Editor's Note

Maintaining a Focus in the Midst of Constant Change!

Completing its’ fourth year, Meridian continues to pursue its’ mission to promote the discussion of research and practice of middle school computer technologies and a legacy of publishing well-respected writers in the field. The beauty of being an online journal allows Meridian’s past issues to be archived on the web-site. This gives readers immediate access to all past issues in their original format, as well as, the chance to experience the evolution Meridian has undergone as new technology develops and the expertise of our board evolves.

This Summer 2001 Issue unveils our new design layout. Subject matter of articles has progressed as the knowledge of best practices for educational technology spreads. True movement towards technology integration is starting to happen! It is exciting, unpredictable and many have helped us identify the word we had not considered, change! This change is being experienced in every aspect of our lives as more things are integrated with technology. All change effects those that experience it thus we move in a state of dis-equilibration.

Equilibration is being defined as “the balancing act between the old and the new…..between perceptions and experiences” (classnotes Dr. Alan Reiman, ECI 709F Adult as Learner, fall ’98). Based on this definition dis-equilibration is a miss-match that puts heavy emphasis on the new unfamiliar experiences. It is important to realize that dis-equilibration can be stressful and those experiencing it need support. Technology demands that users be comfortable with a certain tolerance for
dis-equilibration, however, well-planned staff development that includes specific strategies must be available.

A few researchers that have studied change and the phenomena of technology integration into K-12 schools are Michael Fullan (1992) and Jean Buddington Martin (1998). Whether you read the thoughts of these researchers or others, it is important to acknowledge the importance of your school/district to understand change. Traditional research along with action research is helping administrators, teachers, technicians, superintendents, and parents make decisions and outline plans for technology integration. Research has indicated that those schools that have experienced success have been able to form committees, identify and understand stages of change that their entire staff are experiencing, implement technology planning & effective staff development, stay abreast of best practices for integration strategies and deliver funding and budget strategies. Many sources have devised models that schools and districts can follow to facilitate successful technology planning. Two great sources of information are Planning for Technology (Bailey & Lumley, 1997) and Staff Development in Technology (Bailey & Lumley, 1997). These texts will give step by step references along with links to helpful web resources.

With all that we have learned about educational technology in the past 6 years it is good to step back and be sure that we are maintaining the focus of our vision. The fast pace change of technology makes the transition to the Information Age a challenge for educational institutions. The biggest obstacle being the constant drain of funding that technology requires for maintaining minimum software and hardware requirements. Thankfully we have many heroes who spend endless energy coming up with creative solutions and strategies that have allowed the cause to move forward. With all of the trends that come and go in education sometimes it is hard to remember the organization of things and the way in which educational policy is generated. In short we are bombarded with so much information it is easy to forget what you already know. The good news is technology makes it easy for all educators, no matter what your technical skill, to understand the educational policies in regards to educational technology standards on both the state and federal levels. Watching trends in educational policy and the emergence of new technologies can give planning teams excellent foresight into the future for technology planning. The best place to start piecing this ever-changing picture together is the U.S. Department of Education, access their web-site found at http://www.ed.gov and go to the link for the Office of Educational Technology http://www.ed.gov/Technology/index.html.
The information found here deserves ample time for cruising, as there are links to reports, statistics, grant information etc. Located on this site are a few major documents to examine; The first national educational technology plan devised in 1996 Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge http://www.ed.gov/Technology/Plan/NatTechPlan/, the current national educational technology plan E-Learning putting a World Class Education at the Fingertips of all Children http://www.ed.gov/Technology/elearning/index.html

Wendy Husted

Former Co-Editor, Meridian

2000-2001

References


Update on *The Living Article*

Linda C. Greene

Note to Readers: This article is a continuation of an article that began in Meridian's Summer 2000 issue. If you are not already familiar with this project, you may want to review the previous two installments before you begin reading this update.

Introduction to Living Article (Summer 2000)
Update on the Living Article (Winter 2001)

As was noted in the last update, we are continuing to attempt a new form of academic discourse through the development of this article. It is our hope that as we continue, more of you will become involved in contributing to this project. The responses to this article remain small in quantity but of excellent quality. Unfortunately, since our last update, we have received only one substantive response. Others (which we greatly appreciate) were simply acknowledgments of the usefulness of the information presented.

The focus of this installment will be a commentary on the response that we received to our last update. We hope that this discussion will generate additional ideas and responses and that the eventual result will be a reformulation of the original piece.

Response to Winter 2001 Update
Dear Linda and Charlie,

Thanks for the "living article." Congratulations on exploring new frontiers in technological approaches to mental health. I'm impressed with your work. You asked for feedback.

- I found your opening quote a shocker. It beautifully describes the alienation that often takes place in American public education.
- I have concerns about Kohlberg's research. I think that Carol Gilligan, in her influential book IN A DIFFERENT VOICE, effectively questioned morality based on justice and logic. Cold cognition has been replaced with connectedness, cooperation, and communication.
- Our work with Invitational Education provides a model that is based on respect, trust, optimism, and intentionality. It addresses the total ecosystem of the school, consisting of the five powerful P's: people, places, policies, programs, and processes.
- My concern is that your paper does not even mention "care." It seems that students are viewed as functionaries to a system, where "expectations" and "developmental tasks" are given priority. You may want to review the work of Nel Noddings with her work on caring teachers, gentle teaching, inviting schools.

To conclude, it appears that you have taken a cognitive developmental model as your foundation. You may wish to look at other models that seek to promote healthy development in students. Again, I am most impressed with your rich research.

Best wishes,
William Watson Purkey
Professor of Counselor Education
University of North Carolina at Greensboro
Commentary: Inviting Development

Dr. Purkey’s comments correctly highlight the incompleteness of our original article. In focusing on a cognitive developmental model as the basis of our approach, I believe that we laid the foundation for conditions that might be considered necessary but not sufficient for healthy development. I believe that we can benefit from exploring a number of possible approaches to the concerns expressed in our original piece and hope that others may contribute ideas from additional theoretical orientations.

While we certainly hoped that the concept of "care" was implicit in our discussion, it may be more appropriate to focus on this concept explicitly when discussing how best to educate students in a way that promotes the healthiest possible development. After all, if we hope that our efforts will lead students to care for themselves and others, is there a better way to convey this to them than to model it ourselves? Invitational Education offers an explicit model for putting this concept of care into practice in educational environments. Rather than assuming that caring will take place and making the concept implicit (as we did in our earlier discussion), Invitational Education centers around the importance of intentionality in developing a caring and inviting educational environment. There are five basic assumptions upon which Invitational Theory is based (see "What is Invitational Education?" and "An Introduction to Invitational Theory" for a more complete discussion of this theory). One of these assumptions is as follows:

"Human potential can best be realized by creating and maintaining places, policies, processes and programs specifically designed to invite development, and by people who are intentionally inviting with themselves and others, personally and professionally ("The Five P's")." (IAIE, 2001)

Additionally, Purkey (1999) states in his conclusion to "Creating Safe Schools Through Invitational Education":

"Rather than relying on one program, one policy, or one process, Invitational Education addresses the total zeitgeist, the spirit within a school. It has a wider focus of application than traditional efforts to make schools safe. It is concerned with more than grades, attendance, academic achievement, discipline, test scores, and even student self-esteem. It is concerned with the skills of becoming a decent and productive citizen in a
These goals echo the concerns that were stated at the beginning of this project and bring us back to the original questions. How do we use technology to achieve these goals? However, rather than leaving us with the same unanswered questions, the addition of Invitational Theory to this discussion may help us to refocus some of the original questions. It may be helpful to think about how technology might be applied to the "Five P's". In other words, we might consider the ways in which technology can be used as a tool to make places, policies, processes and programs more inviting to the people involved in the educational process.

An Invitation to Comment

Now that you've had a chance to explore Invitational Theory and to think again about the cognitive developmental model we presented earlier within the context of using technology as a tool for healthy development among adolescents, we invite you to contribute your comments. Are you aware of specific programs that have successfully used technology in this way? Do you want to propose a program of your own? Do you have ideas about other theoretical models that might be instructive in this discussion? Do you want to comment on the usefulness of the models already presented? Please send any and all comments regarding this project to Meridian with the words "Living Article" in the subject line. We look forward to continued collaboration with you.
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Abstract

Personal Digital Assistants (PDAs), such as Palm Pilots, have the potential to revolutionize the middle school classroom. These small, inexpensive devices make it possible for middle school teachers to grade students' work in real time. Expectations for success on the part of teachers using these devices can be important factors in the implementation process. To a large extent, the effectiveness of PDAs as a teaching and learning tool is dependent upon how willing teachers are to use them and to overcome potential barriers such as time limitations. A qualitative collection of data gave a closer look at teachers' perceptions of PDA use and value.
Introduction

A Personal Digital Assistant (PDA) is a small hand held computer with applications such as word processing, spreadsheet, personal organizers, and calculators. Grade reporting and other instructional programs expand the usefulness of these devices for busy educators. With a shift from teacher-centered to student-centered classroom environments, PDAs may play an important role in enhancing the teaching and learning process. PDAs are much less expensive, faster to boot and access than many networked computers, and highly portable. They are truly personal devices that encourage customization. Teachers who must often work on computers and networks with locked-down control panels and software installation bans are able to customize their PDAs to suit their personal and professional needs. They are able to access and edit streamlined Word and Excel files at home and at work.

Literature Review

Research on the effectiveness of PDAs in educational settings is sparse, because relatively few K-12 schools have had PDAs in place long enough to generate longitudinal studies about their instructional impact. Some groups are actively researching PDAs' classroom effectiveness, however. Among these is the Multimedia Portables for Teacher's Pilot in the United Kingdom, which has put 1,138 high-specification portable computers in the hands of practicing teachers in a range of schools. The program has thus far reported high levels of motivation and self-reliance among teachers who consider PDAs to be flexible and adaptable in providing a context for teacher professionalism (Fisher, 1999).

Another group examining the effectiveness of the PDA in an educational setting is the Concord Consortium. Research conducted with second and fifth grades found that both groups were comfortable with the technology, but older students used the devices more effectively (Staudt, 1999). Both groups "easily moved between note taking and data collection" (p. 1). The devices gave students "opportunities to connect questions and investigations to the data in a real time setting that enhances "systematic investigations, critical thinking and cooperation" (Staudt, 1999, p. 1). Additional research suggests that PDAs facilitate group work, the immediate analysis of data particularly during laboratory exercises or when conducting scientific investigations in the field rather than in the classroom (Belanger, 2000).
Pownell and Butler (2000) identify ways that PDAs can benefit educators. They argue that PDAs are only effective when they support how teachers work and use information in their classrooms. They identify four differences between PDA/handheld computers and desktop computers. One difference relates to portability and size. While laptops are smaller and more portable than stationary computers, PDAs are small enough to be carried in a pocket or a backpack. Like laptops, PDAs offer teachers and students portability (Bell, et al, no date; Byers, 1991; Concord Consortium, 2000; Staudt, 2000) and on-the-fly note taking. They are also useful as field journals or in traditional lab settings (Berlanger, 2000; Cooke, no date; Crippen & Brooks, 2000; Trotter, 1999). Soloway (2000, p. 1) argues that PDAs "support cycles of doing and reflecting" by encouraging teachers to more effectively revisit their written work and to revisit each child's accomplishments at the end of each day.

Accessibility is another area of comparison between laptops and PDAs. Handheld devices are considerably less expensive to purchase and maintain than laptops (Belanger, 2000; D'Orio, 2000; Staudt, 2000). Having a PDA in the classroom frees an additional stationary computer for student instructional use. Trotter (1999) calls them "equity computers" because of their low cost and ease of use. D'Orio (2000) believes that wireless PDAs are cost effective methods of assisting schools to handle growing student populations, particularly on campuses with portable units. No wires or trenches have to be laid or ripped up when classrooms are brought back into the main building.

A third category of comparison is mobility. Teachers are not restricted to a stationary computer and can access and retrieve information anywhere, anytime, including in the field or on fieldtrips to museums or historic places (Hsi & Manus, no date; Soloway, 2000). More than any other factor, mobility may be the most appealing feature for classroom teachers. D'Orio (2000) agrees, citing examples of their use as attendance records during fire drills and in portables and other areas of campus that are not network accessible.
The fourth area of comparison relates to the adaptability. PDAs give teachers greater flexibility in managing classroom assignments and in creating student-specific instructional plans (Soloway, 2000). Collaboration and sharing of information and software is enhanced by PDAs as well. According to Soloway (2000), this sharing and commenting on other's work leads to an increase in the quality of finished products, such as lesson plans and artifacts. Laptops and desktop computers currently do not support this type of immediate collaboration.

PDAs allow educators to communicate with email servers, administrative applications (Staudt, 2000), and databases, such as those containing grades and other student information. PDAs also allow educators to access the Internet via modem, infrared or serial port connections, or via wireless access (Bannasch, 2000). Web clipping services such as Avantgo make it possible for educators to download education web sites. While such educational sites are limited, many more are expected to follow Scholastic, Inc., which has been offering its content that assist teachers with lesson planning and professional development.
Personal Digital Assistants in the Middle School Classroom: Lessons in Hand

Methodology

The goal of the pilot study was to investigate how PDAs assist teachers in integrating various technologies, such as spreadsheets, word processing, into classroom management and assessment procedures. Data were collected over one semester using multiple data sources: e-mail dialogues/interviews, attitudinal survey instrument, and classroom observations. To produce an accurate presentation of the research findings, as well as to control for researcher bias, data were triangulated across the research team and data sources (Patton, 1990).

Participant and Setting

The participants in the pilot study were six middle school teachers who teach science, physical education, and special education at a middle school in the southeastern United States. They were selected for participation based on how they envisioned using the devices in their classrooms. The researcher used an instrument that assessed current levels of technology knowledge and comfort level on technology in general and on PDAs in particular. Participants were also asked to explain their vision of how the PDAs would assist their instructional purposes. Their comments were noted throughout the semester both informally by the researcher and formally through a semester end survey.
Participants were offered an introductory session on using the PDA and a follow-up session on using specific applications for the PDAs. Additionally, an on-line tutorial was available and the researcher visited the participants' classes and offered technology support in person and via e-mail.

**Results**

The discussion of the results is organized as responses to five questions, which reflect the purpose of the initial research. These questions are: a) What is your level of comfort with technology?, b) What is your comfort level with PDAs?, c) Compare traditional assessment levels to assessment using PDAs, d) How do PDAs enhance your teaching goals?, and e) What is your philosophy regarding technology? A discussion of barriers to implementation is included as well. Alias names are used to protect participant confidentiality.

**What is your level of comfort with technology?**

Participants rated their current level of technology knowledge on a scale of 1 to 3, with 1 = limited, 2 = fairly knowledgeable, and 3 = very knowledgeable. Pretest and posttest surveys indicated one participant rated herself as a 1. The other five participants indicated fairly knowledgeable in the pretest. All six participants felt fairly knowledgeable at the posttest.

**What is your comfort level with PDAs?**

When asked to rank their current level of comfort with PDAs, even teachers with more extensive technology experience ranked themselves low in this category. None had previous experience with handheld computers, yet most expressed a "fairly comfortable" expectation level for the devices. Only Karen, who viewed herself as possessing only limited computer knowledge, expressed a lack of comfort with the PDA.

**Compare traditional assessment levels to assessment using PDAs.**

When asked to compare traditional assessment methods to the use of the PDAs for assessment, the respondents offered the following ideas:

Jennifer stated that PDAs "allow for immediate assessment of students in lab and group situations." Kim elaborated on this theme, describing how the PDA assists her:
[The PDA] enable[s] me to authentically assess students as they work and learn everyday. It allows me the opportunity to accurately keep a log of students' progress with particular knowledge or skills.

She also discussed how the device helps her pinpoint students' strengths and weaknesses "because I will not have to wait until a class is over in order to write it down. I can jot it down at that moment." She continued, "when students perform well on authentic assessments or physical tasks [but they] do not score well on written assessments or with poor reading skills or learning disabilities [I] notice sooner…

Holly agrees, noting that PDAs "help me streamline the grading process, giving immediate feedback to students as well as giving me more time to help individual students while the activity is fresh in the students' mind. Holly likes that her PDA allows her to quickly "change a student's grade, give bonus points…as [she] travels around the room [and] while students work on an assignment…" Holly also believes that PDAs give the teacher the advantage of being able to enter and update grades quickly, and to write on-the-fly notes concerning individual students. The PDA gives Holly quick access to parents' phone numbers. She can also take notes concerning the current lesson. "That alone would be a real boon to attention deficient people like me!," according to Holly.

"[PDAs] "help me streamline the grading process, giving immediate feedback to students..."
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Grace believes that PDAs are useful in the documentation process, particularly for teachers who must write Individual Education Plans (IEPs), monitor SPED students in general education plans, and record anecdotal records for behavior intervention/modification plans. She is also positive regarding the potential of these devices for grade keeping and for obtaining instant access to parent info, such as phone numbers or e-mail addresses.

How do PDAs enhance your teaching goals?

When asked how the PDA enhances classroom and teaching goals, mobility, organization, instant access to records and other information such as parent contact information are the most frequent advantages mentioned by the participants. One commented, "It allows me to move freely through the classroom making observations and assessments, and recording them in a timely manner." Another commented, "Instead of being stuck in a lab all day, students can go outside and gather data using probes from the Palm Pilot to measure the affect of exercise on breathing and heart rate." This idea of mobility was particularly appealing to the science teachers.

Barriers to PDA use in the classroom.

One of the most difficult barriers, as discovered by this researcher, was for teachers to overcome time limitations to learn how to merge the PDA with the stationary classroom computer. Another less weighty barrier was the need to learn the Palm
operating system which includes the hot sync process between the Windows environment and the PDA. Five out of the six teachers in the pilot program were able to complete the hot sync process without help. One required repeat help before she was able to feel comfortable with the hot sync process.

Durability is an important concern for educational users. PDAs may not be designed for the rough and tumble of the middle school classroom. During the pilot study one PDA was lost after a teacher accidentally dropped it. Fortunately, it was under warranty and was easily replaced and all files were backed up to a classroom PC, so no data were lost. Batteries are another concern for educational users. While the PDA's batteries tended to last for four to six weeks, costs over the course of the year can add up. Some manufacturers are addressing this issue by beginning to offer rechargeable batteries with newer models.

Perhaps the greatest barrier to PDA integration in the classroom revolves around the lack of high-quality educational resources such as software and curriculum integration strategies. Well over 1,000 software programs are available for PDAs. While most of these were not designed for educators, many prove useful in an academic setting. Programs such as Avantgo, a web clipping applications, and Documents to Go, already offer teachers ways to effectively integrate PDAs into the teaching and learning process. For example, Documents to Go allows teachers to create their own documents in Microsoft Word and Microsoft Excel for use on the PDA. These forms include gradebooks, attendance sheets, discipline reports, substitute teacher forms, parental notification forms, and lesson plan outlines. Teachers can easily share forms by beaming a document from one PDA to another.

What is your philosophy regarding technology?

Each teacher expressed high expectations for students and for the PDA technology. All agreed that the PDA technology is useful for classroom management and can be integral to instruction. Several believe that the PDA further enhances their ability to effectively integrate technology into the way they teach, regardless of the subject.
matter.

When answering this question, Holly responded, "I view technology as an equalizer. For instance, the use of a computer allows my students to have access to information and tools that help them compete with less challenged students." Another teacher's reply to the same question was, "Technology is the vehicle that will permit my students (Spécial Ed.) to compete on an equal basis with general education students."

Future Research

As the pilot study progressed, an additional research question emerged. While the initial focus of the study was on teachers and their use of PDAs as tools for classroom management and assessment, it became apparent that the size and ease of use makes PDAs cost effective tools in the hands of students. The next phase of the project will focus on how teachers can effectively integrate PDAs into the existing curriculum.

Future research topics that emerged from the pilot study include an examination of: (a) the changes that took place in the participant's instructional practices with regard to technology and constructivism, (b) how the teacher overcame many barriers to PDA integration, (c) the teacher's reflections on the factors that influenced PDA integration and instructional changes in the classroom, and (d) the benefits to the teacher and her students. Issues relating to the ease of theft and to the sturdiness of the PDAs must be addressed as well.

Discussion

These teachers' journey of learning how to use PDAs, reveals several important points. Like laptops, PDAs may not be for every teacher. The ability to write lesson plans to incorporate the PDA may be beyond those teachers who continue to struggle with the integration of desktops and laptops into their classrooms. Yet without this integration, PDAs continue to function effectively as personal organizers. Indeed, PDAs were popular with teachers who did not like using other forms of technology in their classrooms. Even with the reduced costs of PDAs, costs for many school districts will remain an issue. The expense of purchasing the devices, software, and providing adequate training may deter districts from these devices. However, what is certain is that these devices have a lower start up and maintenance costs.
when compared to laptops and desktop computers.

It remains to be seen what additional research will reveal about the long-term impact of PDAs on effective teaching. These teachers' journey of learning how to use PDAs, reveals several important points. Like laptops, PDAs may not be for every teacher. The ability to write lesson plans to incorporate the PDA may be beyond those teachers who continue to struggle with the integration of desktops and laptops into their classrooms. Yet without this integration, PDAs continue to function effectively as personal organizers. Indeed, PDAs were popular with teachers who did not like using other forms of technology in their classrooms. Even with the reduced costs of PDAs, costs for many school districts will remain an issue. The expense of purchasing the devices, software, and providing adequate training may deter districts from these devices. However, what is certain is that these devices have a lower start up and maintenance costs when compared to laptops and desktop computers. It remains to be seen what additional research will reveal about the long-term impact of PDAs on effective teaching.
Personal Digital Assistants in the Middle School Classroom: Lessons in Hand

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References


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Don't you hate it when someone comes up with a cute acronym for something when a word-by-word description of the idea would be much more effective? Well, sorry, but I have three acronyms for you that apply to the theme of "What Not to Do When Creating a Lesson Plan." These are: KISS (an oldie but goodie), ONES, and DRUDGE. No, these are not meant to be put together in sentence form to suggest something improper; each represents, rather, a basic principle that I have learned and advocate in regard to this process of lesson-plan "Don'ts." KISS means, of course, Keep It Simple, Stupid - but we alter it slightly to end it with Sweetheart, instead. ONES tells us: Only Not Excessively Simple. DRUDGE reminds us: Don't Ruin it Under Dreary Garbage, Either.
"...it seems to me that there is no One Way to design, write, and execute a lesson plan for students using the internet for research and reporting."

This article is not meant to be a comprehensive how-to on How to Create a Lesson Plan for the computer room. I doubt that such an authoritative tutorial exists, or if there is one, I would appreciate it if someone would point me to it. I have even stronger doubts, however, if such an article (or book, or encyclopedia, even) could exist, for the subject matter is still so new, not much more than five years old, yet at the same time so broad. It would be like writing an article on How To Teach (Electronically). What teacher or educational theorist would even presume to tackle such a subject? Any teacher knows that there is no One Way to teach. Likewise, it seems to me that there is no One Way to design, write, and execute a lesson plan for students using the internet for research and reporting. Moreover, creating and using these things is a learning process: the good teacher learns from his/her mistakes, and gets better at it as he/she goes along. Finally, I will concentrate mainly on the structure of the lesson plan here, the bigger picture: egregious errors, important features left out or poorly utilized, and the like. This is not to imply that the core content of the activity - the questions, listed under Activities/Procedure, considered both individually and collectively -- is beyond analysis or criticism. But the step-by-step building of a lesson plan is the subject for another article. What I want to show here, instead, is one piece of the larger puzzle, an online lesson that did not work. I will analyze that lesson plan and draw some conclusions as to why it failed in its objectives; by doing this I hope to help other teachers avoid some of the same mistakes.

Let's take a look at the lesson plan in question. It is at http://www.doctorgus.net/lessons/alexander.htm. It is probably best here to open it in a new window so we can look at the poor thing while referring back to my comments on it: first copy the url above, the go to File, New, and Window, then Paste the url in the Address box of that new window. Now let's look at it and number its major defects:

1. The first thing that stands out, as I look at it now - and as my victim-students looked at it -- is the long list of vocabulary words that the students were required to look up. Thirty-one words. I teach in both high school and middle school, and this lesson plan was designed for students at both levels; I felt that most students were unlikely to be familiar with these terms used in the source site at http://www.geocities.com/Athens/Aegean/7545/Alexander.html. So I asked them to look them up, using the reference-dictionary sites shown. Doing so violates the KISS rule, adding unnecessary complication and complexity to something
that did not require either; it also violates the DRUDGE rule: the list of vocabulary words is certainly Dreary Garbage. Let's be specific:

I drew the focus of the lesson immediately from its content and supposed objectives (more about those in a minute) to vocabulary. What was intended to be a teaching and learning exercise about a significant historical figure quickly became an exercise in looking up words.

It was boring, plain and simple, to walk through the process of defining 31 words. I had chosen a fine web site, vibrant and informative, but had managed to make it leaden and lifeless by requiring students to define a bunch of terms.

If I had deemed the site to be overly laden with words that students needed to look up, then I should have chosen another source; there is no dearth of information about the subject out on the web. You can't really have it both ways here: either the web site is good or it isn't. In this case, I think it's a good source, if a bit challenging. But my rule (then, as now) is: better challenging than a pushover; better to make the students reach out for understanding, and that includes vocabulary as well as concepts. This recalls ONES, above.

The KISS and ONES rules seem to conflict, to want to stake out both ends of the idea of simplicity, and, as we've seen already above, you can't have it both ways. But you can here, because Keeping It Simple applies to the teacher, and ONES is for the students. Writing lesson plans is a difficult enough task for the teacher even at its most basic level - one idea, one resource (web site), one document, one assignment, one set of related questions. Why make it more difficult, more complex? My advice here is to keep it at that level and write your lesson plans just so. Don't go mixing in multiple resources, several web sites, and dozens of questions. This is like the old saw about trying to teach a pig how to sing: don't do it, because the pig won't like it, and it won't work, anyway. If I may be kind of fast and loose with my imagery here, likewise the students won't like the complex lesson plan, they won't perform well using it, and they won't learn much, if anything, from it. So the teacher will be unhappy, too.
How did I know that the lesson plan was a failure? Easy: the students told me so, in no uncertain terms. They were bored by it - especially burdened with the vocabulary part - and they were not challenged by it. As a matter of course I solicit student feedback, both oral and written, on the activity, but I did not need to listen to or read those reactions to realize that the lesson plan was a failure: it was clear from the written responses to the questions. These answers were relatively flat and unimaginative; students showed little interest, due in part to the drudgery of the vocabulary section, in a subject that should have been fascinating and engaging.
Let's move on. We're not done with this lesson plan yet.

2. The next obvious problem here is the lack of important elements. There are many good templates out there for a teacher to use; keeping with the KISS rule, she should find a suitable one and use it. For instance, the New York Times publishes a lesson plan every day, and uses a good format; take a look at any one at the Lesson Plan Archive there: http://www.nytimes.com/learning/teachers/lessons/archive.html. The teacher will find dozens of excellent lesson plans there, each following the same design, which includes grade level, subject, overview, suggested time allowance, objectives, resources/materials, activities/procedures, wrap-up, further questions for discussion, evaluation/assessment, vocabulary, extension activities, interdisciplinary connections, related articles, additional online information, and connections to national and state standards. This may seem like a long and burdensome list, but look it over and you will see that there is nothing that can be deleted. A thorough lesson plan using conventional sources will include the same features; why should an online learning activity be any less thorough or challenging?
The lesson plan that we are analyzing includes some of the requisite features of a complete activity but leaves out many, as well. Well, here’s the new lesson plan; take a look at it and see if you like the changes: http://www.doctorgus.net/lessons/alexandernew_and_improved.htm. I know that I am prejudiced, but I like the new version. It has both learning power and lasting power. It is a complete lesson plan now. It seems to me that the revised version complies with the Don’ts that I have discussed: it is not unnecessarily complicated, it is not boring or tendentious, and most importantly, it seems to me that it challenges students to do critical thinking, to reach out for not only the information contained in the sites provided, but for information that they will find and analyze on their own, also, posing their own questions. I think that the new version reflects good changes that are the result of learning from my own mistakes.

"I intend to use the new version in the fall with next year's classes."

I intend to use the new version in the fall with next year’s classes. I encourage other teachers to give it a try, also, and to let me know how it goes with their students. Sometimes we tend to forget who the ultimate consumers of this work are: it is the students, of course. These lesson plans do not exist in some kind of vacuum, like artwork hanging on the walls of a museum. This stuff is meant to be used - and abused, and critiqued, and improved. In this article I have demonstrated one instance of one failure of one teacher with his classes; I would appreciate sharing with and hearing from other teachers - successes, hopefully.

About the Author:

Arnold Pulda has taught Social Studies at Doherty Memorial High School and Middle School in Worcester, MA, for eight years. Currently he is the Director of Gifted and Talented student programs for the Worcester Public Schools. He received his Ph.D. in U.S. History from the University of North Carolina, Chapel Hill, in 1977. He has been using the Internet in his classroom since 1993. He has led many workshops and made many presentations on how to use the Internet in education. He is a Fellow of the Library of Congress and served as a Facilitator for the Library’s Institute for Educators this summer. His website is www.doctorgus.net. He can be reached at doctrgus@massed.net and would welcome comments on this article from other teachers.

Resources and notes:

There are many places to go to start building your own lesson plans. I have cited the New York Times format above; it is as good as any. For a different approach, get your students acclimated to analyzing primary sources of all types; document analysis worksheets are at the excellent site of the National Meridian.
Archives and Records Administration, http://www.nara.gov/education/teaching/analysis/analysis.html. American Memory, at the Library of Congress site (http://memory.loc.gov/ammem/ndlpedu/lessons/media.html) also offers media analysis tools that will help your students use and create their own document-based questions. There is also a "Lesson Framework" on the site (http://memory.loc.gov/ammem/ndlpedu/lessons/media.html), but it is not for beginners. Filamentality (http://www.kn.pacbell.com/wired/fil/) offers yet another approach: a step-by-step guide to building a lesson plan from scratch. As it says on the web site, "Is Filamentality Easy to Use? Does cream cheese come from Philadelphia?" A good example of lesson-plan structure can be seen at E-Tutor, http://www.e-tutor.com/demo/lessons/1/index.htm; for a fee the site will provide you with tools to build lesson plans. PBS is also a wonderful classroom online resource, with many ready-to-go lesson plans at http://www.pbs.org/teachersource/teachtech/ideaswebbased.shtm; there is no how-to tutorial there, however. The same is true for "Education World" (http://www.educationworld.com/a_lesson/archives/), TeachersFirst (http://www.teachersfirst.com/matrix.htm), The Lesson Bank (http://www.teachersfirst.com/matrix.htm) at $18.00 per, "A to Z Teacher Stuff" (http://atozteacherstuff.com/lessonplans/), Microsoft's Encarta site (http://encarta.msn.com/schoolhouse/default.asp), and TeacherVision (http://www.teachervision.com/tv/curriculum/lessonplans/index.html). My advice again is KISS: find a couple of lesson plan indexes that you like, bookmark them on your browser, and use a few of them as you go through the school year. You will find, however, that you will want to customize even the best of the "canned" lesson plans to suit your students and your curriculum, and that's where my advice of how to avoid mistakes in that process might come in handy.
How Helpful are Computers?

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

by

Dr. Rachel Brown-Chidsey
Dr. Mary Lynn Boscardin

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.
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
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.
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

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

*The interview data were part of a larger study in which surveys about computer attitudes were also collected.*
How Helpful are Computers?

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

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:
"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).
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
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.
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).
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.

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..."
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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References


