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How Helpful are Computers?

Comparison of the Computer Experiences of Students With and Without Learning Disabilities

by

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Abstract

This study investigated the attitudes and opinions of students with and without learning disabilities regarding the use of computers for school-related work. Using in-depth interviews, six students from grades 5 through 12, three students with learning disabilities and three students without learning disabilities, were interviewed. The interviews revealed five general themes: applications of computers, instructional uses of computers, attitudes about computers, personal experience with computers, and resource needs. Comparison of the interviews of students with and without learning disabilities showed that students with learning disabilities experienced greater difficulty with learning how to use computers.



Image obtained from IMSI's MasterClips Collection, 1895 Francisco Blvd. East, San Rafael, CA 94901-5506, USA.

Do students with and without learning disabilities view the use of computers for school work differently? Very little research has investigated students' attitudes toward computers even though more computers are being placed in classrooms every year. While there is evidence that students with learning disabilities often struggle with writing (MacArthur, 1999), there has been little research into whether students with learning disabilities hold different views about computers than their non-disabled peers. This study investigated the attitudes that selected students with and without learning disabilities held about computers and their use in schools. A few earlier studies have looked at students' beliefs about computer use in schools and offered preliminary findings about attitudes, opinions, and overall use (King, 1995; Kinnear, 1995; Lewis, Ashton, Haapa, Kieley, & Fielden, 1999; Olivier & Shapiro, 1993; Proctor & Burnett, 1996). King's (1995) work showed that students do not always perceive computers as generally helpful, and that other variables, such as access time and location, influence their usefulness. Proctor and Burnett (1996) indicated that greater frequency of access and use of computers is related to more positive student attitudes about them. Lewis et al. (1999) found that even when computer use was connected with improvements in the quality of students' writing, students' attitudes about computers decreased. Of note, Kinnear's was the only study which used interviews of students as a means of learning about students' experiences using computers. Kinnear (1995) found that students' attitudes about computers were linked to how highly they rated the importance of computers. Olivier and Shapiro (1993) showed that there is a very high correlation between actual use and computer efficacy among students. Together, these findings point to the importance of understanding more about students' computer skills, beliefs and attitudes.

Method

Following Pajares' (1992) recommendations for beliefs-oriented research, this study used qualitative data collection and analysis methods to learn more about students' attitudes about the role of computers in education. The unique advantage of this approach was that it involved asking students directly about their computer experiences instead of inferring them from survey results. The data were collected using in-depth interviews which addressed two specific research questions:

1. How do students with and without learning disabilities view computer use in schools?
2. Are the computer attitudes of students with learning disabilities different from those of students without learning disabilities and how does that influence their interaction with technology?

Participants

The interviews were conducted with two students from Riverview, a public elementary school for grades Pre-K through 6, two students from Fairmont, a private boys' boarding school for grades 6 through 9, and two students from Wesley Academy, a private co-educational boarding school for grades 7 through 12. The schools participating in this study were given pseudonyms to provide anonymity. All three schools are located in non-urban communities in the Northeast United States near the universities, but not in the same towns, where the researchers are affiliated. The schools were chosen because they had students representing a variety of grades and had varying levels of computer technology. Together, these factors allowed for an exploration of how students' grade, computer experience, and level of computer technology available interact to influence their beliefs and attitudes about computers.

Prior to selecting the participants for this study, the researchers discussed the selection of interview subjects with administrative personnel at each school. Candidates were nominated by school personnel based on the research objectives of learning how students with and without learning disabilities view computers. School personnel were asked to nominate students who were considered representative of their peers, but also possessing sufficient verbal skills to engage in an in-depth interview process. Once a pool of interview candidates was made, the students were asked in person by the researchers if they were willing to participate in an interview. Two students from each school (n = 6) were selected to be interviewed using structured interviewing techniques (Marshall & Rossman, 1995; Seidman, 1991). All six interview nominees agreed to participate. All interviewed students and their parents provided their written consent to participate in the interviews. Half (3) of the students were identified as having a learning disability. Among the students, years of experience using computers varied with age, however, all reported that they began using computers between ages five and eight. Information concerning the interview participants' sense of their computer skills was also collected. None of the subjects reported not having computer skills, but they did indicate a wide range of skill level, from poor to excellent. The following profiles give more



[image:http://www.allfree-clipart.com/](http://www.allfree-clipart.com/)

background information about each participant and provide a context for each participant's computer-related experiences.

Darren: "So many possibilities." Darren, a 14 year old ninth grader, in his second year attending Fairmont when the interview was conducted, saw computers as offering students more options. He had chosen to attend a boarding school because his father's work with an international corporation involved overseas postings. With the exception of the second and third grades in the United States, Darren attended English language international schools through the sixth grade and then came to the United States as a boarding student starting in the seventh grade. Darren described his school experiences as generally positive, reporting that he has always enjoyed school. Darren had no history of a learning disability or school problems. He enjoyed his time at the international schools but described them as being small. He appreciated the chance to attend boarding schools which have larger student populations. Darren reported that he has always been a fairly successful student, reporting that "I like to learn."

Nathan: "It's harsh!" In contrast to Darren, Nathan offered a very different view of the role of computers for helping students with different learning needs. Nathan was 15 at the time of the interview and was completing his ninth grade year at Fairmont. Nathan had attended Fairmont for four years, starting in the sixth grade, taking advantage of the school's academic support services to deal with his dyslexia. Both of Nathan's parents are teachers and he was a day student at Fairmont. Nathan's parents were teaching at a boarding school on the West coast when he was born. When Nathan was two, the family moved to the Northeast to another boarding school, leaving there when Nathan was in the first grade to work at their current boarding school not far from Fairmont.



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Frances: "I can see kids working all together." Frances, a 12 year old sixth grade girl at Riverview with no history of learning problems, focused on the social potential of computers. She was a very busy student who participated in a number of activities in and out of school. Frances had attended the public schools in her town since Kindergarten. She was a member of the school band and chorus, served on the student council, and participated regularly in ballet, figure skating, and soccer programs in the local community. Frances reflected a very positive and upbeat attitude about school, reporting that she likes her classes, especially math.

Stewart: "Unmeasureable [sic] things." Stewart, a twelve year old boy in the sixth grade at Riverview when the interview was conducted, offered a hopeful vision of the future of computers. A student with no history of learning difficulties, he had attended the public schools in this town since first grade. A good student, Stewart was also very involved in a gymnastics program in the local community which involved training three hours daily, five days a week. Stewart immediately showed his strong interest in computers, revealing a high level of expertise. He spoke primarily of the uses of computers for school and home tasks but also made mention of specific needs for computers at his school.

Michelle: "It was really frustrating." Michelle, a 14 old girl in eighth grade at Wesley Academy, expressed ongoing frustration about computers. In her first year at Wesley Academy at the time of the interview, Michelle had attended public schools in two Northeast communities prior to choosing Wesley Academy for the eighth grade. This choice was made as a result of her mother's frustration with Michelle's lack of progress at the local middle school. Michelle was identified as having Attention Deficit Hyperactivity Disorder (ADHD) in fourth grade. She was first treated with stimulant medication, which, she reported, helped her concentrate better but also depressed her. Her mother, a physician, discovered that Michelle was not taking her medication and an alternative medication was found which did not create the depressive side effects. Michelle reported that she likes her new school very much. She enjoys the small classes and finds that "I can't get away with not answering questions and not being part of things."

Paul: "It's a good thing." The oldest student interviewed was 18 year old Paul, a young man in his senior year at Wesley Academy. Paul saw computers as essentially helpful, but also spoke of the challenges they created. He had attended public schools through fifth grade, displaying some evidence of learning difficulties. As a result he went to a private school for sixth grade but went back to public school for seventh, where he was identified as having a learning disability. He attended another boarding school for eighth and ninth grade and enrolled at Wesley Academy as a boarding student in tenth grade. Paul revealed in his interview that he selected Wesley Academy because it offered the best financial aid package in addition to an academic skills support program.

Interview Format

The interviews were conducted at the schools during times mutually convenient to the researchers and participants. Interviews were scheduled so that students did not miss any instructional time, except when teacher permission was obtained in advance and the students, especially the students with disabilities, would not be compromised in any way. The interviews were conducted in a quiet, distraction-free setting (e.g., empty classrooms and offices). This allowed for interview sessions in which the interviewer had the full attention of the students. If the interviews had been held in classrooms or dormitories, other ancillary data might have also been gathered, but these settings could have influenced the participants' attention to the questions. The participants were reminded of the estimated 45 minute duration of the interview at the start of the session.

Interview Procedures. The structure of the interviews followed an adapted version of Seidman's (1991) interviewing model which involves organizing the interview questions around three stages of information gathering: a) focused life history, b) the details of experience, and c) reflection on the meaning. Each interview progressed through these three stages, using guiding questions that were designed to elicit participants' experiences, opinions, and suggestions concerning their use of computers for school work and whether such use is different for students with special needs. The guiding questions are found in Table 1. Each interview session started with these questions, but other follow-up questions were asked as appropriate. The researchers focused on learning how each participant experienced the use of computers in schools, especially regarding students with special learning needs. The terms used in these descriptions served as anchors for summarizing and expanding on each participant's responses to the interview questions. All interview sessions were audiotaped using a portable micro-cassette recorder. The audiotapes were transcribed by the first researcher. Accuracy of transcription was checked by having another typist transcribe portions of three interviews. Comparison of the matched transcripts showed .98 agreement on exact words between typists.

Table 1
Interview Guide

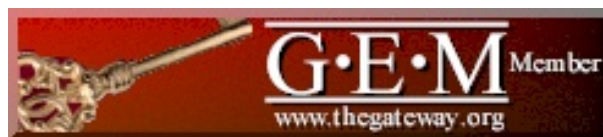
Stage	Questions
I: Focused History of Background and Computer Use	From your survey,* I know a little about your background. What else would you like to tell me about yourself? What do you think of when you think of computers? When and how did you first use a computer?
II: Details of Experience	Describe for me a situation in which you have used a computer for school work. How have your own computer skills influenced your use of computers for school-related work? What is your sense of how students in general view the use of computers in schools?

III: Reflection on the Meaning	How do computers change schools or individual classrooms? What do you think computers offer students with special needs? What do you see as the future of computers and other technologies in schools in terms of providing inclusive work environments?
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**The interview data were part of a larger study in which surveys about computer attitudes were also collected.*

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Interview Analysis

The interview data were analyzed using Glaser and Strauss' (1967) open coding procedures. This method relies on the development of categories and properties directly from the data rather than the use of a priori external categories (Glaser & Strauss, 1967:36ff; see also Glaser, 1992 for further explanation). The transcripts were analyzed by the researchers and then reviewed by an outside reader experienced with this form of research in order to ensure the trustworthiness of the interpretation of the data (Silverman, 1993; Wolcott, 1994). Both the researchers and outside reader used the same methods and procedures of analysis. The focus of the interpretation of the interview data was on key words or phrases which were repeated by individuals or several of the interview participants (Dey, 1993). Large chunks of text might be initially coded in regard to a central theme and then recoded later with greater attention to individual precision. An example from Darren's interview was this comment:

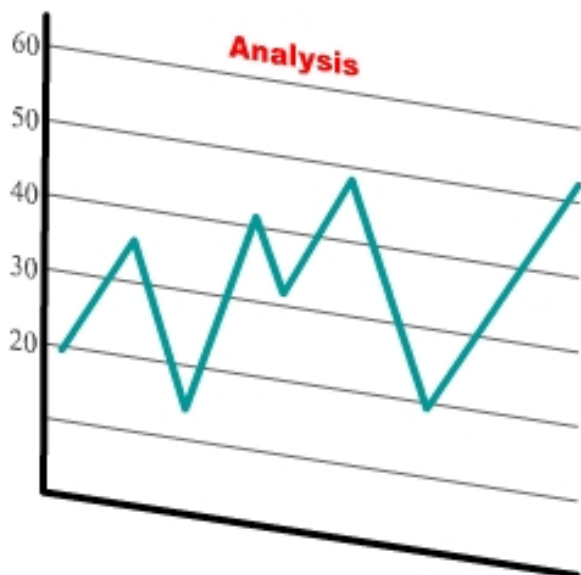


Image created by Lee Carroll - Meridian
Co-Editor

"I was six or seven when we first got our computer. My brother was really young and he didn't even bother the computer. I played games a lot on it: Space Quest, something like Move Runner, really old corny games most but they pretty much started me off on a computer gaming career (Darren, ninth grade student)."

A first read of the above passage might lead to a general code of first **computer experiences** but a more complete analysis showed other codes such as **uses, games, age, family involvement, and applications**. After having created separate code lists from the data, the researchers and outside reader conferred and compared their codes. A combined coding list was generated for use by both the researchers and outside reader.

Two methods were used to check the reliability of the transcript data. The use of selected sample dual transcription provided a verification of transcript accuracy. In addition, member checking procedures were used. Selected interview participants were given transcripts of their interviews to review for accuracy. No changes to the typed transcripts were requested. The validity of the interviews was checked by having two outside raters code the interview data using the same methods used by the researchers. This provided a way to compare and cross-check the categories and themes of responses as interpreted by the researchers and the outside readers.

Results

The interviews revealed a great deal about how the participating students thought about computer use in schools. Comparison of the responses of those students with learning disabilities and those without showed that, for most categories, all students' interviews reflected similar themes and patterns. Of note, the greatest differences between the interviews of students with and without learning disabilities was the mention of **negative attitudes**. The students with learning disabilities spoke far more often of their own negative attitudes (e.g., frustration) about computers than did those students without learning disabilities. Nonetheless, the students with learning disabilities also spoke of positive experiences with computers and gave examples of how they had benefited from computer use (e.g., creating a better product in the end).



image: <http://www.freeimages.co.uk/>

Themes.

Analysis of the categories and subcategories led to the identification of five major themes in the interviews which represented the statements the participants made about computer use in schools. As represented by the students who participated in the interviews, **applications**, **instruction**, **attitudes**, **experiences**, and **resource needs** are all important elements of how students with and without learning disabilities view computers. Figure 1 shows the five major themes and their inter-relationships. These themes point to the ways students with and without learning disabilities view computer use in schools. Importantly, there were several areas of overlap which appeared as passages were coded. These overlapping themes suggest that the participants viewed computers as holding several functions or roles in schools. The themes are interactional in that, together, they help to create attitudes about computer use through the shaping of personal experiences.

Figure 1

Figure Caption

Figure 1. How attitudes affect computer accessibility for students with and without learning disabilities

Applications of Computers

All the students spoke often of how helpful computers were for completing school assignments. Nathan commented that:

"...for an English assignment...it depends upon the quantity., I don't know, there's like this set line in my brain, it depends on how important the assignment is and how big the assignment is for both English and history... (Nathan, ninth grade student). "

Still, Nathan differentiated between when computers were and were not helpful for particular assignments based on the length of the writing to be done. Stewart mentioned the convenience of computers for completing homework in that they "help me a lot, because in my papers, I type fast to get them done..." (Stewart, sixth grade student). Many of the students made reference to how computers could be used as tools for learning in schools. There was an open-ended quality to these descriptions, reflecting a sense that computers are not limited to a few uses but could be used for, as sixth grader Stewart put it, "unmeasureable [sic]things" (Stewart).

The students also talked about enjoying using computers for communications. Frances envisioned that students could use computers to interact with students from other schools and countries.

"If you have a pen pal, or if your school is working on a whole other country and you want to get information, or you want to talk to someone for an interview, so you will be able to talk to them...I can see kids working all together, like the whole class working on a huge project for their whole school (Frances, sixth grade student). "

By contrast, Michelle preferred to use computers for personal communication with friends. "I find that there are so many things I can do with computers. I can go on America Online and talk to so many people and it's changed just what I do daily" (Michelle, eighth grade student).

All of the students felt that using computers for games is widely practiced among the students at their schools. Games were described by most students as enjoyable, often serving as a reward for completing school work. Darren referred to his computer "gaming career." When asked what he meant, Darren indicated that he found computer games to be a healthy challenge for his mind and that he took pride in how his expertise at these games had improved over time. Darren also mentioned that computer games were a family activity in his home, providing an example of the connection between computer uses and attitudes and experiences. While most students spoke of computer games in positive terms, Nathan referred to them many times with great disdain. He saw them as "a bad use of time." When asked why, he said he gets frustrated when "kids are just playing their computer games when they could be doing so many better things even like reading a book...it's like hitting your head against a wall..." While Nathan's views on computer games were quite strong, they did not appear to be representative of the other students with learning disabilities in this study. Michelle spoke of how her attitudes about computers changed in third grade because "the games were funner [sic]" (Michelle). Nathan's negative stance on games was the exception among the students. Nonetheless, it was clear that games were on the minds of all the students. Of note, there were no differences by sex among the students about computer games. Despite popular attention to how much boys love to play computer games, both the boys and girls revealed similar enjoyment of computer games.

Instructional Uses

While there was strong agreement that computers, and the word processing software they offer, had changed the experience of writing for many students, in particular those with learning disabilities, the perceptions of the quality of that experience did vary. The students with learning disabilities were not as enthusiastic about computer use for writing. Nathan and Michelle revealed a belief that writing on a computer is less personal, even though it does help create a more presentable document. Particularly with regard to poetry, Michelle indicated that:

...I like to draw it from me or, I don't feel that I can



image: <http://www.allfree-clipart.com/>

get really my input, you know like "that's what I did" if I do it on computer. When you do it on computer it's final. You can't have the little cross out marks, you can't have, you know the little extras. But what you can do is to save it and then go back into it. But I find that if I have my little book then I can pull my book out and curl up into a blanket and write (Michelle).

Michelle did see the benefit of being able to go back and edit saved work, but found computer composition to be less connected to her. Nathan recalled that using computers for writing was not always a pleasant experience. While he did appreciate the value of being able to type a paper quickly, earlier experiences with computers still lingered in his mind. Nathan noted: "I used to associate writing a big paper with using a computer and using a computer with pain." When asked why he associated computers with pain, Nathan recalled an early computer use experience:

"Because when I wrote that report in fifth grade it just took forever. And just using it [the computer] took hours and hours and hours and just using it was very boring and I wasn't, I just, I had trouble focusing on it and stuff like that (Nathan)."

Both Nathan's and Michelle's experiences with using computers for writing revealed aspects of computer use not evident among the students without learning disabilities who generally praised them for how they can help students with learning difficulties.

Spell checkers were the most mentioned feature of computers that can help students with learning disabilities. Almost all of the participants mentioned how using a spell checker benefits the writer and improves the quality of the final written product. As Nathan pointed out, "I'm a terrible speller and to use like a spell checker is incredibly helpful" (Nathan). In creating a list of computer-related wishes for his school, Stewart listed spell-checkers: "I would have updated writing programs with

spelling checkers and grammar checkers" (Stewart). Still, several students also mentioned that many students do not use spell-checkers efficiently or properly. Frances suggested that some students do not use them as they could; "[Be]cause we all have computers but I'm not sure that they use spell-check...Because they don't know about it" (Frances).

In general, the ways that the participants described the role of computers in instruction reflected more student-focused instructional practices. Michelle commented on how having computers in the classroom changes the discourse between students and teachers:

Michelle also pointed out the need for trained personnel in the computer classroom, suggesting that teachers are still needed, if for different reasons.

"...it's sort of like change of environment to go up to the computer room. And it's pretty much like a real classroom, it's just what we use on a special occasion...there's questions asked about how to do things instead of like how to say it. And there's questions, should I press this or will it erase that paper, or should I type this in? There's extra things asked or needed for what you happen to be working on in a computer classroom. You have that special interplay. And if the teacher doesn't know, you're out of luck. You need someone who has knowledge [about computers] (Michelle)."

Frances, a student without a learning disability, noted that computers could help students with "dyslexia, they can teach them the ABC's and vowel sounds" (Frances). Michelle, a student with ADHD, explained how computers help students with learning disabilities: "You have to be up straight and giving full attention" (Michelle). In response to the questions related to how computers might benefit students with learning disabilities, the interviewed students spoke most often of the role of assistive technology in helping such students. Their responses tended to be non-specific, but reflected a sense that assistive devices, including computers, could serve a compensatory function for students with special needs, especially learning disabilities. Again, the students pointed to how their own level of expertise with computer use influenced the degree to which a computer enhanced their own school work. Importantly, the students with learning disabilities reported more negative past

experiences with computers and indicated their current use of computers was influenced by these experiences.

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Attitudes

The students made many statements reflecting both positive and negative attitudes about computers. The parity of the number of the students' positive and negative statements is striking but also reflects a dichotomous mindset which was seen in several of the students' interviews: "It was fun, but it was confusing" (Frances). Many of the students described feeling both enjoyment and frustration when using computers; they revealed jointly held positive and negative opinions, neither of which seemed to overpower the other. Even the most enthusiastic computer users reported feeling frustration and negativity with computers at times. Michelle reported that "our computer, it's a nice computer, but it always acts up...so I get easily frustrated with computers." Among the negative attitudes, several participants noted that computers are breakable and costly. Nathan mentioned that "they're breakable" (Nathan). Stewart noted that it's inconvenient to be without a computer: "when my dad takes it in to get fixed, I have a whole bunch of things due tomorrow and I need my computer to print them out" (Stewart).



image: <http://www.allfree-clipart.com/>

The most common positive attitudes that were expressed in the interviews included beliefs that computers make tasks easier, are enjoyable to use, make work go faster, and improve the quality. These attitudes often described the uses that students mentioned. Computers were reported to make writing easier and faster and many students expressed how they enjoyed using computers for games and other tasks. Frances noted that "...it made it easier." Stewart, a student without learning disabilities, connected computers with benefits for students with learning difficulties: "maybe for kids with learning disabilities, [we] might get bigger monitors...so that the typing would be bigger and it would be easier for them to read" (Stewart). Frances mentioned that using a computer for writing was both faster and easier "because, it made it easier than writing it all up because you have it on a piece of paper and if you lose that then you have it on your computer." She also talked about using the spell-checker "cause I don't want to get in trouble" (Frances). When asked about why this prevents her from getting in trouble, Frances indicated that it improves the quality of her papers and leads to better grades.



image: <http://www.allfree-clipart.com/>

Among the negative attitudes expressed by students the most frequent were frustration and fear. These themes showed that the students did not see computers as all good. In particular, such attitudes indicated that there were identified drawbacks to computers which must be understood alongside the positive aspects. Citing frustration and other less-than-pleasant experiences, the students with learning disabilities offered a different picture of the convenience of computers. As a group, these three students shared stories suggesting that working with computers is not always easy and fast. Michelle revealed fairly negative attitudes about computers, referring to them as frustrating many times. Michelle's first computer experience was in first grade and she recounted that she didn't like it because "you couldn't look at the keys" (Michelle). She also mentioned that at the time she was not on medication and perhaps that added to her frustration. Michelle found her next experience, at a new school in third grade, to be better. She indicated that she still gets frustrated when the computer cannot keep up with her typing but that she's learned "it's not the end of the world" (Michelle). Showing a sense of the good and bad aspects of computers, Michelle revealed that "...in a way it just helps me feel like I can organize it better without having to look over it a lot of times..."



image: <http://www.allfree-clipart.com/>

Paul mentioned that for him typing a paper on a computer was very difficult at first because: "well, I was pretty slow" (Paul, eleventh grade student). Although all three of these students saw the benefit of using computers for writing in order to produce higher quality work, they shared experiences of "pain," "frustration," and long hours in getting to a point where computers were truly useful for writing tasks. This was different from the other students who were interviewed who did not reveal such feelings of fatigue or frustration in the process of learning how to use a computer for school work.

While holding a more extreme position than the other students, Nathan offered a comment about the potential negative effects of computer use by students, suggesting that "people are going to be socially stupid." In general, the students revealed interest and concern with the social components of computer use. In particular, several students mentioned a concern with having to share computers when using them for class work. Frances said that "I think it's easier to have your own computer because it's hard to switch when you're right in the middle of a paper and it's someone else's turn." However, Frances also conceded that "when you're doing a project with a partner or with a group, then you want to share a computer" (Frances). There was relatively little mention of differences between the ways that boys and girls differ in computer use. Michelle noted that "in my computer classes the boys sort of don't what to do it, because it was boring" (Michelle). There were no other indications that the students found significant differences in the ways that boys and girls make use of computers.

As noted, the students with learning disabilities mentioned more negative attitudes about computers than their peers. Still, the students with disabilities also spoke about the positive things computers can do. Importantly, both groups of students mentioned the benefits that computers offer students even though computer use may sometimes involve frustration and delays. The students noted that greater computer expertise can help minimize frustration with computers, but even expert users still have problems.

Personal Experience

Several of the participants revealed how much their past experiences with computers had shaped their ideas about how computers should be used in schools. All of the students indicated that they currently owned a computer and made reference to experiences and opportunities that having their own computers offered. For example, Darren and Stewart reported how "fun" it was to learn how to use the computers owned by their families, often asking questions of their parents and spending long hours investigating and learning about the many things a computer can do. Frances and Nathan mentioned that although their families own several computers, getting access to them alongside other family members was often difficult. Frances hinted at the importance of getting personal computer time, saying: "I find time" (Frances).

These students also spoke of school situations involving computers which shaped their ideas about how computers should be used. However, the school-based experiences were less intimate and appeared less "fun". Both Frances and Stewart, who attended the same school, mentioned not liking having to share a computer with another student, wishing for more personal time with the school computers. Paul also mentioned how students' views about using computers for school work were shaped by their lack of access to them. "I don't think they really [like them]...the majority I guess wouldn't like it as much 'cause like a lot of kids in this school don't have computers, yet they're asked to do a lot of their projects on computers" (Paul).

Resource Needs

Material computer needs were articulated by several of the students, including Paul, who pointed out that "a lot of kids don't have computers, yet they're asked to do a lot of their projects on computers. We have computers, but only during certain times, and if you're not allowed to use the computers you're allowed to hand-write it" (Paul). Hardware and training were the two most mentioned needs. Without adequate resources, it is impossible to develop programs for students that incorporate computer technologies.

All the students mentioned some aspect of resource needs, but the perception of the need varied by school. Both the students with and

without learning disabilities mentioned resource needs and spoke about how lack of access to either computers or computer instruction influenced the extent to which they could take advantage of the benefits computers offer students. Several of the students indicated that lack of computer access was preventing students from becoming more experienced with computers, and, by extension, preventing students with learning disabilities from taking advantage of the supports that computers can offer them.

What Was Not Said

What was not said about computers in the interviews is as important as what was said. The students who participated in the interviews did not question the presence of computers in their schools. Even Nathan, who was the most cautious about the role of computers, agreed that they are important for certain school-related tasks such as writing. There appeared to be silent agreement that computers offer something of value to schools and students. The silent concurrence that computers have a reason to be in schools reflects the purposefulness of their role. Of note, there were no differences between the students with and without learning disabilities concerning the silent concurrence about the presence of computers in schools. All the students, even Nathan, mentioned how computers were beneficial for students, especially students with learning disabilities.

Discussion

All the interview participants talked about many applications and uses for computers in their school-related work. The students' responses indicated that they believe that computers have an important and positive role in schools. The students also agreed that computers offer more to students with learning disabilities because they help such students deal with limitations that otherwise interfere with learning and work completion. The students noted that their own past experience with computers influenced how they used them for school work, suggesting that students' general computer experiences are important predictors of future use. The only major difference in the attitudes of students with and without learning disabilities was related to their positive and negative attitudes. The students with learning disabilities reported more negative attitudes about computers, but also held positive attitudes as well. These negative attitudes came from past experiences with computers, such as being forced to learn how to type, that were not as positive as those of the other students, highlighting the importance of the quality of students computer experiences in shaping their attitudes about them. These findings support prior research which pointed to the quality of students' computer experiences in shaping their attitudes and use patterns (King, 1995; Kinnear, 1996).

There was a compelling sense in both what was and was not said that computers provide students with innovative and alternative points of access to school-based learning experiences. According to the students interviewed, it is the accessibility that computers offer to students with learning disabilities that best supports their use in schools. This sense of accessibility is found in the specific references to the computer resource needs of students as well as in the spirit or rationale for the use of computers in general. These interviews suggest that computers are helpful to students with learning disabilities (as well as other students) because they offer ways of access to learning experiences that otherwise might be unavailable. Examples from the interviews suggesting how computers enhance accessibility included writing, reading, slower-paced instruction, individualized instruction, and student-centered instruction. All of these provide points of contact or entry (access) by students into learning tasks that would otherwise be more difficult or impossible. These findings confirm those of Fitzgerald and Koury (1996), Lewis, Graves, Ashton, and Kieley (1998), and MacArthur (1999), that computers are helpful tools for accommodating the needs of students with special needs like learning disabilities.

The most salient finding from the interview data was the connection between participant attitudes and prior experience. Similar to the findings of Proctor and Burnett (1996) and Kinnear (1996), these students revealed a relationship between their prior computer-related experiences and their current attitudes and opinions about their use. It was clear that many of the participants had developed their attitudes and opinions about computers from their past experiences, consciously or perhaps unconsciously. The interview data indicated that most of the participating students have generally positive attitudes about computers. In several cases, these attitudes were mediated by existing negative variables. Still, except in one case, Nathan, the positive aspects of computers were seen to outweigh the negatives. The participants did not seem to have difficulty holding contradictory beliefs about computers and were comfortable with the pairing of positive and negative qualities. No prior research on the contradictory nature of computer attitudes was found in the literature and more research into this is needed.

Of note, the three students with learning disabilities had less positive attitudes about computers than those without disabilities. In each case, these students expressed greater frustration with learning to use a computer and were more equivocal about what role computers should have in programs for such students. This finding is very important because it has implications for how enthusiastic students with learning disabilities might be about working with computers. Some individuals may find learning to use a computer generally difficult, however, the extent and duration of difficulty can be mediated by instruction and support. As noted by De La Paz (1999), some aspects of using a computer may be more difficult than traditional learning methods for students with disabilities. More importantly, it should not be assumed that just putting computers in classrooms is going to lead to their effective and immediate use (Cohen & Spenciner, 1993). How students and teachers use computers appears to be related to a number of personal variables, including student motivation, some of which could be mediated by schools (Anderson-Inman, 1999). Providing students with instruction about how to use computers effectively and giving them opportunities to practice successful use of computers could help to reduce negative experiences. In addition, those who participate in the assessment of students with learning disabilities should evaluate a student's computer skills prior to suggesting or implementing a recommendation for increased computer use such as access to word processing for written assignments.

Summary

The interviews provided important additional information concerning the role of computers in special education. Using grounded theory methods, several main themes about computers were identified in the participants' words, including applications of computers, attitudes, instructional uses, personal experiences with computers, and resource needs. Experience using computers was described by participants as a shaping variable in how they use computers for school-related work. Overall, the interview participants reflected a sense of optimism and support for the role of computers to help students with learning disabilities and suggested that they expect to see computers have an important and lasting role in helping such students find success in school. Still, the students also pointed to a need for greater computer resources for the benefit of all students. To this end, there was a call from the students for increased access to computers and more frequent and systematic use of computers for school-related work. These findings suggest that both students with and without learning disabilities recognize how computers can be helpful tools. Educators can learn from these students the importance of providing computer access that offers adequate training and support for students with learning disabilities. Importantly, the findings from this study suggest that educators need to integrate instruction about technology with other lessons so

that students with learning disabilities develop the skills and attitudes necessary for them to use computers effectively for school work.

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