENTS	52	80%	13	20%	42	65%	23	35%
28	MILD	23	82%	5	18%	17	61%	11	39%
37	SEVERE	29	78%	8	22%	25	68%	12	32%

Legend: **MILD** = MILD + MILD & REGULAR  
**SEVERE** = SEVERE + MILD & SEVERE + MILD & SEVERE & REGULAR  
**N** = Number of Teachers

**TABLE 7**  
**Instructional Uses**

<b><u>Language Arts</u></b>	<b>Frequently</b>	<b>Occasionally</b>	<b>Rarely</b>	<b>Never</b>
<b>Tutorials</b>	24.4%	12.3%	3.1%	18.5%
<b>Drill &amp; Practice</b>	30.8%	18.5%	1.5%	16.9%
<b>Simulation</b>	6.2%	13.8%	3.1%	23.1%
<b>CD-ROM</b>	13.8%	13.8%	6.2%	20.0%
<b>On-Line Library/ Computer Lab</b>	7.7%	13.8%	10.8%	23.1%
<b>Internet in Classrm</b>	10.8%	6.2%	10.8%	30.8%
<b><u>Math</u></b>				
<b>Tutorials</b>	21.5%	15.4%	1.5%	18.5%
<b>Drill &amp; Practice</b>	30.8%	24.6%	1.5%	16.9%
<b>Simulation</b>	4.6%	12.3%	3.1%	21.5%
<b>CD-ROM</b>	6.2%	10.8%	1.5%	23.1%
<b>On-Line Library/ Computer Lab</b>	4.6%	1.5%	4.6%	26.2%
<b>Internet in Classrm</b>	4.6%	4.6%	3.1%	30.8%
<b><u>Applications</u></b>				
<b>Word Processing</b>	16.9%	29.2%	7.7%	20.0%
<b>Database</b>	1.5%	10.8%	4.6%	26.2%
<b>Spreadsheet</b>	1.5%	4.1%	4.6%	30.8%



**TABLE 8**  
**Computer Usage - Language Arts & Math**

N	TYPE OF STUDENT	Computer used during Language Arts				Computer used during Math			
		(Yes) N	Percent	(No) N	Percent	(Yes) N	Percent	(No) N	Percent
18	MILD (M)	14	78%	4	22%	13	72%	5	28%
21	SEVERE (S)	15	71%	6	29%	15	71%	6	29%
11	MILD & SEVERE (M/S)	10	91%	1	9%	8	73%	3	27%
10	MILD & REGULAR (M/R)	9	90%	1	10%	4	40%	6	60%
5	MILD & SEVERE & REGULAR (M/S/R)	4	80%	1	20%	2	40%	3	60%

Legend: N = Number of Teachers

**TABLE 9**  
**Public/Private School Setting**  
**Instruction/Student Category/Language Arts/Math**

<b><u>TOTAL</u></b> <b><u>TEACHERS</u></b>	<b><u>Computers used during Instruction</u></b>		<b><u>Category of Student</u></b>		<b><u>Computers used during Language Arts</u></b>		<b><u>Computers used during Math</u></b>									
	(Yes) N	(No) Percent	Mild N	Severe Percent	(Yes) N	(No) Percent	(Yes) N	(No) Percent								
Public	24	63%	14	37%	17	71%	7	29%	29	76%	4	11%	23	61%	6	16%
Private	26	81%	5	19%	3	14%	18	86%	21	81%	3	12%	17	65%	4	15%

**N** = Number of Teachers

**Notes:** Public Teachers - 5 did not respond to Computer used during Language Arts, 9 did not respond to Computers used during Math  
Private Teachers - 2 did not respond to Computer used during Language Arts, 5 did not respond to Computers used during Math

**TABLE 10**  
**Computer Effectiveness**

	N	<u>Effective</u>		<u>Somewhat Effective</u>		<u>Not Effective</u>	
		N	Percent	N	Percent	N	Percent
All Teachers*	64	40	62.5%	23	35.9%	1	1.6%
Mild	28	20	71.0%	7	25.0%	1	4.0%
Severe*	36	20	56.0%	16	44.0%	0	0.0%
* One teacher did not answer the survey question regarding effectiveness.							
<b><u>Setting</u></b>							
Public	38	28	73.0%	9	24.0%	1	3.0%
Private*	26	10	39.0%	15	58.0%	0	0.0%
Public/Private	1	1	100.0%	0	0.0%	0	0.0%
* One private school teacher did not respond							
<b><u>Category</u></b>							
Mild	18	12	66.0%	5	28.0%	1	6.0%
Severe	20	11	55.0%	9	45.0%	0	0.0%
Mild/Severe	11	6	55.0%	5	45.0%	0	0.0%
Mild/Regular	10	8	80.0%	2	20.0%	0	0.0%
Mild/Severe/Regular	5	3	60.0%	2	40.0%	0	0.0%
<b>Legend: N = Number of Teachers</b>							

## **APPENDIX**

## Survey

### General

In what type of school do you teach?

\_\_\_\_\_Public

\_\_\_\_\_Private

What grade or at what level do you teach?

\_\_\_\_\_Elementary

\_\_\_\_\_Intermediate

\_\_\_\_\_Secondary

In what type of class setting do you teach?

\_\_\_\_\_Regular

\_\_\_\_\_Inclusive

\_\_\_\_\_Class Support

\_\_\_\_\_Resource

\_\_\_\_\_Self-contained

How many students in the categories below do you teach?

\_\_\_\_\_Students with mild disabilities

\_\_\_\_\_Students with severe disabilities

\_\_\_\_\_Regular Education students

Are there computers available for your students to use in your school?

(check off as many as appropriate)

\_\_\_\_\_ My Classroom

\_\_\_\_\_ Computer Lab

\_\_\_\_\_ Library

### Applications

Do you use a computer during instruction?

\_\_\_\_\_ Yes - Indicate number of times.

\_\_\_\_\_ Daily

\_\_\_\_\_ Weekly

\_\_\_\_\_ Monthly

\_\_\_\_\_ No

Check off any of the following ways your students use computers (check off as many as appropriate). For any checked, circle the appropriate indication of how often it is used.

_____Word-processing	(Frequently	Occasionally	Rarely	Never)
_____Database	(Frequently	Occasionally	Rarely	Never)
_____Spreadsheet	(Frequently	Occasionally	Rarely	Never)
_____Other (please specify)_____				
	( Frequently	Occasionally	Rarely	Never)

*Language Arts* (includes comprehension, letter/word recognition, spelling, reading)

_____Tutorials	(Frequently	Occasionally	Rarely	Never)
_____Drill and Practice	(Frequently	Occasionally	Rarely	Never)
_____Simulation	(Frequently	Occasionally	Rarely	Never)
_____CD-Rom research resources				
	(Frequently	Occasionally	Rarely	Never)
_____Use of on-line services in Library and/or Computer Lab				
	(Frequently	Occasionally	Rarely	Never)
_____Use of Internet in the classroom				
	(Frequently	Occasionally	Rarely	Never)
_____Other (please specify)_____				
	(Frequently	Occasionally	Rarely	Never)

*Mathematics*

_____Tutorials	(Frequently	Occasionally	Rarely	Never)
_____Drill and Practice	(Frequently	Occasionally	Rarely	Never)
_____Simulation	(Frequently	Occasionally	Rarely	Never)
_____CD-Rom research resources				
	(Frequently	Occasionally	Rarely	Never)
_____Use of on-line services in Library and/or Computer Lab				
	(Frequently	Occasionally	Rarely	Never)
_____Use of Internet in the classroom				
	(Frequently	Occasionally	Rarely	Never)

\_\_\_\_\_Other (please specify)\_\_\_\_\_

(Frequently    Occasionally    Rarely    Never)

Do you consider the computer an effective instruction tool?

(Effective    Somewhat Effective    Not Effective)

Comments:

1.

2.

3.