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## Personal Digital Assistants in the Middle School Classroom: Lessons in Hand

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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.*



Image created by Lee Carroll - Meridian Co-Editor

## 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).



Image provided by the author.

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.



Images provided by the author.

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.

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### 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



Image provided by the author.

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 (Special 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.

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