

# Tablet PCs as Online Learning Tools

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## INTRODUCTION

Tablet PCs are recent additions to the range of portable, connected devices that comprise mobile computing. Although the devices are just now entering the mainstream market and there are many technical and user glitches still to be overcome, the devices show much promise as a future component of the online learning infrastructure. This paper discusses early applications of Tablet PCs in learning environments and outlines key applications where the devices might have the greatest impact on online learning in the future.

The paper starts with a general description of the Tablet PC and its market potential, followed by a review of current reported deployments of Tablet PCs in education and a summary of findings regarding its utility in such settings. We close out the paper with a discussion of the potential future role that Tablet PCs can play in online learning. Note that at the time of this writing, a Tablet PC model from Apple computing, though much anticipated, has not been introduced into the general market. Hence, this article only discusses Tablet PCs running the Microsoft Windows operating system.

## BACKGROUND

Tablet PCs have the potential to radically change the way we relate to and with computers. Much of this impact comes about through two key features of Tablet PCs – ink and portability. Ink – or, more exactly, digital ink, enables a wider range of information entry options than the traditional keyboards currently in use. All Tablet PCs come with a pen as an input option. With this pen, one can draw and write on the Tablet PC's screen surface using a variety of digitally controlled ink settings – changing color, pen size, pen shape, and so forth, as needed. These freeform inputs can take the form of meeting

and class notes on a digital notepad, doodles and complex, full-color drawings. The inked material can then be saved as images for future enhancement or incorporation in a variety of document formats. A user can also opt to have any handwritten ink input interpreted and converted to digital text for editing using word processing tools such as Microsoft Word.

Aside from expanding the range of input options, this digital-ink-based mode of information entry makes it possible to do without the keyboard for certain tasks. Users have the option of using ink or a soft keyboard to enter information. Without a keyboard, the Tablet PC has a form factor roughly equivalent to a heavy (4 pounds or so), one-inch-thick notepad portfolio. Tablet PCs without a keyboard are categorized as “slate” types. A second type of Tablet PC is a “convertible,” which comes with a special swivel attachment between the screen and keyboard, allowing a user to switch between a more conventional laptop configuration (with the keyboard) and a slate configuration. A third option, typical of the Compaq/HP Tablet PCs, allows a user to fully detach the keyboard and carry the screen component independently as a slate.

Most Tablet PCs weigh (and cost) roughly the same as ultra-light laptops. However, with the slate configuration, Tablet PCs provide a unique portability option. Essentially, the slate provides a digital notepad that allows the computer screen to lay flat on a surface rather than upright. This makes it possible to envision the Tablet PC as a replacement for many activities where a paper notepad or clipboard is used – from meetings to all types of distributed service functions usually performed by nurses, doctors, utility technicians and delivery persons. Furthermore, the slate form factor reduces the barrier that the computer with an upright screen places between its user and other people that a user might be interacting with. For example, nurses will be able to input notes into a device without the upright screen acting as a barrier between them and

a patient, or teachers can more easily maintain eye contact with a class while teaching a lesson with digital material.

Other key features that Tablet PC users can benefit from are its connectivity and multimedia capabilities. Tablet PCs generally come with multiple connectivity options, including wireless options such as 802.11b and infrared. This expands the range of materials available to a user at any moment that the Tablet PC is in use. For example, a teacher can be walking around a wirelessly enabled room and pulling in material from the Web to illustrate a point. Tablets come with fairly good-quality audio and video capabilities that allow the quality display of any content. Furthermore, the devices allow quick switching between portrait and landscape mode, letting users display content in the best format possible.

Tablet PCs' inking and multimedia capabilities, portability and connectivity highly recommend them as a key part of the online learning infrastructure. As the clients on which class materials will be viewed by teachers and/or students, Tablet PCs can transform the way current materials are used in an online setting, such as a wireless classroom. At the extreme, teachers and students can roam freely around the wireless space, pulling in materials from the network as needed, sharing them among each other either locally or via the network, and uploading materials for submission. Class sessions that involve breakout groups can especially benefit from this platform. Teachers can walk around the room with a Tablet PC, pulling in relevant information to point out to each breakout group. Group members can pull in resources via the network to their Tablet PCs as needed, and capture and summarize discussions of the group for submission to the teacher and for discussion with the full class. Furthermore, with their multimedia capabilities, Tablet PCs are seen as potential e-book platforms (Goodwin-Jones, 2003), perhaps eventually bringing to an end the back-breaking book bags that students endure and the auditor-sized rolling bags that teachers use to lug around their class materials.

Current versions of Tablet PCs were first introduced in November 2002. As of November 2003, only 435,000 units had been sold, amounting to less than 2% of the notebook market, with little growth expected in 2004 (Bulik, 2004). This slow start had

naysayers proclaiming the demise of the Tablet PC, even as vendors released second-generation devices powered by improved Pentium-M chips, and Microsoft updated its Tablet PC operating system to address text input issues (Arar, 2004). While Tablet PCs have gained growing acceptance in several vertical markets (health care, field sales), so far few consumers know much about them (Gros, 2003). Still, they have the backing of many industry giants, foremost of which is Microsoft. Already, the Tablet PC has been cropping up in popular media – television programs like *Alias* and *24* and movies like 2004's *Collateral*. We may yet see the Tablet PC become the device of choice for the education market, particularly if price points for the devices drop closer to those of traditional laptops and more software applications that leverage Tablet PC capabilities become available.

## **CURRENT DEPLOYMENTS OF TABLET PCS IN THE CLASSROOM**

A review of current published information on Tablet PC deployments in education, summarized in Table 1, shows a range of pilot studies being conducted in a variety of institutions and levels. Current reported uses can be categorized as three types: paperless classroom, interactive classroom, and multimedia assistive technology.

- **Paperless Classroom:** In a paperless classroom, hard copies of all classroom documents are replaced by electronic documents as much as possible. Several deployments involved the successful substitution of electronic documents on the Tablet PC for textbooks, homework assignments, teacher feedback and grade recording, and administrative reports (Barton & Collura, 2003; Bentley College, 2004; DiGiorgio, 2003; Lindsey, 2003; Roldan, Solt, & Su, 2004; TechWeb News, 2004). As a full-function Windows XP computer, the Tablet PC is able to function as an enhanced e-book reader. In addition to standard productivity tools (word processor, spreadsheet and database), these functions include multimedia and annotation enhancements. The Tablet PC's connectivity facilitates the exchange of electronic docu-

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