Abstract:
The potential for widespread use in education of personal digital assistant (PDA) technology in the immediate future is promising enough that e-learning specialists should begin to investigate how to produce for it and how to take advantage of its delivering capabilities. While its unique characteristics and limitations make it a different production experience, they are not particularly difficult to master.

Introduction
Perhaps it is best to begin by outlining the limitations of this presentation. Even in the written abstract of this presentation, it is pointed out that I will concentrate on applications that are not especially difficult to master. For sure, my coverage of PDA applications will be far from comprehensive. Not only will discussion and examples be restricted to instructional use, they will evolve from my own discipline, which is music. And music instruction usually involves sound as well as text, so multimedia involvement is especially important. These stipulations suggest that many of the fine PDA applications, including those on which PDA popularity is largely based, are not included. It is clear when observing the evolution of Palm Pilot usage, for example, that its original functions were in organizing functional information (the “organizer” as a pseudonym) and making such material readily portable. Certainly, having access to and organizing information are important in education, but the applications that result in producing and using specialized learning objects are really what the present topic is about.

Except for an occasional envious reference, also not covered in this presentation will be the use of advanced and sophisticated software such as the Microsoft eMbedded Visual Tools (Windows CE Platform Software Developer Kits). Neither will you find in this presentation any tips on wireless uses, although we must project the immense value this will be for future elearning delivery. Discussion of direct access to the internet will be similarly limited.
Perhaps the factor which will most limit the scope of this presentation is the wide range of hardware available to us. It seems like yesterday that I bought my Sharp Wizard packed with 256 kb of memory (a tool which I still use). Compare that now to two generations of products hitting the market after I bought my iPaq just six months ago, a good very recent example being the Nexio S160 (128mb/400mhz). In addition, a good amount of standardization is still lacking. Such a situation prohibits us from knowing for sure where the evolution is leading us. A good example of this dilemma is physical size, the spectrum of which is ranging (without a clearly dominating direction) from those units so small that only a nimble hand may use them, through the rapidly evolving market of tablets and 17” laptops that widen the central spectrum of 12-15” laptops, to the wonderful 22”+ flat screens. That size range becomes more complex when facing the decision, in the central part of the spectrum, of whether to choose a pen-based computer or remain “true” to our traditional mouse. Even before tablets have been fully tested for their functional value, manufacturers have a solution for us: the convertible tablet PC.

While I recognize that such choices are a positive product of our times, I am not pleased that manufacturers are capitalizing on this dilemma for great commercial gain. Along with the convertible table PC, two other examples come to mind, and I recognize that many more would be just as demonstrative. Six months after my purchase of a “state of the art” PDA, its attractiveness has been superceded by two generations of finer versions and its price has dropped dramatically. (It is clear to me what a rapid drop in price suggests regarding the original price.) And in preparation for this presentation, in order to solidify my “back-up” plans, I purchased a more powerful battery (expensive), which required a new and different expansion pack for its use (also expensive). Similarly, we should not be misled by self-serving statements designed to sell PDA hardware and software. Such is the case, for example, of the following statement prominently displayed on a software company’s website. “Students ‘beaming’ information between two handheld computers has become a friendly gesture that is as common as a handshake.”

My Particular Needs

I recognize the PDA as a product which, by its very nature, must be portable and, for the most part, must work independently from other devices that I may otherwise expect to have available. So, I accept the limitations of stylus input, a small screen, a capacity that is much less than I expect on larger machines, and a speed that only rivals the speeds of desktops of the very recent past. After all, those are a part of the nature of PDAs (at least, for now).

But I do need a reasonable amount of memory, a speed that will not balk at tightly-compressed sound files, and enough flexibility for add-ons. Those basic needs do exclude most of the older versions, especially of the Palm variety, but manufacturers are presently responding to these common observations at a rapid pace. As far as physical size is concerned, our evolving micro technology has the potential to over-play compactness. But at this point in time, I really feel I need a screen width of at least 240 pixels and am pleased to observe 320+ pixel
width on the newer devices. (Whether I want the bulkiness of a 5” width is still debatable.) Visually and functionally, it makes sense to generate text lines that are more than just two or three words long, produce print large enough for comfortable reading, and offer decent-sized images in multimedia pieces. To set a similar lower limit on speed and memory is risky in a world that provides monthly increases in those basics, but if purchasing in February of 2003 I would not expect less than 300 khz and 64MB, with easy integration of 256MB+ memory cards. (Those lower-limit guidelines will obviously increase almost as rapidly as the evolution that creates them.)

I need easy internet access that is with me wherever I go, and on this need I must say “I am not there yet” on my PDA. Evolving wireless features, together with more “PDA friendly” web sites, should soon take care of this need, but I have presently not found my pocket modem card and the access to the traditionally-formatted e-mail and web pages to be particularly user friendly.

I have found that the built-in software for typical “office” functions (including Acrobat Reader) meets my needs, and at least two versions of sound/video players work well. However, while I see the great potential of daily “docking and syncing” with my desktop to obtain updated PDA-compatible information from the internet, I do not yet find instructional pieces and learning objects that in anyway compare to what is available for normal computer use. This is as expected, since (early in its evolution) neither do I see a significant percentage of the educational community using the devices.

Finally, I don’t presently have an “absolute need” for the wirelessness (in its present state) that is a part of the technological revolution of 2002, but I am beginning to recognize its potential—a potential that seems far more than easy and neat communication between computers in near proximity to each other. I also don’t need multi-purpose PDAs—a GPS navigational system, cell phones, and cameras as well—and they very well may not be on my “wish list” in the future.

My Configuration

So, what is my present configuration? My hardware is a Compaq iPaq Model H3765 Pocket PC, with 64 MB of RAM and a speed of 206 MHz—about the best I could buy less than a year ago ago. I added the fold-up keyboard and the CF card expansion pack, so I am enjoying its micro-storage capacity up to 512 MB on about 1½ square inches, along with CF modem internet access. I know there is now more power out there, but I am relatively comfortable with being a bit behind the cutting edge, realizing that most PDA users are in a similar mode and also realizing that buying twice each year is a bit much for the pocket book. As a user of course, I have Pocket Word, Excel, Internet Explorer, Microsoft Reader, ActiveSync, Windows Media Player, and daily access to AvantGo. My particular PDA also has a voice recorder and handwriting recognition, although I do not build my elearning applications around their functions.

Although I do not have them presently, other expansion packs for the iPaq include one with a pc card, a dual-slot pc card, a Bluetooth/CF card, a wireless
GSM/GPRS data and voice (check all of these again on the box), and the newly released set of Expansion Pack Plus.

My Needs vs. My Configuration

Without being all-inclusive, here is what I don’t have that I know is available or is on the immediate horizon. It's a list now that will continue to grow until, being trimmed for a short time until I decide to take the PDA upgrade “plunge.” We all know there is a point when add-ons to older generation products just are not wise investments.

- a new Palm PDA (I don’t even have an old one, although I still use my Sharp Wizard electronic organizer.) Now, it’s a new “ball game,” and the presently-available Palm software seems to be rather extensive.
- A new wireless Pocket PC, perhaps 400+ MHz, and 64+ MB of RAM as it becomes available
- A built-in function (short of purchasing additional software) for rotating the screen usage to “landscape” (not necessarily a bigger screen) and an easy way to capture all of the screen real estate (I recently paused and then aborted the installation of shareware for those purposes, after reading the warnings that such software could be somewhat risky.)
- a mobile QuickTime player (Come on, Apple, get with it.)
- longer battery life
- better and much more elearning material from AvantGo and other (commercial) sources of specialize PDA information
- a user-friendly internet connection and functionality
- user-friendly instruction (wizards and templates) for learning Microsoft eMbedded Visual Tools and similar advanced-level production tools
- The Nexio S160 ($749 est. but not priced as of this writing), with a 5-inch 800x480 landscape screen, integrated 802.11b networking, 400 mhz processor, 128MB ram, and CF slot, with optional VGA-out adapter and clip-on keyboard. Unfortunately, unless this becomes the standard, programming for it may exclude programs presently functional on more common PDAs.

The Basics of PDA Usage

There is little need to cover PDA basics in much detail, recognizing that the audience for this presentation already has a basic knowledge. In addition, there is considerable variety in the present products, which are rapidly evolving. But, in addition to their need for streamlined software, their small size, and their relatively limited functions, speed, and memory, the major “basic” of PDAs is what I see as their unique strength—their purposeful design to gather new information and store it for portable use.

Recognizing that the pre-0S5 Palms dealt with the basics, those included a date book, address book, to-do list, note pad, and games. Those earlier palms operated at 20-66 mhz, with ram storage in the 8mb range and below, and had resolution of no more than 160x160 pixels. With the release of the Palm OS5, the functionality was expanded dramatically, although the different processor
eliminated an upgrade from the earlier operating systems. For all practical purposes, especially if 3rd party support is considered, the characteristics of the OS65 Palms resemble the Pocket PC, with resolution at 320x320 and beyond, wireless capability, speeds starting at 206 mhz, and extended storage capability. Equally available in Palms are word, excel, PDF, and PowerPoint.

Micro storage cards are important to the basics of PDA functionality. Lack of standardization is a presently negative characteristic. However, they provide very stable service and functionality. These include Compact Flash, MultiMedia, Secure Digital, Sony Memory Stick, and SmartMedia cards.

More About “Wirelessness”

Wireless networking that is presently being enjoyed is nice. But my friend at the University of Hull in the United Kingdom suggested a much more exciting possibility. As the administrator of the IConex Project, he has been working for some time now with learning objects conceived in the Flash/XML context, and my recent visit with him brought me into that “fold.” But he also suggested that I include in my presentation today his goal for PDA usage in his particular library setting, where he manages technological support. “What I want as soon as we are technologically ready,” he said, “is to have an electronic portal installed at the entrance of the library where an individual’s wireless PDA will be filled with updated library information. Of course, we can only provide to the individual’s PDA a fraction of the library information we have available. But if his particular profile of interests, reading habits, and academic pursuits have been previously established on our system and, of course, strictly guided by his own desires and specifications, then his first act within the library will be to take a seat and check his PDA for what has just been downloaded.”

Favorite Traditional Production Tools

For production, which is done on my synchronized desktop, I use Dreamweaver MX, Fireworks for my image editing, RealProducer for audio and video (I personally avoid Windows Media), Flash MX (but always set for output to Flash5), Acrobat, Excel, PowerPoint, and Microsoft Word. In the course of this presentation, I will also introduce more specialized software products that are becoming increasingly important in the elearning environment.

More Software: Specialized Production Tools and e-Learning Objects

It may be noted that much of the specialized software referenced in this presentation are commercially available (sometimes freeware, shareware, demos, and Beta versions) from Handango, Mobileplanet, and Handmark. Some, such as iPresentation and Lectora, are only available directly from their production company.

My selection of specialized production and presentation tools includes Voyager Shadow (supporting the VGA CF card), FlashAssist (which takes Flash to the “next PDA level”), the ClearVue suite of programs--document, image,
presentation, and worksheet, Lectora for the Pocket PC, and IAPresenter. I have also found value in iPresentation, Pocket FlipCard, Lgt Editor, XML Store, Screen Capture, MobiPocket, and Mobile DB. For a variety of reasons—including time limitation, expense, difficulty, and potential value to me personally—I have not given much attention to BHS Data on the Run, CETalk Sender, FlashAssist Pro, eMbedded Visual C++, and Lectora for Palm.

So, I have managed to put together and test a list of various tools and elearning objects from four sources: those that are commercially available; those that may be downloaded, primarily from AvantGo; my own pieces developed with traditional production tools; and original elearning objects using specialized production tools.

These programs reside (presented in order of my preference) on my Compact Flash Card, in main PDA memory, as a download from AvantGo (and therefore also in main memory), or on the internet.

Out of necessity, my demonstrations will cover only a few tools and elearning objects which I use or have access to. Here is the complete list from which I am choosing.

- Commercial Products (sometimes offered as freeware or short-term Demo/Beta versions): Bones, Pocket Tuner, Color Picker, Interview4U, 4.0 Student
- AvantGo—(numbers increase daily, but as of 2/3/03): Education (30), Business (193), Entertainment (307), Technology (176), News (317), and others (447)
- Original pieces using traditional production tools:
  - Benny Goodman (Flash)
  - Jazz Classics (Dreamweaver)
  - Brahms (RealProducer audio)
  - Gregory Davis (RealProducer video).
- Original elearning objects using specialized production tools:
  - PowerPoint of present presentation (ClearVue)
  - PowerPoint of present presentation (iPresentation)
  - Benny Goodman (FlashAssist) (Compare to Flash alone.)
  - Understanding Music (Lectora)

The Selected Demonstrations

- PowerPoint with ClearVue (from Compact Flash card)
- PowerPoint with iPresentation (from Compact Flash card)
- Dreamweaver (original) (from Compact Flash card)
- Flash—alone (original) (from Compact Flash card)
- Flash—with FlashAssist (original) (from Compact Flash card)
- RealProducer—Audio (original) (from Compact Flash card)
- RealProducer—Video (original) (from Compact Flash Card)
Concluding Remarks

In the short time I have been developing learning objects for PDA delivery, I have become increasingly aware that applications in education are mostly limited to a few funded projects, to unrealistic promotional schemes of hardware and software developers, and to experimental efforts by individuals (including myself). In this context, it seems especially important to emphasize that the “surface” has hardly been broken in educational use of PDAs. It also should be noted that the professionals in education need deliberately to move forward in planning and research to shape the evolution of mobile products most useful to us. Such evolution presently is based almost entirely on a combination of commercial value and what is working in the business world. Technology has provided us with just about anything we want—any size, any function, and any where.

So, what is it that we want?