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The impact of technology integration on the elementary classroom with reading disabled students

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The impact of technology integration on the elementary classroom with reading disabled students

Abstract

The content of this paper will discuss and review the current literature in the area of technology integration in the elementary classroom, especially those classrooms with learning disabled students. The areas to be covered in this paper include technology's impact on student learning, legal reasons to use technology in the classroom, effective integration principles for technology integration, software and equipment for learning disabled students, Internet integration, and web-based instruction. All of these areas have an influence on how technology is integrated into the elementary classrooms and how effective that technology can be.

The Impact of Technology Integration on the Elementary
Classroom with Reading Disabled Students

A Graduate Research Paper
Submitted to the
Division of Educational Technology
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Abstract

The content of this paper will discuss and review the current literature in the area of technology integration in the elementary classroom, especially those classrooms with learning disabled students. The areas to be covered in this paper include technology's impact on student learning, legal reasons to use technology in the classroom, effective integration principles for technology integration, software and equipment for learning disabled students, Internet integration, and web-based instruction. All of these areas have an influence on how technology is integrated into the elementary classrooms and how effective that technology can be.

Introduction:

First grader Darius never talked aloud, was slow to complete his work, and worked in a "socialization group" to draw him out of his shell. After the computer arrived, Darius spent nearly 90 minutes with the machine his first day. Thereafter, his teacher noticed that he was completing seatwork without prompting and then would slide his seat over to the computer and watch others program in LOGO. Soon after, he would stand beside the computer, talking and making suggestions. When others had difficulties, he was quick to show them the solution. Others started getting help with LOGO from him. In brief, Darius moved up from the lowest to the highest reading group. He began completing twice as much work each day as he had previously. He participated eagerly during class discussions and as a "crowning achievement," was given a ten-minute "time out" because he wouldn't stop talking (Clements, 1994, p. 4). Were these results just a coincidence, or was there a definite correlation between this student's use of the computer and his improved educational growth? The purpose of this paper is to try to answer the question of whether technology integrated into the elementary classroom has a positive impact on how students learn and retain information that is provided to them through our educational system. Do children learn more or learn better using technology? More specifically, does use of technology in the

elementary classroom improve the ways in which educators can provide instruction to students with learning disabilities, especially those who struggle with reading?

Methodology:

Resources for information on the topic of technology integration in the elementary classrooms with students who experience learning disabilities has been collected from a variety of sources. A large portion of research has been acquired using the Internet. Web searches and ERIC have provided numerous useful articles. More journals and books were also borrowed from the Keystone Area Education Association dealing with topics of technology integration and learning disabled students, targeting the area of reading. The Garnavillo School District's reading curriculum and the Title I handbooks were located and read, and provided information about what is expected of the instructors and learners in this area. The district's Technology Plan and School Improvement Plan also shed some light on what is expected of the classroom teachers in the area of using technology with learning disabled students.

Literature Review:

Education has moved in numerous directions over the past decade. Many factors have contributed to these changes, but one of the biggest impacts on education has been the use of technology in the classroom. There is a vast amount of new

technology available to enhance the educational process in the classroom. Diskey (1998), estimates that "Today, almost 80 percent of our nation's schools have computers and are wired to the Internet. A significant increase from just 35 percent four years ago" (p. 1). With the availability of computers, the Internet, and numerous other technologies, it is the responsibility of teachers to understand methods for using technology to strengthen classroom instruction, especially with those students who need nontraditional methods of instruction to help them succeed in the learning process.

The following research will cover technology's impact on instruction and learning in the elementary classroom, targeting especially those students with reading disabilities. Reading is one of the core subject areas in most school curricula, and appropriate technology integration can enhance and expand the learning experiences of all students in this area, especially students who experience learning difficulties.

Technology integration is becoming a must rather than a need in most American classrooms today. Behrmann and Lahm (1994), explain that:

Technology is no longer only a desirable addition to teaching and access to learning, federal law now mandates that it be incorporated in educational programs

for children with disabilities when appropriate. The Education of the Handicapped Act Amendments of 1986 (P.L. 99-457) contained new provisions regarding the use of technology and mandated the design and adaptation of technology for use in teaching children with disabilities. (p. 105)

The Technology-Related Assistance for Individuals with Disabilities Act of 1988 (P.L. 100-407) developed a set of definitions that have now become common ground for most federal, state, and local institutions, including schools. The Technology Act divided assistive technology into two categories; *assistive technology devices* and *assistive technology services*. The term *assistive technology devices* was defined as "any item, piece of equipment, or product system that is used to increase, maintain, or improve functional capabilities of individuals with disabilities." The term *assistive technology services* included any service that directly assists an individual with a disability in the selection, acquisition, or use of assistive technology devices (Behrmann and Lahm, 1994, p. 28).

A third law that has affected how educators look at technology integration is the Individuals with Disabilities Education Act (IDEA; P.L. 101-476), passed in 1990, that expanded what was included in previous legislation. The IDEA states that if a child with a disability requires assistive

technology devices or services, or both, in order to receive a free public education, the school must ensure that these things are made available to that child. These powerful laws have required our schools to take a look at needs and changes that must take place for them to continue to provide a quality education for all of their students. For classrooms with learning disabled students, technology integration is a requirement that must not be ignored.

One of the problems of technology integration is that many times the technology goals are geared more toward workplace and careers rather than everyday classroom work. Technology goals need to be written for all types of students and for all areas of the curriculum, challenging students to investigate authentic problems which fit into the curriculum. "The best strategy is to write technology expectations into the curriculum guides. Every curriculum document should identify learning experiences and strategies which require the use of new technology" (McKenzie, 1998, p. 1). To accomplish this, school districts need to spend time and money to make technology integration in our schools a priority, and develop realistic technology plans to include all areas of the curriculum, and all types of students including those with special needs and learning disabilities. A study funded by the US WEST Foundation, found that there are certain principles that hold true for effective

integration of technology in schools. These principles are as follows:

- *Identify and support technology zealots.
- *Training is as important as the technology itself.
- *Never underestimate how long it will take to get connected.
- *Technical support needs to be on-site, individualized, and teacher-oriented.
- *Move forward with those teachers who are ready.
- *Realize that the introduction of technologies changes the power structures of schools.
- *Integration of technologies into curricula requires changes of huge magnitude.
- *For students and teachers, learning occurs when we build on what's already known.
- *Social and emotional aspects of learning cannot be ignored.
- *"Bathroom" time comes before Internet time in the classroom.
- *Kids can often teach kids about technology use better than adults.
- *Not everyone deals with change at the same pace.
- *Technology can rally communities and parents.

There are a vast number of new ways to use the computer for instruction, and there seems to be never ending research

to support technology's impact on education. Young children's appropriate use of computer hardware and software is safe and supports their learning and development (Hohmann, 1994). Use of word processing, the Internet, web-based instruction and educational software are only a few ways computer technology is used in many of today's classrooms.

Word processing is a tool used by even the youngest of students. Programs such as Kid Works, the Writing Center, and Appleworks help students create original documents. Apple Classrooms of Tomorrow, (ACOT), researchers said, "Even the youngest students have no problem becoming adept users of the keyboard. With very little training, second- and third-graders were typing more than twice as fast as children of that age can usually write" (Mehlinger, 1995, p. 3). Those who support the use of computers to teach writing skills found that students write more detailed pieces of work with more creativity when allowed to use the computer and word processing programs.

A basic word processing program on a personal computer can make life much easier for a student with a learning disability. According to Veen (1999) "A student can type in ideas as they come to her or him, then use the program to rearrange the ideas into paragraphs and finally an essay" (p.4). This may eliminate the "blank sheet of paper syndrome" many students face when sitting down to write because they do

not have to organize their ideas in their head. Also, mistakes can be erased by simply clicking a key. Learning disabled students are now able to turn in a perfect-looking paper, not a ragged sheet torn up from erasing. This can build self-esteem that is often lacking in students facing such problems.

Another important benefit of a word processor is the ability to check spelling. Not only can a student feel confident about the work, but the feature can also increase spelling skills. As cited in Veen (1999), "The feature can increase spelling proficiency by showing continuously the wrong words and their correct counterparts" (p. 5). Other, smaller devices can provide help when writing and reading for those with learning disabilities. There are a number of electronic tools that are currently on the market. An example would be a pocket dictionary that can both display and speak a definition of any word typed into it, even if the word is spelled incorrectly. These devices are very useful because they can be taken anywhere such as on field trips, the grocery store, shopping, as well as be used in the classroom.

According to McArthur (1996), "Word processors also have several capabilities that may influence and help the reading disabled student with the writing process" (p. 348). First, the editing features of the word processor allow writers to make frequent changes or revisions without time-

consuming recopying. This encourages students to concentrate more on the content of their work while writing the first draft, rather than worrying about all of the mistakes they are making. Second, word processors give students the power to produce neat, printed work and to correct errors without messy erasures. The literature on process approaches to writing and whole language places considerable emphasis on the value of publishing students' writing (McArthur, 1996). The motivation provided by printed published work may be especially important for students who struggle with handwriting and mechanics. Computers make it possible to publish in a wide range of professional-looking formats. Desktop publishing programs make it easy to produce newsletters, illustrated books, big books, business letters, signs and posters, and many other forms of work. A third feature of word processors that can be an asset for reading and writing disabled students is the visibility of the text on the screen. Being able to see what is typed on the screen together with the use of typing rather than handwriting, can facilitate collaborative writing among peers and increased interactions between teacher and student. Peers can work together, sharing responsibility for generating ideas, typing, and revising in a variety of ways, because each student can see and read the text easily. Also, by working together, students can learn writing techniques and gather

ideas from each other. A fourth feature of many word processing programs today are the "talking" word processors, or speech capable. Talking word processors allow students to take control of and experiment with language. If a student is unsure how to pronounce a word that he/she see, he/she can simply type it into the computer and have it verbalized for them. Students with difficulties mixing up letters can also benefit from hearing new words read to them by the computer. Chang and Osguthorpe (as cited in Clements, 1994) stated, "Another successful approach is a picture-word processor that allows beginning readers to compose messages by simply pressing squares of picture words without having to spell words or use extensive eye-hand coordination (p. 35).

The Internet is also a technology that most classrooms today have access to, and the World Wide Web keeps expanding every day to make more information possible to these students. "Schools that get on the information highway will not be bypassed like the ghost towns of the old west. They will become part of the worldwide web of information and interchange. Schools that don't will produce students with limited employment and success opportunities" (Foa, Schwab, Johnson, 1999, p. 3). During his state of the Union Address in January 1996, President Clinton announced a goal of every American classroom being wired to the Internet by the year 2000. Research has shown that use of the Internet in the

classroom has had a definite effect in how students learn (Office of Educational Technology, 1996, p. 1). According to Sunal, Smith, Sunal, and Britt (1998),

“We found that meaningful learning can result from the use of the Internet resources by all students, including those with varying learning styles and reading difficulties. That will not occur however, until teachers have some expertise in the intricacies of the Internet so that they can facilitate its use by students” (p. 1).

There are types of software available that can read text orally to a student with a reading difficulty, even text off the Internet, or the information can be downloaded then be read orally to the student. Also according to Sunal, Smith, Sunal, and Britt (1998), there are five different levels of Internet usage being integrated into our classrooms.

*At level 1, the classroom teacher only uses the Internet to gather content information for what will be instructed in the classroom.

*At level 2, the classroom teacher shares information gathered on the Internet with the students to provide content information and provide students with the knowledge that the Internet can be used as a resource.

*At level 3, the classroom teacher incorporates Internet information directly into the lesson.

*At level 4, students are given access to using the Internet for a student-directed project, while the teacher acts as a facilitator.

*At level 5, students directly plan and implement their use of the Internet.

At the time of the Sunal et al. (1998) study, levels 1-3 were most frequently used in the classroom, while levels 4 and 5 were much less attempted. The Internet can be a very useful tool for the classroom teacher and students because they have access to the most current information that is out there. Teachers need to become adept users of the Internet so they can instruct their students to use this powerful resource.

As with any new technology, the use of the Internet comes with risks. Parents and teachers have a huge responsibility to guide students in using the Internet properly. And with most types of media today, there are a large amount of inappropriate materials available on the Internet. Students need to be taught at an early age what materials are appropriate for them to use (Boersma, 1995). This brings up the question of who is responsible for teaching what is appropriate on the Internet. How can we protect our children from information and experiences which are potentially damaging, while at the same time protect individual and family rights to access? Some people question if children using the Internet are being exposed to anything

more than what they see in movies or on television. With the technology that exists today, it is virtually impossible to monitor everything students can get ahold of. Parents have the responsibility to try to monitor what their children get access to at home on the Internet. They may do this by sitting with their child while they are on-line or they may install software that blocks their child from accessing things they should not. Schools must come up with policies to ensure student safety while using the Internet at school.

The World Wide Web (WWW) also represents a new way of conceptualizing and delivering instruction in our schools. Spiro (as cited in McManus, 1995) stated, "The Web is delivery medium, content provider, and subject matter all in one" (p. 2). When creating Web Based Instruction (WBI), a teacher must consider several factors; enough equipment with adequate wiring to the Internet, student entry level behaviors to work somewhat independently, and enough time to complete WBI successfully. When instructing a student with reading disabilities, this may be a challenge for the student to work independently and complete the work in the time allotted (McManus, 1995). The Hypermedia Design Model has taken the traditional Instructional Designs System model and made a few changes to make a more usable model for WBI (McManus, 1995). One of the major assumptions behind the Hypermedia Design Model is that the role of the instructor

will be the instructional medium, thus the WWW, instead of the classroom teacher. The steps the teacher will follow using the Hypermedia Design Model are as follows:

- *Define your learning domain
- *Identify cases within the domain
- *Identify themes/perspectives to be highlighted
- *Map multiple paths through cases to show themes
- *Provide learner-controlled access to cases
- *Encourage learner self reflection

Web Based Instruction offers one of the most effective ways to work with learners who are widespread in their academic abilities, and with an understanding of the use of HTML, Web Based Instruction makes it easy to meet the needs of changing subject matter and various student learning styles (McManus, 1995, p.2).

Over the past ten years numerous studies have been conducted on how the use of computer technology affects how students learn. Most research shows that computer technology and its capabilities have had a positive influence on how much the average student learns and retains (Clements, 1994). As cited in Mehlinger, (1995), one such study was the Apple Classrooms of Tomorrow (ACOT), research study. This study began in 1986, and was anticipated to take ten years to complete. The project began with seven different classrooms to represent a cross-section of the United States K-12

classrooms. In each participating classroom students were given two computers, one for them to use at school and one for them to use at home. This project's goal was to see how students' learning was affected by the increase in computer use, and how the teachers' teaching was affected by the use of the computer. Some researchers feared that prolonged use of a computer would have negative effects on students and teachers. After two years into the study classroom observers went into the classrooms to investigate progress.

Researchers were pleasantly surprised with their findings. They found teachers were using their computers to do their work. They also found that the students showed more evidence of spontaneous cooperative learning than in traditional classrooms. They were not bored with the technology, and they had little trouble with using the keyboard, including very young children. The children wanted to use the computers even more. Students in this project performed well on standardized tests and some even better than students were expected to do in the regular classroom. Also later in the study, students seemed to take more responsibility for their own learning and the teacher became more of a facilitator than an instructor. ACOT researchers continued to monitor their students and teachers every two years during this project. At the end of the ten years, ACOT (as cited in Mehlinger, 1995), reported:

Technology acts as a catalyst for fundamental change in the way students learn and teachers teach. Technology revolutionizes the traditional methods teachers use. Students become re-energized and much more excited about learning - resulting in significantly improved grades - while dropout and absentee rates decrease dramatically. For high school students in the program, dropout rates fell from 30 percent to near zero, while absenteeism was reduced from 8 percent to 4 percent. Teachers can and will embrace technology, if they are given the kind of professional development and support they need (p. 5).

When technology is integrated into the elementary classroom, the response from the students is remarkably obvious. Kids love hands-on activities, lots of action and sound, and playing what seems to be games. All of these things are rolled up into technology, are just waiting to be used.

In 1994, Software Publisher's Association (SPA) found that educational technology has a positive impact on student achievement in most subject areas, in all grades, and in regular classrooms as well as those for special-needs students (Mehlinger, 1995, p.5). Educational technology also seems to give students a more positive attitude about learning. The degree of effectiveness is influenced by how much and what types of technology the students can access. As

cited in Mehlinger (1995), the SPA (1994), states, "Technology makes instruction more student-centered, encourages cooperative learning, and stimulates increased student-teacher interaction" (p. 5). In 1997, the Jostens Corp. conducted a survey of 1,000 teachers who used computers in their classrooms on a regular basis. They found that 61 percent of these teachers believed that computers resulted in a great improvement in student motivation. An additional 33 percent said that technology in general provided improvement in student motivation (Moe, 1998). Technology integration can also encourage higher-level thinking from students because the computer can facilitate more "real-world" problems that require students to use higher-order skills such as problem solving, collaboration, analysis, and simulation. These types of projects and activities require the student to take more responsibility for their work, meaning that kids take a more active role in the learning process.

When looking at the area of reading, there are numerous advantages of integrating technology into the curriculum. Reading failure is the overwhelming reason that children are retained, assigned to special education, or given long-term remedial services. Shaywitz (1999), states,

"Brain-based research says that reading is not an automatic function, but must be learned. The reader must develop an awareness that the letters on a page

represent the sounds of a spoken word, and the brain learns to read the same way it learns to talk, one sound at a time" (p. 2).

There are numerous computer programs out there that help students to learn to read one sound at a time. An example of one would be Reader Rabbit Kindergarten.

In this program the student can see the letter, hear the sound, look at words with the sound in it, and practice using the sound throughout their journey in the game portion of the program. Other software available for reading development are Reading Blaster, and a variety of interactive storybooks such as Winnie the Pooh, Barnie and Friends, The Land Before Time, and The Critters collection by Mercer Mayer. Cloze software programs can be effective to help determine students' comprehension levels, and can later help to improve those levels. Veen (1999) believes, screen reader software such as eReader can be installed to help those with reading difficulties to hear what they are seeing on the computer. Screen reader software also has the capabilities to add spoken voice and visual highlighting to text off of the Internet or out of a word processing file. These programs cannot replace good reading instruction in the classroom, but can enhance what is already being taught.

As cited in Clements (1994), "Young children make significant learning gains using computer-assisted

instruction software. This type of software gives the students a task to do, then asks them to do something, and finally gives them immediate feedback about how they performed" (p. 37). Clements, provides some of the unique capabilities of CAI:

- *the combination of visual displays, animated graphics, and speech;
- *the ability to provide feedback and keep a variety of records;
- *the opportunity to explore a situation; and
- *individualization.

Research indicates that drill-and-practice software can increase primary grade children's reading skills. The amount of practice is important. A small number of sessions with such software may have little or no effect however, placing computers in kindergartners' classrooms for several months significantly increases reading skills (Clements, 1994).

Students with learning disabilities have benefited greatly from technology being integrated into the classroom. Bulkeley (1998), states, "Struggling students often get more out of computers than do other students. No doubt that's partly because they have so much room for improvement, but it's also because computers are effective at drilling basic skills such as reading, writing, and math" (p, 9B). Audio and video recording can give students instant feedback on their

oral reading and story-telling skills and can help them to develop further. Computer software allows students to write and illustrate their own stories before their fine motor skills have developed enough to allow them to do this by hand, proves to motivate students to want to develop their skills further. Title I funds and other federal programs such as Technology Challenge Grants and Technology Literacy Grants are helping with technology funding for schools serving disadvantaged students to purchase more equipment and hardware to use with low functioning students.

Many questions are still unanswered as to the effectiveness of using computers and technology in the elementary classroom. These questions that surround the computer debate will no doubt revolve for the next decade and beyond. Morgan and Shade (1994), provide a list of such possible questions as follows:

- *Are we teaching child development theory too narrowly so that students are unable to apply theory to new developments-such as computers-in their world?
- *How can we address the bias of highly educated professionals who are resistant to new modalities?
- *Does computer use promote any kinds of learning and development that are different from those acquired through other educational strategies?
- *How can teachers use computers to accommodate

differences in individual learning styles and cultural background?

*Should teacher education programs be preparing all teachers to know when and how to use computers in their classrooms, and if so, how?

*Should college accreditation standards and teacher education guidelines require technological knowledge and expertise?

*In what ways could designers of software for young children make more extensive use of early childhood professionals' child development knowledge and expertise, including the principles of developmentally appropriate practice?

*How do teachers get information about software, and how can they control what is purchased? What criteria can they use in selecting the software they want to use?

*What kind of software distribution system would empower teachers to make important decisions for their classrooms?

These questions and others that will emerge as we move education into the next century. Morgan and Shade (1994) conclude, "Not by replacing traditional childhood activities and materials but by opening the door to worlds of discovery as we learn to use computers and computer software in a developmentally appropriate manner" (p. 147).

Conclusions and Recommendations:

In conclusion, technology integration into the elementary classrooms with learning disabled students is a necessity for those students to be successful in this "technology age" in which we live. Computer knowledge and skills are going to be a requirement of all students, including those who are learning disabled, to attain a successful career and to keep up with our ever-changing society. Knowledge of technology needs to begin at an early age and continue on through life. Elementary schools need to develop technology plans to ensure that all student needs are being met, especially those who experience difficulties learning. Technology provides alternate options for delivering education to a variety of learning styles, to enable all students to be successful regardless of their abilities or disabilities. Teachers, students, administrators and parents need to work cooperatively to ensure that all the gaps in our classrooms are filled, and technology integration in the schools is a success.

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