Using Pocket PCs in Education

Dan H. Wishnietsky
Dan H. Wishnietsky

Dan H. Wishnietsky is an associate professor of mathematics at Winston-Salem State University, where he teaches statistics and calculus. His previous teaching experiences include teaching mathematics at the high school and community college levels. Wishnietsky's research interests include incorporating technology into the curriculum, helping students develop research projects, and encouraging minority students to enter aviation. As a private pilot, Wishnietsky is an active member of the Civil Air Patrol, and he teaches aviation classes to fifth-grade students.

Wishnietsky holds degrees in biotechnical engineering, psychology, sociology, and education administration from the University of California-Los Angeles and the University of North Carolina-Greensboro. He is a member of the National Council of Teachers of Mathematics and Phi Delta Kappa International. His previous publications include four fastbacks, five books, and numerous articles. He also co-authored Managing Chronic Illness in the Classroom (Phi Delta Kappa Educational Foundation, 1996) with his wife, Dorothy.

Series Editor, Donovan R. Walling
Using Pocket PCs in Education

by

Dan H. Wishnietzky
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>7</td>
</tr>
<tr>
<td><strong>The Pocket PC: Its Applications and Functions</strong></td>
<td>9</td>
</tr>
<tr>
<td>Functions</td>
<td>12</td>
</tr>
<tr>
<td>Applications</td>
<td>13</td>
</tr>
<tr>
<td><strong>Applications for Faculty and Staff</strong></td>
<td>18</td>
</tr>
<tr>
<td>Time Management</td>
<td>18</td>
</tr>
<tr>
<td>Administrative Applications</td>
<td>21</td>
</tr>
<tr>
<td>Classroom Applications</td>
<td>23</td>
</tr>
<tr>
<td>Research</td>
<td>26</td>
</tr>
<tr>
<td><strong>Applications for Students</strong></td>
<td>29</td>
</tr>
<tr>
<td>Time Management</td>
<td>29</td>
</tr>
<tr>
<td>Classroom Applications</td>
<td>32</td>
</tr>
<tr>
<td>Research</td>
<td>35</td>
</tr>
<tr>
<td>Communication</td>
<td>37</td>
</tr>
<tr>
<td><strong>Future Applications</strong></td>
<td>39</td>
</tr>
<tr>
<td>The Palm-Sized PC</td>
<td>39</td>
</tr>
<tr>
<td>Wireless Web</td>
<td>40</td>
</tr>
<tr>
<td>Additional Applications</td>
<td>41</td>
</tr>
<tr>
<td><strong>Conclusion</strong></td>
<td>43</td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td>45</td>
</tr>
</tbody>
</table>
Introduction

It seems that every time a new high-tech gadget is introduced, some author writes an article, monograph, or book heralding the wonders of technology and how education would improve if teachers would only competently incorporate the device in the classroom. This author is going to exhibit some candor and state the obvious: It is imprudent for educators to buy technology for the sake of having technology, and it is not computers and their associated devices that will improve education.

The previous sentence should not be construed as a criticism of technology in education. Computers have profoundly influenced society and have had an enormous effect on education. Since the 1980s, computers have brought computer-assisted instruction, simulations, discovery learning, and Internet resources into the classroom. Technology is and should be an integral part of the classroom. However, it is only a tool and should not determine what is taught. Educators are the ones who decide content by working together to develop worthwhile curriculum based on professional standards. If a computer-based technology or any tool enhances the
learning process, then and only then should the tool be used.

The purpose of this fastback is to provide educators with information about the applications and functions of the pocket personal computer so they can evaluate the pocket PC's utility and value and decide the benefits and limitations of its use. The first section will discuss the basics of the technology. This will include explaining the operation of a pocket PC using the word processor, spreadsheet, PowerPoint, Internet browser, and the e-mail applications. Other functions that are discussed include Calendar, Task, Notes, the voice recorder, handwriting recognition, and the infrared ports. The next two sections examine how faculty, staff, and students can take advantage of the various pocket PC applications. Major categories include time management, administration, research, communication, and classroom applications. Finally, the fastback introduces possible future applications as the technology for pocket PCs improves and allows more powerful applications. With this information, teachers should be well versed with the pocket PC and be able to make a well-informed judgment regarding its use in their class.
One advance in computer-based technologies has been the pocket personal computers, also called "handheld" computers and personal digital assistants (PDA). The names associated with these devices accurately describe their size and their function. They are pocket- or hand-sized, function as a personal digital assistant, and operate as a computer. Although several companies produce pocket personal computers, their dimensions and weights are similar. They are just over 5" long, 3¼" wide, and ¾" thick; and they weigh about 6½ ounces. Because they are designed to be portable, these devices have become extremely popular with people in business and industry.

As of this writing, the major manufacturers of pocket personal computers are Palm, Dell, Compaq (a division of Hewlett Packard), and Sony. There are two major operating systems, the Palm OS and Microsoft Windows CE; however, conversion programs are available that convert files between corresponding applications of the two systems. This is required when a person has a file
on their desktop computer that is running, for example, Windows 2000 and wants to be able to transfer and use the file on a handheld running the Palm OS.

In selecting the appropriate pocket PC, teachers should evaluate the ease with which files can be transferred between their desktop and their handheld. Educators who use this technology will discover that they often will transfer files; and the process needs to be simple, effortless, and quick.

Files will need to be transferred often because of the size of the pocket PC's display. The viewable image measures approximately 2¼" wide and 3" high. This is not the size screen on which to type a paper or input a large number of data points, though it is not a problem to input a memo or limited data with the included stylus and the on-screen software keyboard. The stylus, by touching the appropriate icon, reveals and hides the keyboard on the lower third of the display. When the keyboard is revealed, touching the desired characters on the keyboard will input the required data. However, when a large amount of information needs to be entered, the file usually is created on a desktop or laptop computer and then copied to the handheld using a standard synchronization protocol. A folding, full-size keyboard is an available option if there is a necessity to input large amounts of data directly into the pocket PC. Just plug the keyboard into the PC and type.

Other methods of inputting data are using the handwriting recognition software and the voice recorder. With the handwriting recognition software, users write on the display with the stylus, and their handwriting
appears on the screen. The software transcribes the handwritten text to typewritten text that can be used in other documents. Also, a voice recorder can be activated with the touch of a button. A built-in microphone receives the verbal information, and the pocket PC automatically saves the recording in a file that can be listened to at any time.

Additional features to consider before deciding what handheld to buy include the speed of the device’s processor, the size of the memory, the type of rechargeable battery, the software that is included, and price. These are the same variables that educators evaluate when buying a laptop computer.

In most current pocket PCs, the speed of the processor will be suitable for educators’ requirements. Look for a processor with a minimum speed of at least 300 MHz.

The limitation of current handheld computers is in the memory. Often, the computer has only 64 MB of Random Access Memory (RAM) and 32 MB of flash Read Only Memory (ROM), with an option to pay extra for a flash card with addition RAM. The amount of standard memory should increase as the technology improves, as has occurred with desktop and laptop computers.

The system also should include a Lithium Polymer rechargeable battery, a docking cradle for recharging, and an AC adapter.

Make certain that the pocket PC includes the software that will be needed to accomplish required tasks. Software packages also are available for a nominal charge
or for free from such websites as the ones listed in the Resources section.

**Functions**

The operations of the pocket PC described in this section will illustrate why the device is also called a personal digital assistant (PDA). These applications enable people to be better organized and more efficient because the needed information is located in one pocket-sized device, not at various locations. In fact, an earlier electronic tool, called a pocket organizer, included many functions found in today's pocket personal computers.

An example is the pocket PC's calendar application. A person can record appointments, classes, meetings, and other scheduled events. The calendar can display the schedule in day, week, or month format and can provide an easily accessible record of events for improving individual time management. There is even a reminder feature that informs the user that a meeting is scheduled in a specific, preset number of minutes. In order to limit data entry time, the calendar also has a feature for entering meeting times that occur on a regular basis. Once entered, the program automatically records the regularly scheduled meeting, based on any set pattern, such as weekly or monthly.

Complementing the calendar is the "task function." The task function enables the user to schedule tasks on the calendar based on due date, rank of importance, category, and other set classifications. In addition to placing the task on the calendar, the task function stores
information in a separate file for each task. This file also has a link to a "notes" program that is used for entering information. The notes program is a simple word processor that enables the user to enter short memos. As previously stated, the information for the memos may be entered using the software keyboard, an optional external keyboard, a stylus, or by using the voice recorder. The pocket PC, by linking the calendar, task function, and notes program, provides a powerful tool for enhancing time management.

Another useful personal digital assistant feature is the "Contacts" program. This program is a database about individuals. The program has many preset categories, such as name, address, telephone number, and e-mail address. When storing the data, each individual's listing can be placed in folders, thus making it easy to access the stored information.

Applications

The software installed on most pocket PCs will be familiar to most users. Two common applications are word-processing and spreadsheet programs. The word processor has many of the same features found in desktop and laptop word-processing programs, but there are limitations. The size of the screen and keyboard makes entering data a laborious task.

Most pocket PC word-processing programs have "automatic word complete." When this feature is activated, the computer will display a box with suggested words after the first three or four letters of the desired
word are typed. If the needed word is displayed, the writer highlights the desired word and the computer automatically completes the typing. If the necessary word is not displayed, the writer just continues typing. Some people dislike this feature and describe it as a huge annoyance or worse, but those people can easily deactivate the feature. However, even with the word-complete feature, typing any manuscript longer than a few paragraphs is not recommended.

If the user must use a pocket PC to write documents, a compatible, full-sized, folding keyboard is a must. However, typing the document on a desktop or laptop computer is much easier. Because of limited memory, word processors for pocket PCs do not have all the features found in larger personal computers, such as a spell checker or thesaurus. These tools often are used when typing documents, but they usually are not available on the handheld versions. That might change as pocket PCs become more powerful with additional memory.

Similar limitations occur with the spreadsheets included with pocket PCs. Like the word processor, the spreadsheet includes the basic features found in the versions for desktop and laptop computers. However, the add-on tools and many of the functions are missing. In fact, the limitations on the spreadsheet are probably more severe than the incompleteness of the word processor. When pages, calculations, and graphs are calculated using the full version of a spreadsheet, the information files can be copied to the pocket PC for viewing. But when a number is edited on the pocket PC spreadsheet, the corresponding calculations do not
change if the required function is not part of the pocket computer version. Supplementary programs can be found on the Web that will help people who need to edit spreadsheets on their pocket PCs.

Two of the more useful applications found on handheld computers are the web browser and the e-mail program. The web browser enables the user to view World Wide Web pages on the pocket PC. There are two ways in which to do this. The first is simply to download a web page from an Internet-connected computer to the handheld, where it can be viewed at any time. An even more powerful use of the browser is available when there is wireless access to the Internet and the pocket PC has the required hardware and software.

In increasing numbers, libraries, schools, and office buildings have installed computer-based servers and antennae that enable computers with wireless-based technologies to access Internet applications. Pocket PC owners can buy wireless data hardware and software that enable the device to connect to the Internet when in a wireless environment. The hardware for receiving the data signal resembles a hard plastic case. When the user slips the pocket PC into the data receiver, the handheld computer’s size slightly increases and access to the Internet is established. Some of the newer pocket PCs have built-in wireless capability, and additional hardware and software is not required. It should be noted that a handheld computer’s web browser, like the word processor and spreadsheet, has limited function compared to its counterpart on full-function computers.
The uses of the e-mail program are similar to those of the web browser. E-mail programs for the pocket PC enable users to view and categorize their messages. Just connect the handheld to an Internet-connected computer, transfer the e-mail, and manage as desired. The user may write replies and store them in a folder for sending later. As with the browser, the power of the e-mail program is experienced fully only in a wireless web environment. E-mails can then be received or sent by the handheld, instead of transferring the reply to an Internet-connected computer. The user should recognize that, even in a wireless web environment, e-mail programs on pocket PCs have limited function.

One of the more popular programs for making presentations is PowerPoint. Included with most pocket PCs is a software program for viewing presentations developed with the PowerPoint software applications. The user can view, edit, and play PowerPoint slides. One capability that is useful for classroom presentations is that teachers can connect their pocket PC directly to a computer projection system with an optional cable. This enables them to move freely, within the limits of the cable, without having to return to a laptop or desktop computer to make program changes.

A feature found on most handheld computers that is not on desktops and laptops is an infrared port. The infrared port is for short distance wireless communication between compatible computers. When two computers have compatible infrared ports, they can share applications, files, e-mails, and any other stored data. Unfortunately, the current technology on pocket PCs
requires that the infrared ports be aligned and only a few inches from each other. This limitation should abate as more powerful technology is developed.
Applications for Faculty and Staff

The limitations of pocket PCs may lead many teachers to assume that they have little use in the school. However, educators have found them useful for various tasks. This section and the following one will explore how pocket PCs have been used in the education environment. This section will explore applications for faculty and staff, followed by a section describing student use.

Time Management

Time is probably the most important commodity for any educator. How often have exasperated teachers complained that with all the administrative stuff that is required, there is not enough time to teach? Administrators also complain about the added requirements and the inability to complete tasks in a timely manner.

Personal digital assistants cannot create more time, but they can help educators manage it better. For example, the calendar and task applications enable educators to schedule meetings and responsibilities more efficiently. Using the calendar, teachers and administrators can enter a schedule and view their timetable in
daily, weekly, or monthly formats. Even alarms can be programmed to act as reminders at different times. The format provides an easily understood agenda, and nearly all personal digital assistants have a variety of options for giving reminders in advance of a meeting. Having this information in one device that is always in a pocket or purse, instead of scattered on sticky notes in several locations, helps prevent overscheduling and missed appointments.

Educators who use the calendar feature discover that their pocket PCs help them manage personal time. Teaching is a calling, but it should not encompass one's total life. In addition to employment-based meetings, the educator should enter personal engagements into the calendar. This helps provide balance and separation between the personal and the professional, because the demands and obligations of both are listed in one place. The teacher can easily assess the time required in the various categories of his or her life and can make needed adjustments.

The calendar also provides information to refute any false allegations regarding the use of time. The calendar remains in memory until deleted by the user. If questions arise about how time is being managed, data from previous weeks or months is available.

In addition to scheduling meetings, teachers and administrators have task deadlines to schedule. The task application enables educators to enter due dates for assignments, projects, and other responsibilities into their calendar. The tasks can be categorized by level of priority, due date, and other classifications.
One technique educators often use when entering tasks into the handheld is to divide one large project into small modules. Each module is entered into the task application with a corresponding due date. For example, if a teacher is making a presentation at a professional conference, entering the task as "conference talk" with the conference date is probably not the most efficient use of the task application. The instructor should enter, with appropriate dates, the components of the presentation, such as "research topic," "prepare outline," "prepare PowerPoint presentation," "duplicate handouts," etc. Using this method, the deadline does not suddenly surprise the educator, and the work is completed in a timely and often less stressful manner. The task feature, like the calendar application, should be used to schedule not only professional but also personal responsibilities.

Two other features that help educators manage their time are the notes and contacts programs. Notes allow the user to record information presented at conferences, meetings, or other functions. The data can be handwritten into the notes application using a stylus or typed using the software keyboard. The notes then can be copied into a word processor, spreadsheet, or database application. This feature eliminates the need to type previously written information. For example, if an educator is taking minutes at a meeting, he or she can write them directly into the pocket PC and later convert them to type, copy them to a word-processing program for editing, and then print. This saves a great deal of time over the usual method of writing the minutes on paper
and then transcribing them into a word processor. In addition, the voice recorder can be used when the person taking minutes tires of writing notes or when a verbatim record is required.

One very useful function that is not used often enough by educators is the database of contacts. With the PDA, such information as a parent’s phone number or e-mail address is only a few touches of the stylus and a few seconds away. While it may take several hours to first construct the database, the time saved exceeds the time spent entering data. And if the school already has contact information for staff, faculty, and students in digital form, the data can be downloaded quickly.

**Administrative Applications**

Applications installed on pocket PCs illustrate how handheld technology can increase personal productivity by having needed information readily available. For example, teachers often use a spreadsheet as their grade book. They enter each student’s name, label a column for each graded assignment, and enter a formula to compute the final grade. By having a copy of the grade book on the pocket PC, the information is always within easy access when needed. If a student, parent, or other legitimate entity inquires about a grade, the information is available.

Another possible spreadsheet application is the budget. One of the more often heard complaints of school administrators concerns real-time information about how much money remains in the budget. By
entering the budget in spreadsheet form on the pocket PC, the administrator has easy access to the data. Enter the initial budget by line item or category, enter the purchase, and program the spreadsheet to deduct the amount spent from the corresponding category. The budget file will provide the user with the current balance.

The exceptional portability of pocket PCs illustrates how the word processor can increase administrative efficiency by allowing the user to edit at almost any location. Although using the handheld word processor to type lengthy documents is not recommended, educators can edit their documents using the stylus and software keyboard. For example, a laptop computer is not convenient when standing in line or even sitting in a crowded room or auditorium. The files created on a pocket PC can be downloaded to a laptop or desktop computer later.

The other major administrative function involves communicating and sharing files using the pocket PC. The primary method that enters people's minds for communicating and sharing files using a personal computer is the e-mail program. This is also true using the pocket PC. If the education location is a wireless environment, it is as easy to use the pocket PC to send e-mails with required attachments as it is to use a desktop or laptop computer.

One e-mail application in a wireless environment that is becoming increasingly widespread is that, during a presentation, the audience can e-mail questions to the speaker. The speaker can read and answer the questions
at the appropriate time. Audience members also can request such information as a copy of a PowerPoint presentation or an outline of the talk, and the speaker will e-mail the information to the participants while the conference is still in session. In addition to sharing files via e-mail, users can use the pocket PC's infrared data port to exchange information.

Classroom Applications

Since the 1990s, many colleges, universities, and even some secondary schools have required students to have laptop computers. The introduction of the pocket PC enables teachers to take advantage of the same computer-based applications using a device that has increased portability and is less expensive. However, the disadvantages of the handheld computer must be acknowledged and addressed.

An example is an instructor who develops worksheets for class lessons. The teacher types the worksheet on a full-function desktop computer and then saves the file on a handheld computer. At the beginning of class, the teacher uses the pocket PC's infrared port to transmit the file to each of the students. One quick method of transferring files is to have each student transfer the file to other students. In only a few minutes, every student in a class has the file. Teachers who do not want to spend class time transmitting files can have the students download the file from an e-mail or web page to their pocket PC before class. Students who are not prepared at class time can still receive the worksheet during class
from the instructor or from other students. The teacher presents the lesson and the students complete the worksheet as the needed information is presented. The students not only are hearing the information, but they also are completing a task that helps them remember the necessary knowledge. If the instructor desires, the students can e-mail a copy of the completed worksheet back to the teacher.

Other types of files that can be transmitted to the handheld as part of a lesson are PowerPoint presentations and web pages. When students are provided part of a lesson in an outline or PowerPoint presentation, they can easily review the information at any time and also can edit the file provided by the teacher based on their preferences. Teachers also frequently use the Internet to complement and update the textbook and also to provide a starting place for student exploration. With the handheld computer, students are able to view these web pages whenever and wherever they choose. They also can copy the data to a laptop or desktop for use in other applications.

Some have questioned the effectiveness of providing the information in digital form. Why not just give the students a paper copy of the same information? First, using the digital format does save paper. More consequential is that digital files are more easily used than are hard copies. Information on paper often withers, while the same information in digital form can acquire a renewed life. By having the ability to edit, students experience more ownership of the curriculum and are more likely to study and evaluate the information and
share it with others. And when the page is stored on a pocket PC, it is always available.

Classrooms that have wireless web access increase the pocket PC’s functionality and enable teachers to comfortably integrate the efficacy of the Internet into a classroom lesson. When an area has wireless access to the Internet, teachers can create a list of web pages that will strengthen the lesson and post them on a personal web page. These posts are saved as links so that students are able to download the appropriate web page by accessing the teacher’s site and clicking the appropriate link. The students are soon able to view the requested site on their pocket PC.

Currently, the most powerful feature of the Internet for classroom use is the interactive web page. Textbooks are static and present an unchanging snapshot of information. Web pages, however, can be programmed to be interactive. For example, suppose a statistics teacher wishes to demonstrate how the distribution of a binomial experiment changes based on sample size and the probability of a success on each trial. The text might have several pictures to illustrate the result, or the instructor can demonstrate what will occur on the chalkboard or by using overheads. In a wireless web environment, the teacher can link students to an interactive web page that illustrates the binomial distribution. The student can change the sample size or the probability of a success, and the web page will immediately alter the distribution based on the new information. Interactive websites include a variety of topics and disciplines and can be located by executing a web search or by consulting this fastback’s Resources section.
Another classroom use of the Internet in a wireless environment is the ability of students to communicate instantly with the instructor or each other. Obviously, this can have both positive and negative implications. The positive results occur when the discussion is about the topic. Students can e-mail questions to the instructor or work together on the same digital worksheet. However, students also can send communications that are not relevant to the class. Instead of passing notes under the table, the 21st century student sends messages electronically using the Internet. Other problems that have occurred in the classroom include playing games, viewing inappropriate material, and listening to online radio broadcasts. Teachers should set clear guidelines for using pocket PCs, and many schools require students to sign statements agreeing to follow established rules or risk loss of computer privileges.

What is significant for teachers to keep in mind is that technology should not be used for its own sake, but only when it helps broaden and develop the curriculum. The teacher, not the technology, should be in control.

Research

Research has long been an important function of the Internet. In fact, the genesis of the Internet was the high-level, research-based network, ARPANET, the Advanced Research Projects Administration Network. The question is not whether the Internet is a useful research tool, but whether personal digital assistants have a legitimate research function.
Because of the limitations of screen size and download speed, most Internet-based research will be accomplished on desktop and laptop computers that are connected to high-speed data lines. However, it sometimes is helpful to be able to do research at an unexpected moment. For example, a teacher or administrator is at a conference, and a speaker makes a claim. If the location is a wireless web environment, the educator can use the handheld computer to connect to the Internet and verify or disprove the claim. Once the research is completed, questions and comments have added weight because they are supported by data. Knowing the audience has research capability also causes speakers to be better prepared.

This also can be useful at meetings or in the classroom. At too many meetings in an education setting, decisions are based on emotion or politics and not on sound research and pedagogy. Meetings in a wireless web environment enable attendees to access needed information on websites or online libraries. They also can obtain data by sending and receiving e-mails from knowledgeable colleagues. This can lead to more sound decisions.

Classroom discussions also are meetings, and often students make inaccurate statements that they believe to be true. The personal PC in a wireless web classroom enables the class to research the statement and separate the valid from the erroneous. Thus the students take more control of their education, and they are learning research skills that will benefit them beyond their school years.
There also are applications on personal PCs that can be used for research and do not require web access. For many researchers, the software program of choice to calculate descriptive statistics and perform statistical tests is the spreadsheet. The user labels the columns and enters the data, and the spreadsheet completes the requested calculations. Although the research is most often accomplished using a desktop or laptop computer, the handheld computer is useful for entering spreadsheet data when performing field research. For example, an education researcher is in a classroom recording the number of times teachers exhibit certain types of behavior during a class period. The researcher, instead of making notes on paper, can record the data directly into the spreadsheet. This often helps with the organization of data; and after the data are entered, the spreadsheet on the pocket PC can perform some simple analyses. The data are easily available for use on the pocket PC or for download to another computer.
Applications for Students

The applications in this section are similar to those found in the previous section. However, they are described from a student perspective. Also, there is an emphasis on how the technology can be used to develop skills that will help the student beyond the classroom and after graduation. Whether it is called preparing students for lifelong learning or developing skills and knowledge for every area of life, pocket PC applications, from time management to research and communication, will help develop needed skills.

Time Management

As any teacher of college freshmen recognizes, students must learn methods on how to set priorities and better manage their time. Many college orientation classes offer instruction in time management, but often without the anticipated positive results. Too many college students who have the ability to be successful do not succeed because they skip classes, neglect assignments, and disregard their scholarly responsibilities. Although the time-management functions of the pocket
PC will not change their attitudes or solve their time-management issues, the handheld computer can be a valid teaching tool to help students acquire the needed time-management skills.

One technique is for teachers to divide assigned projects into segments and have a separate due date for each segment. The student enters each segment as a task into the pocket PC’s calendar program. Teachers should suggest that the task be placed in the “high priority” category. After the students enter the information into the pocket PC, have them submit the task calendar for review. For example, suppose an instructor asks students to develop a web page about an African-American writer. Tasks, along with corresponding due dates, could include the following: choosing the author, researching information, outlining the information for the page, developing the page, testing the page on the Internet, and presenting the finished product. Students enter the information into the handheld computer and transmit the file to the teacher. As each stage of the project is finished, the information is submitted for review.

To build on this work, the next long-term assignment may have only a final due date assigned by the instructor. The students would create their own schedule and set dates for when they will accomplish their tasks. As before, the student will enter the tasks, with corresponding due dates, into the pocket PC and transmit the data to the instructor for evaluation.

Use of the personal digital assistant should not be limited to educational tasks. Personal tasks also should be entered. How else will the student be able to under-
stand the distinction among obligations with high, medium, and low priority? Teachers should advocate that students enter tasks and dates from all areas of their life, with an emphasis on how to rank obligations. For example, is a Thursday evening pizza party more important than studying for a unit test on Friday? The student and educator might present different answers; however, the teacher could furnish guidance for assigning priority by using the concept of actions and consequences. For example, if the student was prepared for the Friday test, the pizza party might deserve a higher priority. The studying is complete and an evening of enjoyment might actually be beneficial and relieve any test anxiety. Conversely, a student who has not studied should place a higher priority on preparing for the test. Consequences of poor grades include limited options regarding acceptance to colleges and universities, scholarships, and employment.

The address book or contact application is popular with students. Most students are very social and enjoy maintaining a digital address book. The ability to easily exchange contact information is another plus. Included in the pocket PC address book is also the ability to write notes and opinions about the individual and to place each person in user-named categories. Educators might not want to know what students record about them. However, educators do have an opportunity to have students use the address book for instructional purposes. For example, in a political science class, the instructor asked students to create an address book of all elected officials that had jurisdiction over their area. This in-
cluded the president, the two state senators, the mem-
ber of Congress, the state’s governor, and all locally
elected officials. After the assignment, students had the
contact information for communicating their political
opinions to an elected official. In fact, the students used
their pocket PC in a wireless environment to send their
opinions by e-mail.

Classroom Applications

It was previously suggested that teachers could
strengthen the curriculum by providing lesson-related
web pages to the students’ pocket PCs. Instead of the
teachers finding the information, they can announce the
topic in advance and have the students find appropri-
ate web pages to download to their handheld computer.
This exercise helps the students prepare for the lesson
and also provides them with information they can use
to evaluate what is taught. Students should not accept
what is presented as fact just because it is stated in a
book, on television, on the Internet, or by the educator.
They should look for consistency and question discrep-
ancy. If the information the teacher presents is not con-
sistent with other facts, students should be required to
examine the discrepancy further. This exercise should
enhance classroom discussion and should help students
develop critical thinking skills. The instructor could
have the students transmit their best websites about the
lesson to other students.

Students should be encouraged to prepare in advance
for events outside the classroom. If they are going to
attend a speech, ascertain in advance the topic and who is speaking. The students could then load digital information about the topic and speaker into their pocket PC so that they are ready to challenge any inconsistencies in the presentation and to ask meaningful questions.

When the meeting or classroom environment has wireless web capability, the handheld computer demonstrates even greater power. For example, regardless of the level of a student’s preparation, some of the information the student presents might seem questionable and also might not be addressed in the information the student downloaded to augment the presentation. A wireless web setting enables listeners to immediately execute an Internet inquiry regarding the questionable information and to ask questions. Emphasize that information found on the Internet may be inaccurate and that it is always imprudent to rely on only one source.

Applications not related to the Internet also can benefit students. For example, when students present a talk, they usually have note cards or full-sized sheets of paper to help them remember their points. Handheld computers eliminate the need for hard-copy notes and their associated problems, such as placing them in the wrong order or losing them entirely. Students can have their notes in digital format on their pocket PC and refer to them during the talk. All the annotations are in the same file and in order. The student only has to open the file before the talk and access the needed material by touching the handheld computer’s screen. There are not any papers to drop, and the information is in proper order. As an added bonus, the speaker is able to trans-
mit his or her notes to other interested students. However, students should be certain that their handheld computer is fully charged and that they have a printed hard copy of their notes in case the device malfunctions.

The word processor is another application that can help increase learning. During the 1990s, schools began to place great emphasis on writing across the curriculum. In most school environments, assigned papers are submitted in hard copy. The instructor makes corrections and suggestions, assigns a grade, and returns the paper to the student. Sometimes students edit the assignment and resubmit. Using the power of the word processor and a pocket PC, evaluating and editing manuscripts before submission can become an integral part of the assignment. One process is to have a student exchange his or her manuscript with another student. Each student edits the other's manuscript before submission to the instructor. Another method would have students edit their own manuscript at least twice and submit the manuscript with the original wording and the editing. This can be done easily in word-processing programs with a “track changes” feature, such as Microsoft Word, in which changes are highlighted on the screen and on the printed document. The instructor can easily note the progression of the document from rough draft to finished product. Although most of this editing would be accomplished using a desktop or laptop, the handheld computer is a convenient device for editing at any location. Track changes also can be useful when students share files for editing. The highlighted changes can be evaluated when the original author receives the
suggested revisions, and each change can be electronically accepted or rejected.

A final suggested classroom application is using electronic books or e-books in the classroom. E-books are books that are printed in a digital format such as American Standard Code for Information Exchange (ASCII text) or HyperText Markup Language (HTML). When the e-books are in HTML format, they can include audio, video, and hyperlinks, as are found on web pages. Most e-books can be read on pocket PCs that include the required software.

Depending on the pocket PC’s available memory, more than 20 e-books can be stored on a handheld computer. Education institutions are using e-books to present students with the most current textbook. If an update is needed, corrections can be made as easily as changes are made on a word processor. There is not the need to publish a new edition. Also, if the school uses e-books as textbooks, the student can carry all the textbooks for his or her classes without the massive loads that many students are required to haul through crowded school halls. Even the small screen does not have to be a limitation. Students can change the font size, and the book becomes a large-print edition. In addition, some electronic book-reading software enables the student to search, designate, and annotate the manuscript.

Research

The pocket PC is not the optimal device for students to conduct research on the Internet. The small screen
and the slow access speed limit its usefulness. When Internet-based inquiry is required, students should use a computer with a high-speed data line.

The handheld computer does provide an advantage when the student is in a wireless environment and requires a small amount of information or when the information must be available immediately. Suppose a student, about to present a speech regarding Supreme Court cases about the church-state relationship, realizes that she forgot to review decisions rendered within the past two weeks. In a wireless environment, the student can check web pages on Supreme Court decisions and download the most recent information for the talk.

Another research method combines the power of the Internet, e-books, and the personal digital assistant. Online libraries always have been considered a valuable reference tool. When facts change, the digital material is updated easily. However, there are times when the student may not have access to the Internet. Instead of always depending on Internet access, the student could download reference e-books into the pocket PC for use any place, any time. Suggested reference works include an atlas, encyclopedia, dictionary, almanac, and other specialized reference works that the student might find valuable. If an update is required, the student can download a more current reference work.

A powerful addition to student research is the spreadsheet program. The traditional method for handling data in such lab courses as chemistry and physics is to write the information on paper and then enter the figures into a calculator or computer to perform the analy-
sis. The pocket PC's spreadsheet application eliminates the need to record the data twice. Before the experiment, have each student label the columns with the variables being measured. The rows of the spreadsheet will correspond to the trial number. As the experiment is performed, the resulting data is entered into the appropriate cell. The pocket PC spreadsheet can calculate the required statistics and save the results to a file. The statistics file can be printed or transferred to the instructor.

Communication

With all that is available on the Internet, the function that is used most often is still e-mail. People are social beings who enjoy communicating. Thus it is understandable that so many of the Internet-based curriculum guides use e-mail as part of the lesson plan.

A well-known example is a project to publish a bilingual periodical. In that project, three Spanish classes in three schools in the United States networked with the English classes at three schools in Mexico. The students wrote, edited, and e-mailed the articles in their first and second languages and published the newspaper together. However, the available technology at that time left a significant deficiency. That limitation was that e-mails had to be sent to the one computer available in each classroom. The teacher had to retrieve the information, print a hard copy, and distribute the files to the students. Many students had no direct access to the project e-mail.
Pocket PCs in a wireless environment change the role of the instructor by providing a setting where each student has immediate access to the e-mails. Students can each receive a copy of the information electronically and, if all the classes have a wireless environment, instant messaging can take place. Students can be divided into specific e-mail groups so that everyone in the designated group receives the appropriate e-mail, and students can mail each other individually. This means that every student is connected to the technology and is electronically a part of the project.

Finally, this type of project illustrates the importance of the pocket PC's infrared port and short-distance wireless communication. When the people working together are located at various places, transferring files requires the e-mail application and an Internet connection. However, if the project is in one classroom, the students can transmit the files directly without having to attach them to e-mails.
Future Applications

It is dangerous to attempt to predict trends in technology. Remember in 1990 when everyone was so excited about Gopher, the menu-based Internet communication system? Within just a few years, the World Wide Web replaced Gopher. However, educators need to evaluate trends in order to make valid decisions. Thus, instead of trying to predict the future, this section provides information about products that currently are being developed for the pocket PC.

The Palm-Sized PC

The major limitation of the pocket PC is not the size of the screen or software keyboard, but the insufficient functionality of its applications. In fact, many of the software programs are called pocket versions of the full-function programs found on desktop and laptop computers. For example, the software packages Pocket Word and Pocket Excel for the Windows CE operating system have limited capabilities compared with their full-feature counterparts. The pocket computers just do not have the memory or storage capabilities to run the comprehensive versions of the applications.
Changes in technology are eliminating the current restrictions, and pocket PCs soon will be full-fledged personal computers. A device currently under development will be about the same size and weight as current handheld computers but will have 256 megabytes of random access memory, a 10-gigabyte hard drive, a universal series bus, and wireless networking. This computer can have a full web browser, word processor, spreadsheet, and any other application found on full-sized computers. In fact, the plan is to have available two docking stations for this computer. One will enable the device to function like a desktop with an attached monitor, and the other docking station looks like a notebook with a 14-inch screen. Instead of having to transfer files from the pocket PC to another computer, this pocket PC will slide into a docking station and become the desktop or laptop.

**Wireless Web**

A wireless web environment greatly enhances the advantages of a pocket PC. However, wireless platforms are slow, difficult to use, and often unavailable. This is changing. The top wireless carriers in the United States are unveiling high-speed networks that increase data transmission up to 1,500%. Currently, personal digital assistants are combined with cell phones, enabling wireless web access anywhere there is cell phone access. The building or the school does not have to install a wireless local area network. With cell phone service, the wireless web is already in place.
Web designers are beginning to develop web pages and content specifically for wireless platforms. Companies such as Sun Microsystems are developing a mobile version of its Java platform that will enable students to use interactive websites on their handheld computers. Although the initial implementation of these new wireless platforms will have problems, the services should improve and eventually be comparable to land-based networks. Expectations from analysts are that after one or two years of advances, hardware and software will enable wireless platforms to have the speed and reliability required for education and business applications.

Additional Applications

Another perceived limitation of pocket PCs is the slow speed of wireless communication using the infrared port and the short distance that is required for transmitting files. Newer handheld computers will include faster infrared ports. This will be especially helpful as the devices become full-function computers and the size of the files and applications increases. Even though it suffices in most instances, the current prevailing infrared speed of 115 kilobytes per second will become much faster.

Of greater concern is the closeness required for sharing files. Often the pocket PC infrared ports can be only inches apart. As of this writing, infrared ports are being developed that can transmit information almost 50 feet. This will enable instructors to transfer files to students
anywhere in a standard classroom. It also will make it possible for students to send messages to their peers in the class.

An additional feature that will increase educator and student productivity is more accurate handwriting and voice recognition programs. Being able to use the pocket PC stylus and the touch screen to write correspondence and convert the handwritten to the typewritten is an invaluable feature. Problems currently occur in the conversion process because the recognition program misreads 10% to 20% of the letters. Of course, these mistakes are easily corrected by editing; however, the task can be very time-consuming and frustrating. Software programmers and hardware designers are working to develop more reliable handwriting recognition programs.

Accurate voice recognition would be useful. Most people are familiar with the cellular phone feature in which the caller speaks a person’s name and the phone automatically dials the number. Voice recognition can develop beyond simple commands to inputting large data files. Instead of typing information, the user would talk into the pocket PC’s microphone and the voice recognition program would enter the words being spoken into a word processor or notes application. Programs of this type currently are available and are used by people with a physical limitation. Since, as every teacher knows, students enjoy talking, this feature would be one that students would enjoy.
Conclusion

Technology should be incorporated in the classroom only if it enhances learning. Pocket PCs have been well accepted in the business community because they increase productivity. Pocket PCs also are used in some education settings. The question that educators need to answer is whether the pocket PC will improve learning in their classrooms.

There are two significant variables that should be emphasized. First, educators should verify that the pocket PC hardware and software is able to do what they want it to do. For example, a statistics class wanted to use the spreadsheet program to perform certain statistical tests. Although the desktop version of the spreadsheet could do what was required, the version for the pocket PC could not.

The other variable is the cost to the school and to the students. Educators must make sound decisions regarding how their budget is spent. Politicians and the general public are increasingly scrutinizing schools. Gone are the days, if they ever existed, when educators were given funds just because they are educating children. Today's educators must have a financial plan that
supports a well-thought-out curriculum. For example, suppose a curriculum plan was generated that incorporates the pocket PC; but that plan required Internet access in a wireless environment, and the money that would be required for creating a wireless platform needed to be spent elsewhere. Could the curriculum plan be implemented using the desktop computers that already are connected to the Internet? If the handheld computer is essential, are there other sources of funds? There are many other questions, but the point should be clear. Educators must survey their local scene, assess their environment, and form their own judgments.
Resources

Websites

Dell Inc.
Manufacturer's site.
http://www.dell.com

Pocket PC
Official Microsoft site. Features FAQs, downloads, tips, reviews, and more.
http://www.pocketpc.com

Compaq iPAQ Pocket PC
Manufacturer's site.
http://www.compaq.com or http://www.hp.com

Handheld and Portable Computer Club
Devoted to helping members get the most from their equipment and to further the exchange of information and ideas.
http://www.hpcc.org

LandWare
Software and hardware products for Palm, WinCE, Newton, and other handheld devices.
http://www.landware.com
Merlot
Multimedia Educational Resource for Learning and Online Teaching.
http://www.merlot.org

Palm Handheld Central
Offers information on Palm-powered handheld computers. Includes news, tips, hardware specifications, software, and more.
http://www.palmhandheldcentral.com

PDA Street.com
Features PDA news, software, reviews, support, message boards, and more.
http://www.pdastreet.com

Pocket PC Magazine
For the users of Windows-powered handheld, palm-size, and auto PCs.
http://www.pocketpcmag.com

Sony Clie Handheld
Official site. Click the “Handhelds/PDAs” link on the home page.
http://www.sonystyle.com

ZDNet: Pocket PC & CE Downloads
Includes games, utilities, communications titles, and more. Click the download button from the home page.
http://www.zdnet.com

Articles


Recent Books Published by the Phi Delta Kappa Educational Foundation

Improving Classroom Questions, 2nd Edition
Kenneth R. Chuska
Trade paperback. $14.95 (PDK members, $11.95)

Virtual Schooling
Donovan R. Walling, ed.
Trade paperback. $19.95 (PDK members, $14.95)

Democracy and Intolerance: Christian School Curricula, School Choice, and Public Policy
Frances R.A. Paterson
Trade paperback. $19.95 (PDK members, $14.95)

Gifted Education: Promising Practices
Joan Franklin Smutny
Trade paperback. $17.95 (PDK members, $13.95)

Psychology of Success
Emery Stoops
Trade paperback. $14.95 (PDK members, $11.95)

Tutor Quest
Edward E. Gordon
Trade paperback. $10.95 (PDK members, $8.95)

Use Order Form on Next Page or Phone 1-800-766-1156

A processing charge is added to all orders.
Prices are subject to change without notice.
Complete online catalog at http://www.pdkintl.org
# Order Form

**SHIP TO:**

**STREET**

**CITY/STATE OR PROVINCE/ZIP OR POSTAL CODE**

**DAYTIME PHONE NUMBER**

**PDK MEMBER ID NUMBER**

<table>
<thead>
<tr>
<th>QUANTITY</th>
<th>TITLE</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Subtotal**

**Processing Charge**

- **Total Merchandise**
  - Up to $50: $5
  - $50.01 to $100: $10
  - More than $100: $10 plus 5% of total

**Indiana residents add 6% Sales Tax**

**Special shipping available upon request. Prices subject to change without notice.**

- Payment Enclosed (check payable to Phi Delta Kappa International)
  - **Bill my**
  - □ VISA  □ MasterCard  □ American Express  □ Discover

<table>
<thead>
<tr>
<th>ACCT #</th>
<th>DATE</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>EXP DATE</th>
<th>SIGNATURE</th>
</tr>
</thead>
</table>

Mail or fax your order to: Phi Delta Kappa International, P.O. Box 789, Bloomington, IN 47402-0789, USA

Fax: (812) 339-5556. Phone: (812) 339-1156

For fastest service, phone 1-800-766-1156 and use your credit card.
Phi Delta Kappa Fastbacks

This series, published each fall and spring, offers short treatments of a variety of topics in education. Each fastback is intended to be a focused, authoritative work on a subject of current interest to educators and other readers. Since the inception of the series in 1972, the fastbacks have proven valuable for individual and group professional development in schools and districts and as readings in undergraduate and graduate teacher preparation classes. More than 500 titles in the series have been published, and more than eight million copies have been disseminated worldwide.

For a current list of available fastbacks and other publications, please contact:

Phi Delta Kappa International
P.O. Box 789
Bloomington, IN 47402-0789 U.S.A.
1-800-766-1156
(812) 339-1156
http://www.pdkintl.org
The Phi Delta Kappa Educational Foundation is focused on the future. Contributions to the Educational Foundation support scholarships, educational publications, and professional development programs — resources needed to promote excellence in education at all levels.

The Educational Foundation is pleased to accept contributions of cash, marketable securities, and real estate, as well as deferred gifts. The Educational Foundation is tax exempt under Section 501(c)(3) of the Internal Revenue Code, and contributions are tax deductible. PDK is more than willing to work with your estate planner, attorney, or accountant to find a plan that best meets your needs.

For more information about the Educational Foundation and how to make a contribution, please contact:

Phi Delta Kappa Educational Foundation
P.O. Box 789
Bloomington, IN 47402-0789
USA

Toll-free: 1-800-766-1156
Voice: (812) 339-1156
Fax: (812) 339-0018
E-mail: headquarters@pdkintl.org
http://www.pdkintl.org