The use of personal digital assistants in the K-8 classrooms

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THE USE OF PERSONAL DIGITAL ASSISTANTS IN THE K-8 CLASSROOMS

by
Tracy Brosovich

A Thesis
Submitted in partial fulfillment of the requirements of the
Master of Arts Degree
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ABSTRACT

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The Use of Personal Digital Assistants in the K-8 Classrooms
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Dr. Louis Molinari
Master of Arts in Educational Technology

The purpose of this study was to determine if Personal Digital Assistants (PDAs) are being used in the K-8 classrooms and if so to what extent. By way of a stratified random sample, four counties in central and southern New Jersey were selected. A survey was developed and sent to the participating districts. Two hundred seventy-five surveys were mailed to eight districts, with a return rate of sixty-eight percent (68%).

Data was collected from the surveys and calculated into percentages. Although seventy-two percent (72%) of the respondents report using some form of technology on a daily basis, only three percent (3%) report using PDAs. Those who report using PDAs agree with the experts on a number of areas. One hundred percent (100%) of the respondents agree that PDAs can do the following: help children to become more technologically literate; help teachers to differentiate instruction; and help motivate students to want to learn.

This study found that PDAs are being used in the classrooms, but by very few teachers and/or districts. Recommendations for further studies are suggested.
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Chapter I

The Problem

The physical appearance of classrooms has changed over the years. White boards and dry erase markers are slowly replacing the standard blackboard and chalk. Overhead projectors, teacher computer stations, TVs, DVD players and telephones can now be seen in classrooms of the 21st century. Unfortunately, many teachers are still relying primarily on the textbooks of the past to dispense knowledge to the participants of the future.

The students that frequent these classrooms have also changed. Spending time outdoors with friends has been replaced by playing games on the Internet, emailing from the computer, or text messaging from a cell phone. Today's students spend hours each day interacting with various forms of technology outside of school, yet seldom have the chance to interact with the same amount of technology while they are in school.

...the current generation of K-12 students is growing up more technologically literate than children their age were a decade ago, with access to an increasing number of devices and services such as video game consoles, mobile gaming devices, cell phones, the Internet, and instant messaging. Interestingly enough, even though many students know and use these technologies as integral parts of their lives, they learned to do so mostly outside of school (National Educational Technology Plan, 2004), and teachers are struggling to integrate technology into their curriculum (Swan, Van't Hooft, Kratcoski and Unger, 2005, p.99).
Former Secretary of Education Rod Paige states, “Education is the only business still debating the usefulness of technology. Schools remain unchanged for the most part, despite numerous reforms and increased investments in computers and networks” (National Education Technology Plan 2004).

Personal digital assistants may be one way of equipping schools with technology. A personal digital assistant is a small lightweight, handheld device that combines computer, Internet and networking features. Once widely considered to be organizers with limited memory, educators are currently “buying them up like hotcakes for faculty and students alike” (Curtis, 2005, p.14). The fact that the personal digital assistant is so portable saves the need, and time, to take all students down to a computer lab and allows keyboards to be available for a fraction of the cost of a desktop computer. Class sets of personal digital assistants (PDAs) offer new ways to practice handwriting. Students can attach keyboards to their PDAs which allow them to do the following: input notes, complete writing assignments and practice keyboarding skills. This information can then be downloaded to a desktop computer for spreadsheets, Word documents and presentations (Just, 2004).

Another important feature of the personal digital assistant is that it can provide a feeling of ownership. Unlike the desktop computer that must be shared by many students, the PDA can be a true personal computer that enables a student to gather, store and retrieve information. This process allows the student to develop a lifelong learning skill, information literacy (Pownell and Bailey, 2001).

The time has come to move away from teachers as knowledge dispensers and move toward teachers as facilitators. Personal digital assistants may offer a cost effective
way to encourage small group collaborative learning while incorporating technology into the classrooms of today.

Significance of the Study

In January of 2001, President George W. Bush signed a bill that would start a revolution in our schools, the No Child Left Behind Act. He states the following:

We cannot assume that our schools will naturally drift toward using technology effectively. We must commit ourselves to staying the course and making the changes necessary to reach our goals of educating every child. These are ambitious goals, but they are goals worthy of a great nation such as ours.

Together, we can use technology to ensure that no child is left behind.

United States Department of Education (n.d).

Under this act, teachers are held accountable for results. Teachers are called upon to use methods proven to work. The National Education Technology Plan 2004 is built upon seven steps, four of which include the following: support e-learning and virtual schools, encourage broadband access, move toward digital content and integrate data systems.

For students with special needs in particular, a personal handheld device allows teachers, students, and parents to adapt the technology to the student’s individual needs without the student being stigmatized. This has become increasingly important in the current policy climate of the No Child Left Behind Act and other efforts to bridge the digital divide. In addition, the nature of handheld technology has the potential to overcome barriers to the use of technology for this segment of
the K-12 student population (van’t Hooft and McClain, 2005, p.26).

According to a survey, more that 85 percent of teachers said they are well trained on the Internet, word processing, and e-mail software, but 27 percent have little or no training on integrating computers into instruction (Poftak, 2004).

Teachers who are anxious to incorporate technology into their classrooms are faced with challenges that stand in their way. According to Technology and Learning’s Online Poll, 68 percent of respondents agreed with insufficient funding, outdated equipment, existing policies and lack of parental involvement as barriers to change. (Poftak, 2004) Many classrooms house one or more computers that sit unused for weeks at a time. If we consider that the International Society for Technology in Education’s National Education Technology Standards for students requires early computer use to fulfill computing and information literacy goals, the challenge to educators is to increase legitimate opportunities at an early age. PDAs hold promise as one solution to the problem of providing computing opportunities because of lower costs (Chang, Mullen, and Stuve, 2005).

Statement of the Problem

For various reasons it has been shown that technology has not been utilized in many classrooms effectively and efficiently. Certainly the cost of technology is great and many schools find themselves attempting to decide cost effective methods that will give the opportunities needed to their students. Chang et al. (2005) pointed out that a partial solution to the expense of technology in classrooms is the investment in personal digital
assistants which are relatively inexpensive and their game like appearance and interactive components may motivate children in learning and maintaining focus. Could it be that teachers are using personal digital assistants in their classrooms as educational tools to enhance their lessons and to increase their students' awareness of technology at the K-8 level as mandated by the National Education Technology Plan of 2004?

Purpose of the Study

We live in a society that is technologically driven. Our daily routines rely on technology: from the alarm clock, to the remote control car door opener, to the computer, Internet and email, just to name a few. Children today are technologically driven as well. Although many forms of technology exist in schools, such as computers, printers, scanners, and digital cameras, many of these technologies are being used solely for managerial tasks. Schools need to embrace the challenge to teach these technologically driven children in a way that will most effectively prepare them to be successful in today's society. Using technology as a teaching-learning device could be the answer to this challenge. Equipping classrooms with various forms of technology is a costly endeavor, one that many small schools and communities can't afford to do.

Access to technology varies greatly depending on several factors, including resources, geographic area, and leadership. Schools in affluent areas tend to have better technology. They are supported by the community and encouraged to use technology in all facets of education. Schools with fewer financial resources are at a disadvantage when it comes to buying, learning, and using technology, resulting in a “skills divide” between students who have the skills necessary to
use technologies and those who don’t. The power of handheld computers, combined with their low cost, will help get technology into the hands of students who might not normally have access to it (Pownell and Bailey, 2001, p.7). Personal digital assistants may offer a cost effective way to introduce technology into the classrooms. The purpose of this study is to determine whether teachers are using personal digital assistants as educational tools in their classrooms.

Hypothesis

There is no noticeable difference in the regular use of a personal digital assistant as a teaching/learning device in the classroom compared to other technologies used in the teaching/learning situation. There will be no significant difference in the number of personal digital assistants in a given school compared to the number of desktop computers. There will be no significant difference in the number of personal digital assistants in a given school compared to the number of laptop computers.

Method of Study

Design

Research was conducted to determine what those who are knowledgeable in technology and education had to say about using Personal Digital Assistants for educational purposes. A letter of transmittal and survey were created and mailed to districts in Camden, Gloucester, Mercer, Middlesex, Bergen and Passaic Counties to determine if personal digital assistants are being used as educational tools and if so to
what extent.

Instrumentation

Based on the information gathered in the literature review, a twenty-nine question survey was created to ascertain if and to what extent personal digital assistants are being used in the K-8 classrooms.

Limitations of the Study

1. Non-response of the survey could impact the validity of the findings.
2. Due to lack of response from the northern counties, the results of this study will be limited to central and southern New Jersey. Thus, the results could not be generalized to the state of New Jersey.

Definition of Terms

1. Personal digital assistant: A PDA is a lightweight, handheld device that combines computer, Internet and networking features. PDAs are available in either a stylus or keyboard version.
2. Desktop computer: A computer that is designed to sit on top of a desk, usually with a monitor sitting on top of the computer.
3. Educational Technology: A combination of the processes and tools involved in addressing educational needs and problems, with an emphasis on applying the most current tools: computers and their related technologies.
4. Mobile Computing Device: A generic term used to describe a small, portable, and wireless computing and communications device.

5. GPS: Short for Global Positioning System, a worldwide satellite navigational system formed by 24 satellites orbiting the earth and their corresponding receivers on the earth.

6. Instructional Technology: Can be defined as the application of electronic media to the learning process.

7. Collaborative Learning: A broad educational term which describes a joint effort, either with a partner or small group, to complete a common goal. This is also known as cooperative learning.

8. Dynamic Grouping: Grouping of students in a way that is characterized by vigorous activity and producing or undergoing change and development. (flexible grouping)

9. Probeware: Peripherals that turn the handheld into a sophisticated scientific instrument.


Organization of the Study

The study is organized into 5 chapters.

Chapter one includes the problem and its significance, the purpose of the study, the hypothesis, and the method of study. The limitations of the study, definition of terms used and the organization of the study are also included.
Chapter two reviews the literature on the use of technology as an educational tool in the classroom, emphasizing the use of personal digital assistants.

Chapter three describes the design of the study, the instruments used and the population surveyed.

Chapter four presents an analysis of the data.

Chapter five includes a summary of the findings, conclusions and implications, and recommendations for further studies.
Chapter II

Review of the Literature

Introduction

“No Child Left Behind requires that every student should be technology literate by the time they finish the 8th grade. The Act also requires the Secretary of Education to update and publish a national long-range technology plan, based on an assessment of the continuing and future needs of the nation’s schools in effectively using technology to provide all students the opportunity to meet challenging state academic standards.” U.S. Department of Education (n.d.). “Teachers’ morale is not exactly high in these No-Child-Left-Behind days. Their hard work and solid results often seem to be unnoticed or overshadowed, especially in schools that don’t make “adequate yearly progress” under NCLB.” (Million, 2004). Feeling the overwhelming pressure of No Child Left Behind, teachers across America are looking for ways to integrate technology into their daily lessons to help their children meet with success. Is one technology better able to encourage this success? Is a personal digital computer more instructionally appropriate than a desktop computer?

Every so often a new technology comes along that challenges our thoughts about what technology is supposed to be. Handheld computers, we predict, are the next machines that will change the face of our everyday lives. Already common in the
business world, these tiny devices are just now being introduced into schools.

Technology leaders need to think deeply and systematically about how this new technology can be used to enhance teaching and learning (Pownell and Bailey, 2001, p.1)

What is a personal digital assistant? There are two types of PDAs. The first type is a palm-sized PDA. These are typically computer companions that run on batteries. They rely on a stylus for text entry and handwriting recognition software. Internet browsing is not possible with most of these palm-sized PDAs, but content can be shared with them from their host computers. Although these are primarily used for personal information management, such as calendars, schedules, contact lists and notes, new applications that expand device capabilities are beginning to be seen.

The second type of PDA is a handheld PDA. With its condensed keyboard, flip-top lid and streamlined versions of desktop application software, the handheld is more like a miniature laptop computer. Unlike the palm-sized PDA, the handheld gives the user access to the Internet and email. Built-in applications available on most handheld PDAs include the following: spreadsheet and word processing software, calculators, address books, to-do lists, memo pads, and digital audio players. It is available with both stylus and keyboard for inputting information (McCampbell 2001).

**Benefits of PDAs**

Two of the main features separating PDAs and desktop computers are price and portability. The price of PDAs range from $150 to $500 or more, depending upon which brand and style is purchased. The Palm handhelds range in price from $83 up to $350 or
more. Hewlett Packard offers PDAs ranging from $200 up to and slightly above $600.
Toshiba and Dell offer PDAs in the $200 to $300 range.

Desktop computers are becoming more affordable as well, but do not offer the second important feature that PDAs offer, portability.

... because of their small size, handheld computing devices no longer constrain users in the way desktop computers or even laptops do. As such, handheld computers support learning outside the classroom, twenty-four hours a day, seven days a week. They thus have the potential to support lifelong-learning anywhere, anytime. (Swan, Van’t Hooft, Kratcoski and Unger 2005, p.100)

One example of the portability of PDAs is a project called the Savannah study. This pilot study explored using mobile devices to facilitate a rich, interactive learning experience where students got to play the role of, and consequently discover information about, lions. One main goal for this study was to take the simulation out of the confines of the classroom and position it in an appropriate setting for the topic. The students taking part in this study played the role of lions roaming in the wild in an area that was 100m x 50m. These students carried PDAs which displayed information and actions that were suitable to their current locations. Headphones were worn for an auditory experience. The PDA screen displayed visual content, as well as messages such as “You’re hungry”, “You’re too hot”, “Return to the den”. The den area was a spot to which the students could assemble for more reflective learning after being out in the field. Each PDA could be tracked using GPS, and allowed the students to ‘hear’, ‘smell’, and ‘see’ the virtual savannah they were exploring. Children reported that they felt as if they had actually experienced what it would be like to be a lion living on the savannah.
Children were heard talking as if they were actually living on the savannah, saying things like “I’m hungry” or “I’m too hot”. Because they were able to explore many aspects of lion behavior, the children thought this simulation had increased their understanding of lions.

This study highlights the changing role of teachers and facilitators in the mobile learning experience. While in the den, children were encouraged to reflect on the success of their activities, but this was mainly teacher-led. When this reflection was led by the children themselves, they were highly motivated. When the teacher took control, the students became more passive and resistant to engagement (Naismith et al, as cited in Kadel, 2005, p.37).

What better way to learn about a habitat than by visiting the habitat while listening to and looking at information related to the habitat. This is a great example of how the portability of the PDAs can allow educators to plan meaningful, content rich, interactive lessons and activities. Although laptops could arguably be used to achieve the same goal, they are much more cumbersome and bulky. Depending on the age of the student, they may not be able to carry laptops around. Due to its size and capabilities, a PDA seems to be the better technology for on-the-go learning.

Lori Palmer, an educational technologist from Arnn Elementary School at Camp Zama, Japan, agrees that the PDAs portability is a great asset to education. She was part of a pilot project that investigated the age and grade level appropriateness of technologies and evaluated how these technologies affect the classroom environment and instruction. She noted that a PDA’s portability “promotes learning anywhere, anytime.” Students can take the devices home, or on fieldtrips to do work. “They motivate children to want to
learn” (Eib and Welton, 2004, p.2). Once again, the portability of the PDA allows for spontaneous, interactive learning inside and outside of the classroom.

The Digital Education Enhancement Project (DEEP) investigated the ways in which new technologies can improve the teaching of literacy, numeracy and science in primary schools in Egypt and South Africa. Twenty four teachers from each country have been participating in a sequence of classroom focused professional development activities. Each teacher has been given a hand-held computer and pocket camera to use during this study. This study reports on the use of these technologies by students and teachers over a twelve month period. Based on pre and post project questionnaires, interviews and observations of both teachers and students, the following was reported.

It [a hand held computer] can be used at home, in the classroom, in friends’ homes, on field trips or at a special event. It can be taken from classroom to classroom and within classrooms be handed from student to student, thus enabling it to be integrated with ease into the flow of daily activity, including in some instances, fieldwork outside the classroom. In this sense, it is the computer that moves with the learner as directed by the teacher, to serve particular pedagogic tasks. It has not disrupted the normal layout of the classroom, nor does it require special furnishing. (Leach et al. 2004, p.21)

This Global South study emphasizes yet another important factor when considering PDAs versus laptop or desktop computers. The PDA moves with the student during an activity instead of the student moving to the desktop computer. This allows for greater flexibility when planning for a cooperative group centered lesson.

Another group of researchers completed a study designed to explore the use of
mobile computing devices and their effect on student learning in K-8 classrooms. Data was collected from four elementary and two seventh grade science classes in Northeast Ohio. This data included usage logs, student work samples, interviews as well as observations. (Swan et al, 2005) states the following:

To summarize, our preliminary findings indicate that the use of mobile computing devices can be beneficial for learning inside and outside the confines of the classroom. This transition of use in and outside of school tends to be seamless, because students are using the same device with the same settings, files, etc., wherever they go. Therefore, learning that may have been taking place already outside of the classroom can be amplified by this technology as well (p. 106).

This study brings forth two very important points. The first point is as educators we know that learning does take place outside of the classroom on a daily basis. The PDA allows us to amplify this learning and apply it to what is being learned in the classroom. Information and data can be logged on the spot. Observations can be recorded and available for class discussion. Secondly, due to the portability of the PDAs, the problem of incompatibility of home and school computers may be alleviated. The student will always have his personal assistant with him and will not have to worry about finding a computer with software compatible to what he is using in school. For reasons just presented, the PDA seems to offer many benefits due to its portability that the laptop and desktop computer are not able to offer.

Aside from the portability factor, why should teachers and students use PDAs? One question that might arise is the following: Are PDAs motivating to the learners? Students today are coming to class expecting to be entertained. They spend so much of
their time outside of the classroom interacting with video and computer games. Can teachers compete with the interactive video games and computer programs that have attracted the interest of their classroom students? This adds to the many duties of today’s teachers. Not only do they have to teach the students, they have to first find a way to get and retain their attention. One very important reason to use PDAs in the classroom is that they can be very motivating to students. According to Royer and Royer (2004) as cited in Change et al. (2005) student motivation to complete school work and on-task behavior increased with the use of PDAs. The small size, game appearance and interactive components may motivate children in learning and maintaining focus. Teachers report that students are more motivated, spend more time using technology, collaborate and communicate more, and benefit from having a portable and readily accessible tool. The increased motivation to learn and increased engagement in learning activities could lead to an increase in time spent on learning activities and higher quality work. Swan agrees with Royer and Royer that PDAs are motivating. Students have found handhelds easy to use, fun, and a useful tool for learning (Swan et al, 2005).

Because today’s students are coming to class with a wide range of digital and video experience, the handheld PDAs feel very comfortable to them. They spend so much of their time outside of school playing handheld games, to be given a handheld device in school is an instant motivator. The motivation is there, it is then up to the teacher to plan and implement meaningful learning experiences.

Another question that might be posed is the following: Can PDAs personalize and individualize classroom instruction? PDAs are equipped with Bluetooth technology. Bluetooth technology is how mobile phones, computers, and PDAs, as well as a broad
selection of other devices, can be easily interconnected using a short-range wireless connection. Those who are utilizing this technology can experience total coordination between their mobile and fixed computer devices (www.Bluetooth.com). This is an important feature for education because it allows the teacher to personalize and differentiate instruction for specific children without the other children being aware of these changes. Course content and assignments can be put on a class webpage and sent to PDAs using the sync capability. Supplemental reading material can be sent to students' handhelds, thereby eliminating the need to photocopy content or share limited texts (McCarmell, 2001).

The Special Needs Population

All children tend to work at their own pace. Some work faster than others. This gap seems to widen when the special needs children are brought into the mix. They often need more adaptations and modifications, along with an increased amount of time, to complete the same assignments that others in the class are completing. Many of these children feel self conscience when extra attention is given to them. They may also feel not as intelligent as the other children because they are given a different assignment to complete. Can PDAs help to solve the very sensitive problem? Can PDAs help the special needs children to feel more self confident and not stand out when compared to their peers?

For students with special needs in particular, a personal handheld device allows teachers, students, and parents to adapt the technology to the student’s individual needs without the student being stigmatized. This has become increasingly
important in the current policy climate of the No Child Left Behind Act and other efforts to bridge the digital divide. In addition, the nature of handheld technology has the potential to overcome the barriers to the use of technology for this segment of the K-12 student population (van’t Hooft and McClain, 2005, p.26). McClain also states, “...when students can use a device they can adapt to their particular needs they are more likely to use it in productive ways” (p.28). She also feels that this technology is much less intrusive and overbearing than desktops or laptops. Change et al. (2005) agrees with McClain when he explains that the PDAs use a sequential navigation scheme instead of the multi-tasking approach of a desktop operating system. This system makes PDAs more age-appropriate in terms of maintaining focus on task.

In a study entitled Uses and Effects of Mobile Computing Devices in K-8 Classrooms, Swan et al. (2005) employed mixed methodologies to explore students’ use of mobile computing devices and its effect on their motivation to learn, engagement in learning activities, and support for the learning process. Data was collected from students in four elementary and two seventh grade science classes. Swan states that many of the teachers interviewed commented on ways in which the use of the PDAs seemed to lessen the academic achievement gap between regular and special needs children. PDAs are proving to be effective technological tools for the special education population.

Not only can the general special education population benefit from the use of PDAs, but children with specific disabilities may find benefits from this specific device as well. Students with learning disabilities or cognitive disabilities can benefit from the PDAs’ task management and organizational functions. Students with mobility
impaired students can benefit from the PDAs small size, light weight, and portability (Access IT, 2002).

Instructional Technology

Instructional technology has been the cornerstone of an ongoing academic debate. Those in favor of using instructional technology believe the technology can improve learning and better prepare students for the 21st century workplace. Those opposing instructional technology complain that billions of dollars have been spent putting technology into public schools, yet American students continue to rank near the bottom when compared academically to international students (Butzin, 2001).

One of the most comprehensive meta-analyses aggregated data from more than 500 individual studies of computer-based instruction. One key conclusion was that students usually learn more in less time when they receive computer-based instruction. Kulik 2004 (as cited in Butzin 2001) Coley agrees with these findings when he states that, “Students in technology rich environments experienced positive achievement in all major subject areas” Coley 1997 (as cited in Butzin 2001, p.368).

Alex Bick is a 16-year-old junior attending Millburn High School in northern New Jersey. He has been helping students and teachers with technology since he became part of the Computer Peer Leader program in seventh grade. He is being mentored by Dr. Chris Dede, a professor at Harvard University. Bick presented a Student Showcase of his work at NECC 2005 in Philadelphia. When he began his eighth grade school year, he was given a Microsoft iPaq Pocket PC as a gift. After using it for quite a few months, he noticed an improvement in his grades. Throughout the remainder of the school year, his
academic improvement continued. He was curious as to whether his experience was a fluke, or whether personal digital assistants could improve high school students’ academic achievement. He decided to conduct a controlled scientific experiment. After obtaining the necessary approval from Millburn High School, a simple random sample determined which twelve students would be offered the Pocket PC devices that were acquired through the generosity of the Microsoft Corporation. After four semester-long trials, his preliminary results show that Pocket PCs positively affect academic achievement. Prior to the experiment, the randomly selected group had similar grades to the rest of the students in their class. Afterwards, their academic achievement increased 11% compared to the entire grade level. When compared to their previous performance as a group, they increased 14%. The students as a whole had a positive experience, with only one student returning the Pocket PC after half a semester, claiming it was too complex (Bick, 2005).

Another study was done by Leach et al. (2004) on the use of hand-held computers for teacher professional development in primary schools in the Global South. They were investigating the ways in which new technologies can improve the teaching of literacy, numeracy and science in primary schools in Egypt and South Africa. Twenty-four primary teachers from each country, forty-eight in all, carried out a sequence of classroom focused professional development activities using a range of new technologies. Each teacher was provided with a hand-held computer and pocket camera for use throughout the project. The study reports on the use of these technologies by both teachers and students over a 12 month period.

According to this study, teachers reported that hand-held computers had positive
effects on student learning, encouraging an ongoing, integrated use of technology within the flow of classroom activity. In interviews at least half of the schools commented on the improved grades and outcomes of students in classes using the ICT [Information and Communication Technology], particularly in literacy. They also reported on increased student motivation and in some cases increased student attendance (p.25).

This study is very important, especially with the onset of No Child Left Behind. Teachers need to find effective ways to incorporate technology into their daily lessons. They also need to keep their students motivated to learn. If PDAs can keep the student motivated and on task, we may see an increase in students’ daily grades as well as grades on standardized tests. Handhelds enable a transition from the occasional, supplemental use of classroom computers and computer labs to the frequent, integral use of portable computational devices (Soloway et al.,2001, and Tinker & Krajcik ,2001, as cited in Swan et al.,2005). “Early evaluations indicate that teachers and students respond favorable to handheld devices, and suggest that handheld computers have the potential to affect student learning positively across curricular topics and instructional activities” (Swan et al, 2005, p.100). PDAs may be an effective way to get both teachers and students motivated to want to use technology in the classrooms.

Some studies support the fact that PDAs help to facilitate collaborative learning in the classrooms. According to Macintyre & Ireson (2002) as cited in Zurita, Nussbaum and Salinas (2005, p.149), “Small-group collaborative learning activities are an integral part of classroom instruction in elementary schools.” What is collaborative learning? Collaborative learning is a term used to describe a situation whereby a partnership or
small group works together to solve a problem. Personal digital assistants can promote collaborative learning through their portability, infrared beaming and short-range networking capabilities. The portability is a huge factor when considering collaborative learning. Prior to PDAs and other mobile learning devices, the children would have to form their collaborative groups around the desktop computers. In a sense, the collaborative student groups and assignments were designed around the number of available desktop computers. If only two computers were available, then two groups could meet at the computers, while the other groups had to take part in a different activity until it was their turn at the computer. PDAs offer a new realm of collaborative grouping. Every member of the group could use their PDA to do their part of the assignment, at the same time, instead of waiting for their turn at the desktop computers. When their assignment is completed, they can send it to their teacher via the Bluetooth capability. The teacher can then send them information as to what they are expected to do next. PDAs encourage students to become interested in the curriculum content and make connections with other students, as well as others outside in the local community (van’t Hooft and McClain, 2005). Roschelle and Pean (2002) as cited in Van’t Hooft and McClain (2005) highlight three ways that handhelds have been used to increase learning collaboratively. These include the following: classroom response systems, participatory simulations, and collaborative data gathering.

Zurita et al (2005) agrees with Van’t Hooft and McClain about the effectiveness of PDAs and collaborative learning in the classrooms. Zurita’s study set out to determine what effect a face-to-face collaborative environment, supported by wireless handhelds that allow for dynamic changes in the composition of groups, would have on the lesson.
Three different group composition changes of six and seven year olds were carried out in one environment and the outcomes were compared with another, similar environment where no such group composition changes were performed. The results showed significant improvements, both qualitative and quantitative, in the environment where dynamic grouping was used.

It has been demonstrated that a collaborative learning environment confers benefits in the achievement of learning objectives, social results, and positive interdependence and motivation. Furthermore, in such an environment students can acquire new skills, ideas and knowledge by working together to build solutions to educative problems. Small group collaborative learning activities are an integral part of classrooms instruction in elementary schools (Zurita et al, 2005, p. 149).

Now knowing how important collaborative learning is, especially in the elementary classrooms, it is imperative that students take part in activities of this nature. PDAs could be the necessary tools which encourage teachers to use collaborative and dynamic groupings for classroom activities.

One question that comes to mind is the following: Are Personal Digital Assistants appropriate for small school aged children? Can these young hands effectively manipulate the stylus which is necessary for inputting information? Change, Mullen and Stuve (2005) completed a study that took place in kindergarten laboratory schools associated with a large Midwestern teaching institution. Four students, two boys and two girls, were selected to be observed, interviewed and videotaped using a Palm m 130 handheld. The researchers found that although the keyboard and screen size could be
challenging for younger children, the children in this study were able to successfully manipulate both of these elements. They were able to correctly hold the stylus like a pencil. By using the PDA, the children maintained their focus and interest during their lessons and projects. The children demonstrated self-directed planning and actions throughout the project. The operating system of a PDA, which requires simpler steps in overall manipulation than a desktop computer, may be more suitable for young children.

The children understood the nature of reversibility-maneuvering from the home screen back to another program and back to the home screen. This notion of reversibility is an important skill necessary for the kind of operating system embedded in most PDAs. Those operating systems (in this case, Palm OS5) can afford little overhead in terms of memory. Thus, they use a sequential navigation scheme instead of the multi-tasking approach of a desktop operating system, which makes PDA operating systems more age-appropriate in terms of maintaining focus on task (Change et al, 2005, p.41).

While the children relied on an adult for overall guidance, they took an active stance to initiate their own selection and inquiry. Whether the PDA is an appropriate technology for young children depends on its implementation. To be used in developmentally appropriate ways, the PDA should allow the child to be in control. The process of exploring the PDA itself, thus allowing the children to discover their own answers, might be one appropriate way to use PDAs with small children (Change et al, 2005). The PDAs small size does not seem to have a negative impact on Kindergarten age children. In fact, the children took an active stance to initiate their own learning while using the PDAs. The fact that children of this age were able to maintain their focus during the activities is
of great importance when considering the short attention span of children of this age. PDAs could play an important role in gaining the young child’s interest and motivation to learn in the academic classroom setting. With guidance, the PDAs are effective educational tools for our youngest children who are just taking their place in the educational environment, the Kindergarteners.

One constant that repeatedly comes up in the research is that PDAs are being used in the Language Arts areas of reading and writing. The following have been reported as ways to use PDAs for the Language Arts curricular area: peer tutoring, shared writing, language work using a voice recorder, storing and redrafting written stories and reading and interpreting multimedia stories. Students have been observed using their PDAs for word processing purposes. “Connect an attachable keyboard to the handheld and you’ve got the ultimate in portable word processing” (Curtis, 2005, p.14). Students can then use their desktop computers to polish the final draft.

The number of books available in digital format is rapidly increasing. Huge libraries of free e-books exist on the Internet. Schools are beginning to incorporate eBooks for handhelds into their daily lessons. Students can also create their own eBooks. They are able to customize by adjusting color and font size to meet their individual needs (Curtis, 2005).

Some children feel that their writing is improving with the use of PDAs. One reason could be that they are writing more often and spending more time on task. Some claim their handwriting to be sloppy. They feel that typing makes it easier to read and the beaming function of PDAs make it easier to share their work with teachers and students. Many teachers claimed that students remained motivated and engaged while using their
PDAs.

Teachers claim to have seen an improvement in the following areas which they associate with the use of PDAs: student motivation and engagement in learning, motivation to complete written assignments, journal writing, peer editing, spelling and mechanics. One teacher said that although she noticed an improvement in all of her students writing, she particularly noticed an improvement in the writing of her special education students. Another teacher said that her “special education students were empowered to write” (Swan et al, 2005, p.108). Many teachers commented on the ways in which mobile computing devices seemed to lessen the academic gap between regular and special education students.

Craig Hinshaw is an elementary school art teacher. He describes a lesson in which his fifth grade students use an animation program, called Sketchy, on their Palms. Using a stylus, a one frame drawing is made directly on the monitor. The drawing is copied, then altered. These steps are repeated until the animation is complete. He tied this into the science curriculum by having his students create an animation of a flower growing, and then being pollinated by a butterfly. His students were allowed to keep their Palms with them. This allowed for lots of practice on animation, even from home (Hinshaw, 2003).

A PDA can also encourage mathematical and scientific concepts. They can be used to make calculations. They can be linked with probeware and graphing calculators (Curtis, 2005). Students have been seen as engaged in recording data as they are in doing the experiments. One student commented that using mobile computing devices makes activities seem more like what real scientists do. It may also be that the ability to easily
carry the devices anywhere, their capacity to collect and store a variety of information, and directly input this into desktop computer applications alleviates much of the drudgery of working with data and supports inquiry learning (Swan et al, 2005).

The research presented thus far suggests that children can benefit from using PDAs in the classroom. Could it be possible that teachers can also benefit from using PDAs in their classrooms? According to the study entitled Deep Impact: a study of the use of hand-held computers for teacher professional development in primary schools in the Global South, (Leach et al., 2004) findings indicate that the use of the hand-held computer has:

(1) Enhanced teacher professional capability by:

- Widening opportunities for professional planning;
- Extending their range of pedagogic practices and subject knowledge;
- Permitting new forms of teacher-to-teacher cooperation.

(2) Improved teacher professional development in relation to:

- The ways students view their teachers;
- The way local communities perceive the school;
- Teachers’ aspirations for future personal development.

(3) Varied in relation to context, particularly with respect to:

- Teacher access to adjacent technologies;
- Geographical location;
- Local educational and cultural practices;
- Home language.

This research shows that a teacher’s professional capability, professional development
and personal relationship with students, as well as members of the community, can be strengthened and enhanced by using PDAs. When teachers feel competent, have good relationships with their peers, students and members of the community, and are willing to take part in professional development and technological training, their students will be the ones to benefit the most. Personal digital assistants may be one vehicle that gets teachers to this point.

Possible Problems

Thus far the ways in which PDAs can positively affect both teachers and students has been discussed. Even though PDAs seem to be great tools that can solve many technological and educational dilemmas, they are not devoid of problems themselves. The small size of most PDAs may be a disadvantage as well as an advantage. The tiny screen may cause problems for small students. Text input is also an issue, especially for the elementary level student. Unless an external keyboard is attached, text input is limited to the onscreen keyboard or text recognition software. Children who have small motor coordination problems may experience difficulty using the onscreen keyboard and small stylus. According to some primary teachers, text recognition software may confuse younger students who are learning to write (Swan et al, 2005).

Another important issue was brought to light by an article from Communicator (2005) which says that educators must rethink policies so technology doesn’t interfere with instructional time. PDAs allow children to communicate and access otherwise blocked sites during class. School districts need to keep up with changing technology and savvier kids. One way districts can do this is to include a section on electronic
devices in their student code of conduct.

Swan et al (2005) suggests another valid point. As with anything new that is introduced in the classroom, there is always a novelty effect. Students tend to be more excited to use something new, because it is new. This could also be the case with PDAs. Will this effect wear off and thus render PDAs no longer motivating to students? One must consider this as well.

This brings us to another interesting study done by Briant J. Farnsworth, et al (2002) entitled Preparing Tomorrow’s Teachers to Use Technology: Learning and Attitudinal Impacts on Elementary Students. The researchers wanted to determine which method of instruction presented by teacher candidates provided the utmost learning and attitudinal gains for elementary students. The teacher candidates were put into pairs and divided into three groups to provide instruction in one of three ways, (1) multimedia via Hyperstudio, (2) Internet, and (3) control without technology. Pretests and posttests were used to measure the learning and attitudinal gains were administered to participating students. The instruction was broken up into two lessons. The first lesson focused on levers and the second lesson focused on simple machines. Taking into account how motivating students usually consider technology, the results of this study in terms of attitudinal gains did not come out the way one would think. The results of the lever activity showed that the Internet and control groups improved significantly between the testing occasions, but the Hyperstudio group remained the same. The results of the simple machines lesson showed that no significant differences existed between the groups in terms of the posttest for attitudinal ratings. While there were differences between the three approaches, none was statistically significant.
Generally arguments in support of technology would suggest that by merely using technology students attitudes would be more positive. In both of these investigations, just the opposite phenomena appeared to prevail. It could very well be that when technology is used and expectations are imposed on students that learning will increase because of the added instructional support elements but attitude will fall because of the new yet subtle pressure to perform with tools that are unfamiliar and have not been mastered (Farnsworth et al, 2002, p. 3).

Technology can in and of itself be motivating to children. However, we cannot expect learning and attitudinal gains to occur just because technology is an instructional part of a lesson. It is up to the teacher to determine the most appropriate way to implement the technology to teach his/her curriculum.

The final factor that must be considered when using PDAs is equipment problems. Teachers must realize that equipment problems will occur and they need to be trained to solve these problems. For instance, batteries may not hold their charge, or the Internet may not be available due to server problems, just to name a few. Teachers need to be provided with professional training to use PDAs. Daily technical support must be available to teachers who are experiencing some type of problem. A significant reason that many teachers are not using PDAs and other forms of technology is fear of the unknown. If teachers know that they will be trained and additional help will be available as needed, they might be more apt to take a leap and try something new (Swan et al, 2005).

Implementation

Implementing PDAs, as well as all forms of technology, is not a linear process.
There are many things that teachers must consider. Teachers must realize that technology infusion is an evolutionary process. Teachers need to look to others for help with both infusing their lessons with technology and technical assistance. Teachers need to be prepared to shift gears when things do not work as expected. It is important for teachers to have a back-up plan. Finally, teachers need to be creative in allowing technology to broaden their lesson plans, yet realistic in knowing what their students can and can’t handle (Wepner, 2002). Sanchez, N.A. and Nicholas, P. examined four experienced teachers’ perceptions of their shifting responsibilities for using technology and what they had to do to adjust to new expectations. Interviews and observations were the two data sources used in this study. The researchers found that specific conditions enhanced technology integration. They are as follows:

- Time in the school day and curriculum to work on technology projects;
- Time for teacher learning;
- Functioning technical infrastructure;
- Access to computers;
- Classroom management skills;
- Small group and student-centered instruction;
- Professional development;
- Curricular goals and standards; and
- Supportive leadership (p.6).

Implementing technology is a very important step that must be taken in our classrooms. In order for teachers to feel comfortable doing this, they must be trained and trained again. Help must be available for these teachers so they have someone to turn to when things don’t go as planned. With technology, problems will occur. Teachers must be prepared to solve these problems or frustration will transpire and teachers will be less likely to use technology again in the future.

The state of education today is vastly different than it was in years past. The
makeup of today’s students who are coming into classrooms cannot be compared to
children of yesteryears. Today’s students learn differently than children of the past.
They have experienced different things by the time they come to into the classrooms.
Teachers must change their instructional techniques to accommodate these new learners.

The potential for technology to help people learn anything except objective facts
or rules has been largely ignored until only recently. The use of technology for
teaching and learning has evolved from computer-assisted drill and practice
instruction to highly interactive multimedia learning environments. In schools
and classrooms, we are beginning to comprehend the potential for technology to
help students construct meaning for themselves based on learning activities where
they are presented with opportunities to perform and learn in multiple modalities
and across multiple domains (Mills and Tincher, 2003, p.382).

It is apparent that technology is here to stay, both in the home and at school. Can PDAs
be one effective vehicle to gain the teachers trust in technology and motivate the students
as well? It is evident in the research that if used properly, PDAs can be effective
educational technological tools. One question that remains is are PDAs currently being
used in the K-8 classrooms and if so to what extent? Chapter III describes the design of
the study and the instrument used to gather data.
Chapter III
Design of the Study

Introduction

A personal digital assistant, PDA, is quite simply a very small handheld computer. PDAs are very popular and frequently used in the business world. Some educators are realizing the potential that PDAs have in the educational arena. Can PDAs be used as educational tools in the classrooms? Can they be effective? This study was designed to determine if PDAs are being used in New Jersey’s K-8 classrooms as educational tools and if so, to what extent they are being used. By surveying teachers in Atlantic, Gloucester, Mercer, Middlesex, Bergen and Passaic counties, the researcher was able to determine if personal digital assistants are being used in the classroom and if so, how they are being used.

The study also attempted to determine how much technology is currently being used in the classroom. Do teachers feel properly trained to use technology in their classrooms? If not, if given more training, would they implement the technology into their classrooms?

Before continuing with the details of the study, let’s take a look closer look at New Jersey. New Jersey is located on the eastern coast of the United States. New Jersey is bordered on the north and northeast by New York, on the west by Pennsylvania, on the south by Delaware and on the east by the Atlantic Ocean. New Jersey is broadly divided into three geographic regions: North Jersey, Central Jersey and South Jersey. We can go
further by looking at the demographics of New Jersey, according to the 2000 census report. The total population in 2000 was 8,414,350; the male population being 4,082,813 and the female population being 4,331,537. The 2005 population estimate is 8,717,925. New Jersey’s total area in square miles is 8,721.30. Of this recorded area, 1,303.96 square miles is water area and 7,417.34 square miles is land area. The density per square mile of land area is as follows: 1,134.4 for population and 446.3 for housing units. The demographic breakdown of New Jersey residents was as follows: 6,104,705 White; 1,141,821 Black or African American; 19,492 American Indian or Alaska Native; 480,276 Asian; 3,329 Native Hawaiian and Other Pacific Islander; 1,117,191 Hispanic or Latino (of any race) and 450,972 were some other race. According to the census, the average household size was 2.68 and the total number of housing units was 3,310,275. The median household income in 1999 was 55,146 dollars. The per capita income in 1999 was 27,006 dollars. There were 135,549 families and 699,668 individual below the poverty level. Educationally speaking, of New Jersey’s 25 and over population, 5,657,799, the percent of high school graduates or higher was 82.1. The percent of bachelor’s degree or higher was 29.8. These percentages are both higher than the total U.S. percentage of high school or higher graduates, 80.4% and bachelor’s degree or higher, 24.4%.

Sampling Size

The sample that the survey targeted was a stratified random sampling. Two counties were randomly chosen from the northern, central and southern areas of New Jersey for a total of six counties. Within each county, two districts were surveyed. The survey was mailed to 18 elementary and middle schools in the following counties:
Camden, Gloucester, Mercer, Middlesex, Bergen and Passaic Counties. The sampling included schools from low, middle and upper economic areas.

Out of the 375 surveys originally sent out, 188 surveys were returned to the researcher. These responses were analyzed and are reported in chapter four of this thesis.

Description of the Instrument

A letter of transmittal was developed to introduce the questionnaire and to explain its purpose to those willing to complete the survey. This letter was entered as Appendix A and the questionnaire was entered as Appendix B. The questionnaire consisted of 29 multiple choice and yes/no questions.

Questions for the survey were developed to prove the hypothesis which was introduced in chapter one. This null hypothesis states the following: There is no noticeable difference in the regular use of a personal digital assistant as a teaching/learning device in the classroom compared to other technologies used in the teaching/learning situation. There will be no significant difference in the number of personal digital assistants in a given school district compared to the number of desktop computers. There will be no significant difference in the number of personal digital assistants in a given school district compared to the number of laptop computers.

The format of the survey was broken down the following way. Questions one through five were set up to ascertain basic information from the respondent. This information included the county, district, grade level and content areas taught. Question number two asks the following: Which of the following best describes you? The answer choices are classroom teacher, computer teacher, special area teacher, basic skills teacher,
Questions six through ten were set up to determine the level of technological expertise of the respondent. These questions were asked to establish which, if any, technologies were being used in the classroom. For example, question number six asked which of the following technologies are you currently using as instructional and/or educational tools in your classroom? Please check all that apply. The choices are as follows: Teacher workstation, Smart Board, LCD projector, desktop computers, laptop computers, PDAs, none of the above and other. These questions were also asked to determine whether the teacher felt he/she had been properly trained to use technology in the classroom. Questions eight and nine asked the following: Do you feel properly trained to use technology in your classroom? Yes or No. If trained properly, would you be more apt to use technology in your classroom? Yes or No. The final question in this section asked if the respondent uses PDAs in the classroom. If they answer no, then the respondent has completed the survey and does not need to answer the remaining questions.

The remaining nineteen questions were used to determine the extent to which PDAs are being used in the classroom. Questions eleven through fifteen asked how PDAs are being used. Question eleven asked the following: If used for instructional and/or educational purposes, for which of the following subject areas have PDAs been incorporated into your lessons? Please check all that apply. The choices were math, language arts/writing, science, social studies and other. Questions sixteen through nineteen asked if and how PDAs have impacted teacher planning and the design of the class lessons. Question sixteen asks if using a PDA in class has helped in planning,
organizing and preparing for lessons? Questions twenty through twenty-five ask how PDAs impact student behavior in the classroom. Question twenty three asks the following: Would you say that your students time on task while using PDAs during a lesson has increased as compared to time on task when not using PDAs? Finally, questions twenty-six through twenty-nine ask generalizations about PDA use in the K-8 classrooms. One example is question twenty-nine which asks the following: Would you agree that the use of PDAs help motivate children to want to learn? The answer choices are Agree, Undecided or Disagree.

Each survey was scored and given a total number of points. Questions one through five asked about the county, district, grade/subject area and number of students. These questioned were asked to gain general knowledge about the teaching environment and were not calculated into the total score of each survey. Question six asked about the technologies currently being used in the classroom. In this question each response was worth one point for a total of six points. Question seven asked how often technology was being used in the classroom. The answers ranged from daily, worth four points, down to never, worth zero points. Questions eight and nine questioned teacher technology training. The answer choices were yes (worth two points), undecided (worth one point) and no (worth zero points). Question ten asked if PDAs were used in the classroom. This was a simple yes (one point) or no (zero points) question. This section was scored out of a total fifteen points.

The second half of the survey questioned those who used PDAs in their classrooms. Questions eleven through thirteen seek information about the general classroom set up and student to PDA ratio. These questions were not scored. Questions
fourteen through twenty-one were yes/no questions with yes being worth one point and no worth zero points. The remaining questions, numbers twenty-two through twenty-nine were Agree, Undecided, Disagree questions worth two, one and zero points respectfully. This section of the survey was worth a total of twenty-four points.

Procedures

The available research pertaining to personal digital assistants in the K-8 classrooms is very exciting and pleasing where student learning and motivation is concerned. Chang et al (2005) states that student motivation to complete school work and on-task behavior increase with the use of PDAs. Its small size, game appearance and interactive components may motivate children in maintaining focus. Due to the reasonable cost of a PDA, it might be a good starting point for technology integration for teachers and classrooms with small budgets. Eib and Welton (2004) claim that a PDAs portability “promotes learning anywhere, anytime.” Not only are PDAs gaining popularity in the regular education population, but they are promising tools for the special educational population as well. “For students with special needs in particular, a personal handheld device allows teachers, students, and parents to adapt the technology to the student’s individual needs without the student being stigmatized” van’t Hooft and McClain (2005). PDAs also support collaborative learning.

...classrooms with handheld computers differ fundamentally from more traditional desktop computing environments in that users interacting with handheld computers can also interact with each other and other computing devices at the same time...handheld computers thus have the potential to support
both personalized and collaborative learning. (Swan et al, 2005, p.100)

The research is certainly available in support of PDA use in the K-8 classrooms. The question that remains is have personal digital assistants made their way from organizers being used in the business world to learning tools in the world of education?

The questionnaire survey was distributed, collected, scored and analyzed. Field testing of the questionnaire showed that it could be accurately completed within 5 minutes if PDAs had not been used by the respondent and within 10 minutes if PDAs had been used by the respondent. The survey was designed to be completed with ease, as the respondents only have to place a check next to their answers. The survey was deemed valid and reliable. Five experts were asked to read the survey questions to check for validity. Five more experts were asked to check for reliability. They volunteered to take the survey, wait two weeks, then take the survey again. Both sets of surveys were scored. A t-test was used to see if the first set of scores was significantly different from the second set of scores. The results of the validity and reliability tests were entered as Appendix C.

Three copies of the survey were sent to Rowan University’s Institutional Review Board, along with a copy of the Human Research Review Application. A copy of the completion certificate for the Human Participants Protection Education for Research Teams online course was also sent to show completion of the online course/tutorial. The survey and application were both approved, thus deeming the survey appropriate to send to those willing to participate in the study.

The survey and cover letter were mailed in a manila envelope, along with a self-addressed stamped envelope for return of the survey. The survey was printed on colored
paper to lessen the chance of getting lost in the shuffle. Teachers were asked to reply within two weeks of receiving the questionnaire.

The names of the respondents were not elicited, hoping anonymity would encourage cooperation to complete the survey. The names of districts and counties were requested, in order to track the location and economic status of the schools where the respondents are employed.

The responses of the surveys that were collected were analyzed in a number of ways. The first area looked at was the number of respondents using PDAs as compared to the number not using PDAs. After tabulating the scores of the surveys, the first ten questions were analyzed to determine the level of technology integration in the classrooms, based on a total of fifteen points with fifteen being the most technologically integrated and zero being the least. Question number six was analyzed in depth to determine the number of laptops, desktops and PDAs that are being used in the classrooms. Question seven’s responses were analyzed and compared to question eight’s responses to determine whether there was a correlation between how often teachers use technology in their classrooms and the amount of technology training they have received. Question eight was analyzed to determine if the majority of teachers in each district feel properly trained to use technology in their classrooms. Question nine then asked if trained properly, would the teachers be more apt to use technology. This was analyzed to determine if more technology training should be offered in the various districts.

Questions eleven through twenty-nine were analyzed to determine how PDAs are being used in the classroom. Questions eleven was analyzed to determine for which subject areas PDAs were being used. Question twelve was analyzed to determine how
the PDAs were being used in the classroom. For example, are PDAs being used for centers/stations, independent seatwork, group work/special projects, or communications tools. Question thirteen asks about the distribution of PDAs. Are they distributed to each child, pair, small group or does it vary per activity? Questions fourteen, fifteen, twenty and twenty-one were analyzed to determine if PDAs were being used outside of the classroom for instructional purposes. Questions sixteen, seventeen, eighteen, and nineteen were analyzed to determine the extent to which PDAs were being used by the teachers for educational purposes. The remaining questions were analyzed to determine how teachers feel about the PDA’s impact on children in terms of the following: motivation to learn and complete assignments, time on task, grades, and use to increase their level of technological awareness.

Summary

Chapter three describes the instrument developed to determine if and how PDAs are being used in the classrooms. This chapter explains the design of the study, sampling size, description of instrument, procedures as well as the time period for data collection. This chapter also describes how the instrument will be scored and analyzed. The analysis of this data and recommendation for further study will follow in Chapters four and five.
Chapter IV

Analysis of the Data

Introduction

The purpose of this study was to determine whether personal digital assistants, PDAs, are being used in the K-8 classrooms and if so to what extent. Within each county, two districts were surveyed. The survey was mailed to 18 elementary and middle schools in the following counties: Camden, Gloucester, Mercer, Middlesex, Bergen and Passaic Counties. A total of 375 surveys were mailed out. Although an attempt was made to represent the entire state of New Jersey, some counties in northern and central New Jersey refused to participate. Perhaps these counties did not want to take the time to participate in a Master’s thesis. Personal Digital Assistants are relatively new and untested in the world of education. These counties may not have been willing to participate due to that fact. Due to a limited number of surveys returned from the counties of Bergen and Passaic, the results of the study will be limited to central and southern New Jersey. The results will be based on a total of 275 surveys sent and 186 surveys returned. This represents 68% of the total surveys that were sent to recipients.
Statement of the Hypothesis

In order to gather data, three hypotheses were generated. The first hypothesis states the following: There is no noticeable difference in the regular use of a personal digital assistant as a teaching/learning device the classroom compared to other technologies used in the teaching/learning situation. The second hypothesis states that there will be no significant difference in the number of personal digital assistants in a given school compared to the number of desktop computers. The third hypothesis states the following: There will be no significant difference in the number of personal digital assistants in a given school compared to the number of laptop computers.

Relationship of Results to the Hypothesis

The survey was not only given to regular education teachers, but other elementary and middle school teachers as well. Respondents were asked to choose one category from a list of five that best described their teaching assignment. Their choices were as follows: classroom teacher, computer teacher, special area teacher, basic skills teacher or “other”. Those who checked “other” indicated that they were one of the following: special education teacher, reading specialist, educational technology facilitator and ESL teacher.
A large majority of the respondents, seventy-seven percent (77%), reported being classroom teachers. Twelve percent (12%) of the respondents fell into the “other” category. Nine percent (9%) were special area teachers. Three percent (3%) were basic skills teachers and finally two percent (2%) were computer teachers. The responses to this question are very important because it sheds light on the make-up of the respondents. This information was entered below as Table 1.

Table 1
Percentage of Teachers Surveyed and their Area of Specialization

<table>
<thead>
<tr>
<th>Counties</th>
<th>Classroom Teacher</th>
<th>Computer Teacher</th>
<th>Special Area Teacher</th>
<th>Basic Skills Teacher</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camden</td>
<td>67</td>
<td>3</td>
<td>7</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>Gloucester</td>
<td>79</td>
<td>0</td>
<td>15</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Mercer</td>
<td>83</td>
<td>2</td>
<td>10</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Middlesex</td>
<td>73</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>77</td>
<td>2</td>
<td>9</td>
<td>3</td>
<td>12</td>
</tr>
</tbody>
</table>
In order to gain an understanding of which technologies in particular were being used in the classrooms, respondents were asked to select which technologies they use as instructional tools in their classrooms. They were asked to check all that apply. Those who selected “other” indicated the use of televisions, videos, digital and video cameras, augmentative communications, Avery Key, overhead, scanner, electronic keyboard, graphing calculators and Alpha Smart. Eighty-five percent (85%) of the respondents utilize a teacher workstation. Not only is this the highest total percentage, but it is also the largest percentage in each of the four counties. Sixty-one percent (61%) utilize desktop computers. Laptops are utilized by twenty-four percent (24%) of the total respondents while Smart Boards are used by twenty-three percent (23%) of the respondents. Twenty-one percent (21%) of the respondents utilize LCD projectors. PDAs were reported to be used the least among the choices of technology given. Ten percent (10%) of the respondents reported using other forms of technology. This information was entered as Table 2.

Table 2

<table>
<thead>
<tr>
<th>Counties</th>
<th>Teacher Workstation</th>
<th>Smart Board</th>
<th>LCD Projector</th>
<th>Desktop Computer</th>
<th>Laptop</th>
<th>PDAs</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camden</td>
<td>82</td>
<td>43</td>
<td>15</td>
<td>66</td>
<td>13</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Gloucester</td>
<td>97</td>
<td>11</td>
<td>27</td>
<td>70</td>
<td>22</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>Mercer</td>
<td>85</td>
<td>20</td>
<td>23</td>
<td>54</td>
<td>29</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Middlesex</td>
<td>81</td>
<td>9</td>
<td>23</td>
<td>53</td>
<td>49</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>23</td>
<td>21</td>
<td>61</td>
<td>24</td>
<td>3</td>
<td>10</td>
</tr>
</tbody>
</table>
Table four delineates how often teachers reported using technology for instructional and/or educational purposes in their classrooms. The results are listed in percentages per county and a total percentage is given as well. Seventy-two percent (72%) of the respondents reported using technology for instructional and/or educational purposes on a daily basis while two percent (2%) never use technology for educational purposes. It is encouraging to see that 72% report using technology on a daily basis, however, only three percent of the respondents report using PDAs. This information was entered as Table 3.

<table>
<thead>
<tr>
<th>Counties</th>
<th>Daily</th>
<th>Bi-Weekly</th>
<th>A Few Times a Month</th>
<th>Seldom</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camden</td>
<td>70</td>
<td>11</td>
<td>13</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Gloucester</td>
<td>35</td>
<td>27</td>
<td>24</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Mercer</td>
<td>51</td>
<td>24</td>
<td>17</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Middlesex</td>
<td>26</td>
<td>17</td>
<td>45</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>72</td>
<td>19</td>
<td>24</td>
<td>9</td>
<td>2</td>
</tr>
</tbody>
</table>
The researcher was interested to determine whether the respondents felt properly trained to use technology in their classrooms. The respondents were asked if they felt properly trained to use technology. Sixty-two percent (62%) of the respondents reported feeling properly trained while twenty-three percent (23%) said no they were not properly trained. Seventeen percent (17%) were undecided on their response. Several teachers wrote a comment stating that they felt one could never receive too much training. Camden County teachers had the highest percentage, eighty (80%), of yes responses while Middlesex County had the lowest yes response, 47 percent (47%). Gloucester and Mercer Counties had the highest percentage of undecided responses, being twenty two percent (22%) and twenty percent (20%) respectively. This information was entered as Table 4.

### Table 4

Percentage of Teachers Who Feel Adequately Trained to Use Technology

<table>
<thead>
<tr>
<th>Counties</th>
<th>Yes</th>
<th>No</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camden</td>
<td>80</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Gloucester</td>
<td>49</td>
<td>30</td>
<td>22</td>
</tr>
<tr>
<td>Mercer</td>
<td>66</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Middlesex</td>
<td>47</td>
<td>34</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>62</strong></td>
<td><strong>23</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>
If given the proper training, would respondents be more apt to use technology in their classrooms? Eighty-two percent (82%) of the respondents reported that they would be more apt to use technology in their classrooms if they were properly trained. Twelve percent (12%) were undecided in their response and five percent (5%) said they would not be more apt to use technology if given more training. These results show that even though 62 percent (62%) of the teachers felt properly trained to use the technology they were currently using, 82 percent (82%) say that they would use more technology if they were properly trained. When asked if they use PDAs in their classrooms, many teachers replied No, but would like to receive the training to use PDAs with their students. This is encouraging that teachers are reportedly open-minded to using new technologies in their classrooms. This information was entered as Table 5.

Table 5

Percentage of Teachers Willing to Use More Technology if Properly Trained

<table>
<thead>
<tr>
<th>Counties</th>
<th>Yes</th>
<th>No</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camden</td>
<td>83</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Gloucester</td>
<td>74</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>Mercer</td>
<td>89</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Middlesex</td>
<td>84</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>82</td>
<td>5</td>
<td>12</td>
</tr>
</tbody>
</table>
The first half of the survey attempted to gain a general understanding of the level of technology saturation in each county. The second half of the survey determined if and to what extent Personal Digital Assistants were being used in the classrooms. Out of the four counties surveyed, only one county reported using PDAs in the classrooms. This was Gloucester County. Gloucester County reported three elementary schools and one middle school using PDAs for instructional and/or educational purposes. This figured out to be fourteen percent (14%) of the respondents in Gloucester County reported using PDAs. If we consider all of the counties surveyed, this figure is drastically reduced to three percent (3%). This information was entered as Table 6.

Table 6

Percentage of Teachers Who Use PDAs in their Classrooms

<table>
<thead>
<tr>
<th>Counties</th>
<th>Teachers Using PDAs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camden</td>
<td>0</td>
</tr>
<tr>
<td>Gloucester</td>
<td>14</td>
</tr>
<tr>
<td>Mercer</td>
<td>0</td>
</tr>
<tr>
<td>Middlesex</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
</tr>
</tbody>
</table>
Gloucester County was very unique in that it was the only county that reported using PDAs in the classroom. Actually, Washington Township was the only district to report using PDAs in the classroom. Although this represented only three percent (3%) of the total population that responded, the results are significant in many ways. Three of the teachers who reported using PDAs in their classrooms were part of a pilot program that started last year. Each of these teachers was given a classroom set of PDAs to use with their students. The respondents were asked to select the subject areas in which the PDAs were being used for educational purposes. Teacher 1 reported using PDAs for Social Studies and commented that due to departmentalization, the students switch for science. He would, however, use PDAs in science class, if he taught science. This information was entered as Table 7.

Table 7

Grade Levels Taught and Subjects for Which PDAs are Used

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Grade Level Taught</th>
<th>Math</th>
<th>Language Arts Writing</th>
<th>Science</th>
<th>Social Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher 1</td>
<td>sixth</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Teacher 2</td>
<td>sixth, seventh, eighth</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Teacher 3</td>
<td>fifth</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Teacher 4</td>
<td>fourth</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Teacher 5</td>
<td>fifth</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
</tbody>
</table>

Total Percentage | 40 | 60 | 60 | 40 |
Teachers were also asked to report on the ways in which PDAs are utilized in their classrooms. They were encouraged to check all that apply. Twenty percent (20%) of the respondents reported using PDAs for centers/stations learning experiences. Eighty percent (80%) of the respondents reported using PDAs for independent seatwork activities. Eighty percent (80%) also reported using PDAs for group work and special projects. Forty percent (40%) said that PDAs were used as a communications tool in their classrooms. This information is important because the data states that the majority of the respondents who are using PDAs with their students are doing so both independently and in small groups. Twenty percent (20%) report using the PDAs for centers/stations. The middle school teachers might be calling this kind of activity a small group activity. The terms “centers” and “stations” might be more age specific to the lower elementary grades. This information was entered as Table 8.

### Table 8

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Centers/Stations</th>
<th>Independent Seatwork</th>
<th>Group Work Special Projects</th>
<th>A Communication Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher 1</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Teacher 2</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Teacher 3</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Teacher 4</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Teacher 5</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
<td><strong>80</strong></td>
<td><strong>80</strong></td>
<td><strong>40</strong></td>
</tr>
</tbody>
</table>

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Those respondents who reported using PDAs were asked to describe the distribution of the PDAs in their classrooms. Eighty percent (80%) reported having one PDA per child while only 20 percent (20%) reported having one per small group. Teacher 1 reported having one set of thirty to be shared with five different classes. Although each child does not have their own personal PDA to keep, while in class each child has one to use. None of the respondents selected “one per pair” or “varies depending on the activity”. This information is very important because the research identified cost effectiveness as a major benefit to using PDAs in the classroom. Due to the fact that PDAs are more cost effective than desktop computers, each child could have their own PDA to use. These results were entered as Table 9.

Table 9
The Distribution of PDAs in the K-8 Classrooms

<table>
<thead>
<tr>
<th>Respondents</th>
<th>One per child</th>
<th>One per pair</th>
<th>One per small group</th>
<th>varies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher 1</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher 2</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher 3</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher 4</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher 5</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>80</strong></td>
<td><strong>0</strong></td>
<td><strong>20</strong></td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>

According to the research reported in chapter two, a growing trend among those using PDAs is to have their children take the PDAs on class field trips or send the PDAs home with the students for assignments outside of the classroom as well as off the school property. None of the respondents reported taking the PDAs on class trips or sending
them home with the students. One respondent reported that it was against district policy to allow the students to take the PDAs off of the school property.

Can PDAs help the teacher in planning and organizing lessons? Eighty percent (80%) of the respondents reported that using a PDA in class has helped them in planning, organizing and preparing for their lessons. One hundred percent (100%) of the respondents reported taking their PDAs home for the purpose of school related business as well as using their PDAs to differentiate instruction. Sixty percent (60%) of the respondents reported using the PDAs to help modify or adapt assignments for a special needs student. This information was entered as Table 10.

Table 10

Ways in Which Teachers Report Using PDAs in the K-8 Classrooms

<table>
<thead>
<tr>
<th>Ways PDAs Are Used</th>
<th>Teacher 1</th>
<th>Teacher 2</th>
<th>Teacher 3</th>
<th>Teacher 4</th>
<th>Teacher 5</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan, organize and prepare for lessons</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Prepare for school related business from home</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Differentiate instruction</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Modify or adapt assignments for a special needs student</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>
Have students responded positively towards using PDAs? One hundred percent (100%) of the respondents report that yes, students have responded positively to using PDAs in class. One hundred percent (100%) of the respondent have reported that their students’ time on task while using PDAs during a lesson has increased as compared to time on task when not using PDAs. One hundred percent (100%) of the respondents report that their students seem more motivated to complete their assignments when using a PDA as compared to completing their assignments without using a PDA. Eighty percent (80%) of the respondents report that there has been a positive change in their students’ academic grades when PDAs are used for lessons and activities as compared to when PDAs are not used. Eighty percent (80%) of the respondents agree that the use of PDAs can help to individualize instruction, while twenty percent (20%) were undecided.

One hundred percent (100%) of the respondents agree that PDAs can do each of the following: help children to become more technologically literate; help teachers to differentiate instruction; and help motivate students to want to learn.

One respondent reported that the survey did not address the maintenance or durability of this technology. She states that there is a huge problem with pin damage and how “kid friendly” they are. She said that it all sounds wonderful but the reality is that they are too fragile at this time. This could very well be a concern for further recommendations and testing.
Summary

This chapter presented the data collected via the survey instrument. Data was collected from four counties in New Jersey, two from Central New Jersey and two from Southern New Jersey. An analysis of the data was completed in order to determine if the null hypothesis should be accepted or rejected. The data was found to show a noticeable difference in the regular use of a personal digital assistant as a teaching/learning device in the classroom compared to other technologies used in the teaching/learning situation. Therefore, we must reject the hypothesis that states there is no noticeable difference in the regular use of a personal digital assistant as a teaching/learning device in the classroom compared to other technologies used in the teaching/learning situation. There is a significant difference, with PDAs reportedly being used by only three percent (3%) of the respondents.
Chapter V
Conclusions and Recommendations

Summary of the Problem

We live in a technologically driven world. Technology has permeated most aspects of our business world. Has it permeated the world of education as well? Educators are encouraged to use technology when presenting their lessons, but are they properly trained? Do they have not only adequate, but state of the art equipment to educate their children? Does every child have access to the technology? The expense of properly equipping the classroom with technology could be enormous.

The Personal Digital Assistant is a piece of technology that is relatively inexpensive. It carries with it the essential elements of desktop computers. It offers people the opportunity to use technology in a relatively uncomplicated way. Some experts are suggesting that the PDA can be an important technology in both the elementary and secondary classrooms.

Could PDAs be one cost effective way to integrate technology into the classrooms? The purpose of this study was to determine if and to what extent PDAs are being used as an instructional tool in the K-8 classrooms.

Summary of the Method of Investigation

The first part of the investigation consisted of extensive research to determine
if the PDA had the capability of being an effective classroom tool for the K-8 classroom. As seen in Chapter Two’s literature review, the experts overwhelming agree that PDAs offer one cost effective way to help all students become technologically capable. According to the literature, PDAs have also helped to increase time on task, increase student motivation to learn, and have had a positive effect on the general attitudes of the students in regards to school.

The second part of the study attempted to determine whether personal digital assistants, PDAs, are being used in the K-8 classrooms and if so to what extent. Within selected counties of New Jersey, two districts from each county were surveyed. The survey was mailed to 18 elementary and middle schools in the following counties: Camden, Gloucester, Mercer, Middlesex, Bergen and Passaic Counties. A total of 375 surveys were mailed out. There was virtually no response from the two northern counties originally included in the study. Due to this circumstance, the results of the study were limited to central and southern New Jersey. The results were based on a total of 275 surveys sent and 186 surveys returned. The 186 surveys returned represent sixty eight percent (68%) of the total surveys used in this study.

Conclusions and Implications

Out of the four counties surveyed, only one school district in the southern county of Gloucester reported using PDAs in their classrooms. The number in this particular school district was five. This number was shocking since experts in the field, as represented in the literature, recommended the PDA as a viable, inexpensive device that
would allow technology integration in the classrooms. Perhaps this study is looking at a device that has not yet made its mark and/or contribution in education and we may be standing on the brink of a small revolution to come.

Another factor for the results could be that high schools were not included in the study. Although there was no evidence to indicate that the high school situation would be any different than the elementary school situation, it is something that should be explored to confirm or deny the use of PDAs at the upper levels.

This study found that seventy-two percent (72%) of the respondents reported using technology for instructional and/or educational purposes on a daily basis. However, only three percent (3%) of these respondents reported using PDAs in their classrooms. Gloucester County was very unique in that it was the only county that reported using PDAs in the classroom. Washington Township was the only district to report using PDAs in the classroom. Three of these teachers reported being part of a pilot group to use PDAs as instructional tools in their classrooms. The teachers reported using PDAs as instructional tools for the following academic subject areas: math, language arts/writing, social studies and science. The PDAs were utilized in a variety of ways. Twenty percent (20%) of the respondents reported using PDAs for centers/stations learning experiences. Eighty percent (80%) of the respondents reported using PDAs for independent seatwork activities. Eighty percent (80%) also reported using PDAs for group work and special projects. Forty percent (40%) said that PDAs were used as a communications tool in their classrooms. Those respondents who reported using PDAs were asked to describe the distribution of the PDAs in their classrooms. Eighty percent
(80%) reported having one PDA per child while only 20 percent (20%) reported having one per small group.

Even though the percentage of respondents using PDAs was very small, three percent (3%), their responses were very enlightening. One hundred percent (100%) of the respondents report that yes, students have responded positively to using PDAs in class. One hundred percent (100%) of the respondents have reported that their students’ time on task while using PDAs during a lesson has increased as compared to time on task when not using PDAs. One hundred percent (100%) of the respondents report that their students seem more motivated to complete their assignments when using a PDA as compared to completing their assignments without using a PDA. Eighty percent (80%) of the respondents report that there has been a positive change in their students’ academic grades when PDAs are used for lessons and activities as compared to when PDAs are not used. Eighty percent (80%) of the respondents agree that the use of PDAs can help to individualize instruction. One hundred percent (100%) of the respondents agree that PDAs can do each of the following: help children to become more technologically literate; help teachers to differentiate instruction; and help motivate students to want to learn.

How can it be that something which is so well known in the business world has yet to permeate the education world? Could more districts be using PDAs, but chose not to participate in this study? While not extremely expensive, they may be liable to theft or loss. It could be that schools feel that younger children are not responsible enough to use these devices in and out of their classrooms. According to the literature review and the survey results, those teachers who are using PDAs have reported seeing positive
effects in terms of grades, motivation and work completion. If given the proper training and equipment, would more teachers be willing to implement PDAs in their classrooms?

Based on this study, PDAs can be one cost effective way to integrate technology into the classroom. There have been positive student results when PDAs are used in the classroom. This question remains: Are PDAs being used as instructional tools in the K-8 classrooms in other parts of the country? Based on reports from the literature, this study conjectures that PDAs are being used throughout the country, but not by many teachers/districts. Kadel (2005) says it best when he states the following, “It is now up to practitioners to embrace, experiment with, and learn from what PDAs have to offer to our students” (p.37).

Recommendations for Future Studies

The following recommendations for further studies are suggested:

1. Repeat this study with different counties and include counties from northern New Jersey to see if the results would be changed in any way.

2. The positive and negative effects of Personal Digital Assistants should be tested to determine if the value warrants the expense.

3. Repeat this study and extend it to include grades 9-12 to see if Personal Digital Assistants are being used at the High School Level.

This study attempted to determine if Personal Digital Assistants were being used in the K-8 classrooms. An in depth study into the available research regarding PDA use...
in the classroom was performed and reported in the literature review. A survey was
distributed, collected and analyzed. These findings were reported in chapter four.

This study found that PDAs are being used in the classrooms, but by very few
teachers and/or districts. Some suggestions as to why this occurred were offered.
Recommendations for future studies were also suggested. According to the experts,
the PDA seems be a child friendly technology tool, however, it has yet to
impact the educational world as it has the business world. The Personal Digital
Assistant could very well be the next technological tool to take the world of education by
storm.
References


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APPENDIX A

Letter of Transmittal
Dear Fellow Educator,

Please allow me to take a moment to introduce myself. My name is Tracy Brosovich and I am an elementary school teacher as well as a graduate student. I am working towards completing my Masters degree in Educational Technology from Rowan University. Having taught at the second grade level for many years, I am well aware of how precious your time is, however, I am hoping that you will be willing to take just a moment of your time to complete the attached survey. I assure you it will only take a few minutes to complete, but your information will be very significant and beneficial to me.

This survey is part of a research project in which I am trying to determine to what extent personal digital assistants (PDAs) are being used in K-8 classrooms. Regardless of whether or not you are using PDAs in your classroom, I ask that you kindly take a moment to fill out the survey. It will not take more than a few minutes of your valuable time.

Please complete the attached survey and email it to me by **February 28th**. I am surveying various districts from the entire state of New Jersey. Upon the return of these surveys, the data will be collected and analyzed. It is very important that this survey be returned by the aforementioned date so that the information in my thesis can be thorough and complete. I truly appreciate your help with this project.

Sincerely,
Tracy Brosovich
Hurffville Elementary School
856-589-7459
cbroz1@comcast.net
APPENDIX B

The Survey Instrument
Survey Questions

Please answer the following questions to the best of your ability. If the question does not apply to you, please respond NA. Participation in this survey is voluntary and all responses will be kept anonymous and confidential.

1. What is the name of the county where you teach? ____________________________

2. What is the name of your school district? ____________________________

3. Which of the following best describes you?
   - Classroom teacher
   - Computer teacher
   - Special area teacher
   - Basic skills teacher
   - Other ____________________________

4. What grade/subject area do you teach? ____________________________

5. How many students are in your classroom? ____________________________

6. Which of the following technologies are you currently using as instructional and/or educational tools in your classroom? Please check all that apply.
   - Teacher workstation (single desktop computer designated to teachers)
   - Smart Board
   - LCD Projector (multimedia projector)
   - Desktop computers If so, how many? ________
   - Laptops If so, how many? ________
   - PDAs (Personal Digital Assistants) If so, how many? ________
   - None of the above
   - Other ____________________________

7. Which of the following best describes how often you use technology for instructional and/or educational purposes?
   - Daily
   - Bi-weekly
   - A few times a month
   - Seldom
   - Never
8. Do you feel properly trained to use technology in your classroom?
   - Yes
   - Undecided
   - No

9. If trained properly, would you be more apt to use technology in your classroom?
   - Yes
   - Undecided
   - No

10. Do you use personal digital assistants (PDAs) in your classroom?
    - Yes
    - No

   If you answered no to question 10, then you do not need to answer the remaining questions. Thanks for your input.

   If you answered yes to question 10, please continue answering the remaining questions.

11. If used for instructional and/or educational purposes, for which of the following subject areas have PDAs been incorporated into your lessons? Please check all that apply.
    - Math
    - Language arts/writing
    - Science
    - Social studies
    - Other

12. Which of the following best describes the way in which PDAs are utilized in your room? Please check all that apply.
    - Centers/stations
    - Independent seatwork
    - Group work/special projects
    - A communication tool
13. Which of the following best describes the distribution of the PDAs in your classroom?
   - One per child
   - One per pair
   - One per small group
   - Varies depending on the activity

14. Have your children ever used PDAs while on a field trip?
   - Yes
   - No

15. Have your children ever used PDAs to complete an activity on school property but outside of your classroom?
   - Yes
   - No

16. Would you say that using a PDA in class has helped you in planning, organizing and preparing for your lessons?
   - Yes
   - No

17. Have you taken your PDA home with you for the purpose of school related business?
   - Yes
   - No

18. Have you used PDAs to help you to differentiate instruction in your classroom?
   - Yes
   - No

19. Have you used PDAs to help you modify or adapt assignments for a special needs student?
   - Yes
   - No

20. Have you given an assignment in which your students have had to take their PDAs home in order to complete the assignment?
   - Yes
   - No
21. Have your students voluntarily taken their PDAs out of the classroom to use at home or somewhere other than on school property?
   - Yes
   - No

22. Would you say that your students have responded positively to using PDAs in your classroom?
   - Agree
   - Undecided
   - Disagree

23. Would you say that your students’ time on task while using PDAs during a lesson has increased as compared to time on task when not using PDAs?
   - Agree
   - Undecided
   - Disagree

24. Would you say that your students seem more motivated to complete their assignments when using a PDA as compared to completing their assignments without using a PDA?
   - Agree
   - Undecided
   - Disagree

25. Would you say there has been a positive change in your students’ academic grades when PDAs are used for lessons and activities as compared to when PDAs are not used?
   - Agree
   - Undecided
   - Disagree

26. Would you agree that the use of PDAs can help children to become more technologically literate?
   - Agree
   - Undecided
   - Disagree

27. Would you agree that the use of PDAs can help to individualize instruction?
   - Agree
28. Would you agree that the use of PDAs can help teachers to differentiate instruction?
   - Agree
   - Undecided
   - Disagree

29. Would you agree that the use of PDAs help motivate children to want to learn?
   - Agree
   - Undecided
   - Disagree

Thank you for taking the time to complete this survey. Please return it to me in the self addressed stamped envelope.
APPENDIX C

Validity and Reliability
Validity

Five experts volunteered to read through the survey to determine its validity. One of the experts suggested rewording two of the questions. Another expert suggested rearranging the order of a few questions for clarity. Yet another expert suggested eliminating one question due to the unclear nature of the question. Overall, all of the experts thought the survey was clear and thorough.

Reliability

T-TEST to Predict Reliability

<table>
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<tr>
<th>Respondents</th>
<th>Survey One</th>
<th>Survey Two</th>
</tr>
</thead>
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</tr>
</tbody>
</table>

Number of Pairs of Scores 5
Sum of “D” -8.00
Mean of D’s -2.00
t-VALUE -2.00
Degrees of Freedom <df> 4

Limits-Look at .05

-2.776 0 +2.776

Due to the fact that the t-Value was -2.00, this was within the limits of the range + and or - 2.776. Therefore, the survey can be deemed reliable.