

Tablet PC
– The New New Thing –
Demonstration, and Implications in Deaf Education

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Abstract

The Tablet PC is a fully featured ‘Windows’ laptop, that allows you to write on it using a digital pen. The operating system includes a new notetaking application, Microsoft *Journal*, which makes the Tablet PC work with the “simplicity of using a piece of paper and a pen.” The Tablet PC is available from a variety of hardware vendors, all running Microsoft Windows XP Tablet Edition.

Tablet PCs are of particular note to those with an interest in notetaking for deaf and hard-of-hearing students because of the *Journal* application and a new application – *OneNote* – currently under development at Microsoft. *Journal* and *OneNote* files can include handwriting, text, diagrams, formulas, etc. and support color, meaning that notes can be handwritten or highlighted in color. Photographs and other images can be included in their files.

All Tablet PCs include built-in wireless capability, meaning that notes can be instantly uploaded and shared over the Internet, or can be shared between two laptops being used in tandem by a notetaker and a deaf person sitting near each other in a classroom or meeting.

These features and others will be demonstrated and their implications for deaf education, including the implications for C-Print, will be discussed.

General Characteristics

Tablet PCs, introduced in November 2002, are fully featured laptop computers that run the Microsoft XP Tablet Edition operating system. Because they are laptops, they offer the portability and convenience expected from a laptop system. Because they run the Windows XP operating system they generally run software designed for that operating system. Finally, because they run a well-known operating system, ‘Windows’ users will be immediately comfortable with the new systems.

All Tablet PCs add to this basic functionality with the addition of a stylus – a digital pen – as an input device. Other familiar input devices are available, including a keyboard, mouse, and voice input.

New applications and capabilities are provided with Tablet PC systems. For example, Microsoft provides a new notetaking application named Microsoft *Journal* and a new application for short notes named *Sticky Notes*.

Users write on the Tablet PC display in script with the pen. The script appears on the screen, creating a new type data called 'ink.' Ink can be saved as part of the data created by various applications if those applications have been modified by their vendors, as Microsoft Office has been, to accept ink data.

Hardware Manufacturers

Tablet PCs are available from a variety of hardware vendors, with each providing competing hardware features. For example some provide removable keyboards so that the 'slate' can be used alone with just the stylus for input. Some provide docking stations so that the Tablet PC can be used 'normally' as a desktop machine and the slate portion can be quickly removed to accompany the user to a meeting. Other vendors have designed their systems so that the display pivots on its center to lay flat on top of the keyboard or, when pivoted again, opens like a standard laptop.

As of the writing of this paper, the author is aware of Tablet PCs available from the following hardware vendors.

<u>Vendor</u>	<u>Product</u>	<u>Website</u>
Acer	TravelMate	www.acer.com
Compaq (Hewlett-Packard)	TC 1000	www.compaq.com
Electrovaya	Scribbler	www.electrovaya.com
Fujitsu	Stylistic ST	www.fujitsu.com
Gateway (co-branded Motion)	Tablet PC	www.gateway.com
Motion Computing	Tablet PC	www.motioncomputing.com
NEC	Versa LitePad	www.nec.com
PaceBlade	PaceBook	www.paceblade.com
Panasonic	Toughbook	www.panasonic.com
Toshiba	Protégé	www.toshiba.com
Viewsonic	Tablet PC	www.viewsonic.com

Base prices of Tablet PCs range from roughly \$2,000 to over \$3,000. Optional features and capabilities can increase these prices by up to several thousand dollars.

Sample Hardware Configuration

This section provides a brief overview of the hardware of a sample Tablet PC, the Compaq TC1000, which will be used in presenting this paper.

Compaq TC1000 **Feature**

Explanation

Display (slate)	The slate portion, with its monitor, of this Tablet PC swivels and can be used with the attached keyboard, or the keyboard separates allowing the slate to be used as a standalone computer system.
1 GHz Transmeta Caruso 5800	This is the chip used in the Compaq TC1000. Other current Tablet PCs use an Intel chip; newer Tablet PCs will also use the new Intel Centrino chip.
Wireless	All Tablet PCs provide this feature.
Docking station	The optional docking station allows users to use the Tablet PC in desktop mode. With that station, other devices – such as a larger display, a full-size keyboard, extra USB devices, etc. – can be connected to the docking station and used with the Tablet PC.
Battery	Tablet PCs typically provide 3-4 hours of battery life, with the Compaq model at the high end of this estimate. The Electrovara Scribbler however is advertised at 8-16 hours of battery life per charge.
Hard drive	The Compaq provides either a 30 or 60 GB internal hard drive.
RAM memory	The Compaq provides a base of 256 MB of memory expandable up to 768 MB.
Pen Stylus	The Compaq stylus uses a battery. Other vendors have designed a pen with an eraser capability on the top of the pen.
Keyboard	Some Tablet PCs provide removable keyboards (the Compaq), while on others the keyboard is permanently connected to the slate portion of the computer.
Miscellaneous Input/Output	The Compaq provides a variety of input/output capabilities, including a flash memory card reader, a PC card reader, USB ports, RJ11 port, RJ45 port, and VGA connector.
Voice jacks	The Compaq provides microphone, headset, and headphone jacks.
CD/DVD drive	Different vendors provide different CD/DVD features, for example some provide internal drives, some provide them as standard equipment; they are external and optional on the Compaq.

Tablet PC Shortcomings

There are a variety of shortcomings associated with Tablet PCs, including the following:

<u>Shortcoming</u>	<u>Explanation</u>
Weight	At 3-4 pounds, these PCs are generally lighter than many laptops. Like laptops, these computers are carried from place to place, but unlike laptops which are typically placed on a table for use, Tablet PCs are also intended to be used while being held. Thus weight becomes a significant issue.
Battery life	Typical Tablet PCs operate for 3-4 hours on a full battery charge. Various sleep and hibernation modes are available when the systems are not in use, and turning off features such as wireless

Cost	when not in use increases battery life. However, the battery life may be an issue, depending on the intended Tablet PC application. Cost of course is a relative, subjective issue. However, a typical Tablet PC will be priced considerably higher than a typical laptop. If the Tablet PC becomes increasing popular, this price differential will be minimized.
Alternating between writing and typing	The systems are typically designed for both handwritten and typed input. However, switching between the two modes is awkward.
Converting ink to text	Tablet PCs include the ability to convert ink to text; however, this author finds that capability to be lacking as frequent translation errors need user attention to correct the translated text.
Other	There are a variety of other shortcomings that are vendor specific. For example, CD-DVD drives which are often required to install software, are typically optional features, resulting in higher cost and added weight. <p style="margin-left: 40px;">On some units it is difficult to read the display outdoors. By design some units are “slates” meaning that the unit is designed for basic functionality without a keyboard; for many applications this is a convenient desired design, but not for all applications. Similarly the “convertible” design some vendors provide with a keyboard attached (and perhaps removable) works less well in situations in which the application favors the slate design.</p>

Current Software from Microsoft:

The Microsoft XP Tablet Edition operating system provides several software applications and tools for the Tablet PC operating system. These include:

<u>Software</u>	<u>Explanation</u>
<i>Windows Journal</i>	A basic notetaking application. Additional information about this product appears later in this paper.
<i>Tablet Input Panel (TIP)</i>	This tool provides an on-screen keyboard allowing users to tap input character-by-character when using a Tablet PC without a keyboard. It also provides handwriting and voice input.
<i>Sticky Notes</i>	This tool provides a Post-it Note like capability on the screen, and accepts handwritten or voice input.
<i>Microsoft Windows Journal Viewer</i>	This software allows users of non-Tablet PCs running other Windows operating systems to open and print files created with the <i>Windows Journal</i> . At the time that this paper is being written, this free update is available from windowsupdate.microsoft.com . (This is similar is concept to using an Adobe viewer to read PDF files.)

Microsoft Office XP Pack for Tablet PC This free download extends the handwriting capabilities of the Tablet PC to a separately purchased and installed Windows XP version of Microsoft Office. These extensions allow users to insert handwritten notes into Microsoft Word, to write on PowerPoint slides during presentations, etc. As an example, the graphic just below was created in Microsoft Word with Tablet PC extensions installed.



Software from Other Vendors:

Since Tablet PCs run the Windows XP operating system, the wide variety of software available for that operating system also runs on the Tablet PC.

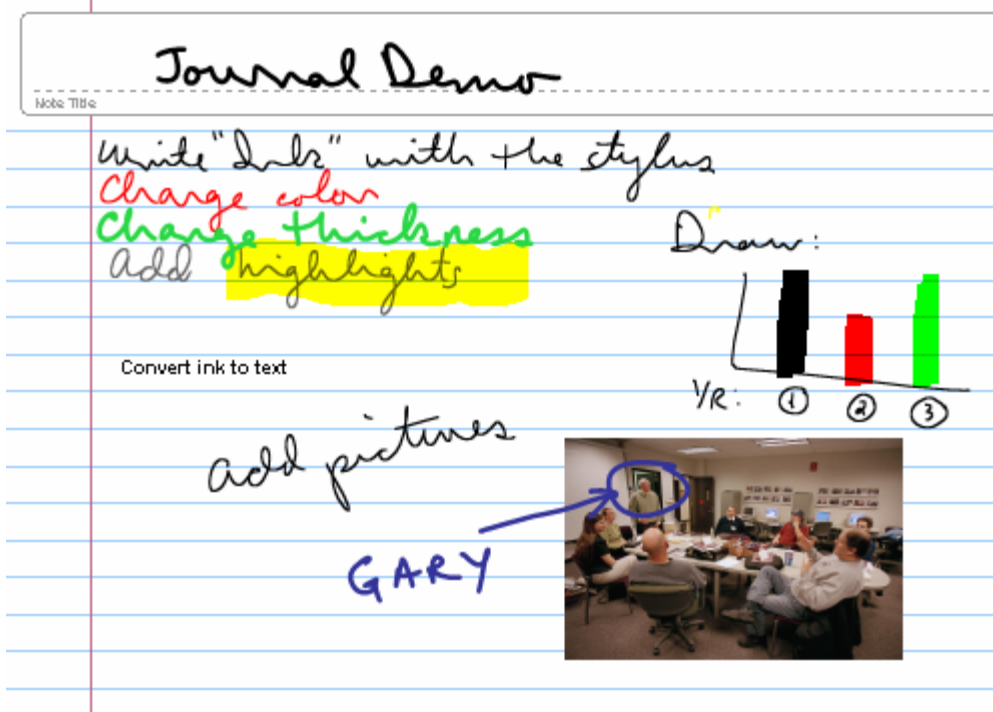
However, addition software products especially designed, or modified, for the Tablet PC, from a variety of vendors is reaching the Tablet PC market. A sampling of these products include *FranklinCovey TabletPlanner*, *Alias Sketchbook*, *Corel Grafigo*, *Zinio Magazine Reader* (for digitally downloaded magazines), and *Mi-co Mi-Forms*. *Colligo Workgroup Edition* provides a peer-to-peer wireless access between Tablet PCs; this allows students and teachers in a classroom, or deaf and hearing co-workers in a meeting, to chat, to exchange files, to draw on a common whiteboard, to share printers, etc.

Windows Journal Features

Windows *Journal*, the handwriting application introduced with the Tablet PC, supports using the stylus to handwrite and draw on the surface in ink. Files produced from *Journal* are saved in “jnt” format, can be read and edited on all Tablet PCs, but are read-only on non-tablet Windows systems on which the free *Microsoft Windows Journal Viewer* has been installed.

Journal supports a variety of pen tips and highlighters, and supports color. Pictures can be inserted into the files, and can be written on with the pen. Handwriting can be selected and converted to text. Microsoft suggests users leave written items in ink format, since the included search capability can find text in handwritten form, including searches across documents.

The image below, of a *Journal* page, illustrates some of these features.



Ink can be selected and moved, can be erased, and can be flagged for later reference. Space can be added horizontally across a file to allow for insertion of additional items on the page. Page templates can be designed in other applications, saved in *Journal* format, and then opened in *Journal*. Since the Tablet PC has wireless capabilities, all *Journal* files can be shared and uploaded directly via that capability.

Future Software from Microsoft:

At the time that this paper is being written, a variety of additional software from Microsoft is being tested before a scheduled release in Winter 2003. Of particular interest for users of Tablet PCs is the *OneNote* product, a new notetaking application. *OneNote* is a significant advance in capabilities over *Journal* described above. *OneNote* runs not only on the Tablet PC, but on other current Windows platforms as well.

This feature-rich product provides tabbed sections across the top of the screen. In an educational setting these tabs might each represent a course a student is taking. Associated with each of these tabs (as with a real paper notebook), are multiple free-form pages on which notes are taken. Each page is reached by clicking on a tab down the right of the screen.

On each page the pen can be used to write ink, or the mouse can be clicked at any location and text can be typed from the keyboard. Sophisticated flags can be added to portions of the notes on the page; for example, a to-do flag will automatically update the to-do list in Microsoft *Outlook*. Speech can be recorded, and is synchronized with areas of the page for later playback.

Applications/Implications in Deaf Education

Early adopters of Tablet PCs are finding the following educational applications for the hardware and software capabilities described above.

Educational Application

Notetaking

Explanation

Notetaking is a particularly promising area in deaf education. Not only might individual students, faculty, administrators, and staff find this capability valuable, but the systems offer great promise for those involved with taking notes for deaf students.

At the National Technical Institute for the Deaf at Rochester Institute of Technology an enormous amount of resources are used in notetaking activities. In the course of a year, several hundred part-time student employees take notes for deaf students, totaling over 43,000 hours of notes during school year 2002-2003.

Notetaking applications such as the new *OneNote* offer the ability to add color to notes, to mix typed text with handwriting and drawn objects, to flag data in the notes (such as flagging all items a professor says will be covered on a test), and then to find matching information across all of these data in all documents with one search.

At the end of a class session, the notetaker can use the wireless capability (if available in the classroom environment), to upload notes to the World Wide Web for instant access by deaf students.

Teachers with *OneNote* available on their PCs can also access those notes for review and revision as necessary.

Markup of student work

Faculty can open student work submitted by deaf students, such as Microsoft Word files, add handwritten notes or corrections on 'top' of the notes, and then electronically return the original work with the notations to students.

Enhance presentations

Faculty or deaf student presenters can handwrite notes on PowerPoint slides during a presentation.

Written evaluations

Teachers and administrators can open forms – for example a teacher classroom evaluation form – on a Tablet PCs, use the stylus to complete the forms, and then send the form wirelessly to the recipient. More sophisticated forms development tools that run on the Windows XP operating system can be used to accept data from forms directly into database applications.

Whiteboard replacement

Teachers who write notes on a whiteboard in class can use the Tablet PC as a substitute white- or blackboard. In this scenario, all notes are available in electronic form for revision as needed and distribution to deaf students.

	Teachers who switch between computer projection onto a whiteboard and handwriting on the same whiteboard, can use the Tablet PC to switch quickly between those applications.
Cooperative design work	In group work situations, multiple students can each use their Tablet PCs to cooperate in the design of a solution to a problem by ‘whiteboarding’ across a wireless network with software such as <i>Colligo Workgroup Edition</i> . Each student can be assigned a different writing color so that the contribution of each is clearly identified.
Chat	Again in group situations, with hardware and software as described just above, students – and faculty – can engage in chats over a wireless connection. This technology might be particularly helpful in group work in which deaf and hearing students are working together to solve a problem.

Brief Summary

The relatively new release of the Tablet PC and the new software surrounding its development, offers promise in a variety of areas in the field of deaf education. Of particular interest is the release of *Journal* and *OneNote* software from Microsoft that incorporates capabilities that significantly extend notetaking, an area of support frequently provided to deaf and hard-of-hearing students.

References

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