

Association for Information Systems AIS Electronic Library (AISeL)

AMCIS 2005 Proceedings

Americas Conference on Information Systems
(AMCIS)

2005

Tablet PCs for Teaching Information Systems Courses

Kirk P. Arnett

Mississippi State University, kpa1@msstate.edu

Mark B. Schmidt

St. Cloud State University, mbschmidt@acm.org

J. P. Shim

Mississippi State University, jshim@cobilan.msstate.edu

Follow this and additional works at: <http://aisel.aisnet.org/amcis2005>

Recommended Citation

Arnett, Kirk P.; Schmidt, Mark B.; and Shim, J. P., "Tablet PCs for Teaching Information Systems Courses" (2005). *AMCIS 2005 Proceedings*. 242.

<http://aisel.aisnet.org/amcis2005/242>

This material is brought to you by the Americas Conference on Information Systems (AMCIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in AMCIS 2005 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

Tablet PCs for Teaching Information Systems Courses

Kirk P. Arnett
Mississippi State University
kpa1@msstate.edu

Mark B. Schmidt
St. Cloud State University
mbschmidt@acm.org

J. P. Shim
Mississippi State University
jshim@cobilan.msstate.edu

ABSTRACT

The authors describe integration of and multiple uses for the tablet PC (TPC) in MIS classes. These uses are geared toward enhancing student learning through the TPC rather than learning how to use a specific tool. These technologies are used in a database course and an information security course to enhance student learning by having students participate in drawing entity relationship diagrams (ERD) and network configurations. Digital documents, annotated with digital ink are exchanged between faculty and students. A survey is used to capture perceptions of MIS majors regarding the value of the TPC in these two courses. These results are then compared and contrasted with results that have been previously published for TPCs in a database course. Results indicate that a major issue facing educators is the lack of critical mass in the adoption of TPCs by students.

Keywords

Tablet PC, entity relationship diagram (ERD), network diagramming, data modeling, IS education.

OVERVIEW

Computer Technology Research (1992) found people retain 20% of what they see and 30% of what they hear. However, people will retain 50% of what they see and hear. Further, people will retain as much as 80% of what they see, hear, and do simultaneously. This means that an effective instructor will typically employ multiple methods of delivery to facilitate the learning process especially when the material at hand is particularly complex. Database and security courses, as well as other information systems courses, often include such complex material (Shim, Arnett, Schmidt, 2003).

One of the suggestions to address the dwindling demand for many IS programs offered by George, Valacich, and Valor, (2004), is to focus on attracting undergraduate students to the IS program. They indicate that “the changes in basic computer literacy suggest that the instructor needs to be very savvy at not only using contemporary applications, but also well versed in many of the issues relevant to these students...” They further suggest that many students may feel that IS is “for geeks” (George, Valacich, and Valor, 2004, page 1044). The utilization of cutting edge technologies, such as TPCs, may be a factor in presenting some of the “cool” things that can be done in IS.

INTRODUCTION TO THE TABLET PC



Figure 1. The Tablet PC

In his Comdex 2000 keynote address, Bill Gates positioned the TPC as

"A full-function Microsoft Windows operating system-based PC incorporating the convenient and intuitive aspects of pencil and paper into the PC experience."

WHAT IS THE TABLET PC?

According to the TechEncyclopedia, a TPC is "a tablet computer environment from Microsoft that is based on an enhanced version of Windows XP. Designed to function more like a portable writing tablet than previous tablet-based computers, the TPC includes handwriting recognition as well as the ability to retain handwritten words and annotations without turning them into computer text. This latter ability is known as "rich digital ink," because the inking (writing, drawing, scribbling) is stored as a graphic after algorithms smooth out rough edges." (TechEncyclopedia, 2005).

According to Walker (2002), to be categorized as a TPC, a computer must meet Microsoft's TPC platform specifications. The following list describes the details:

- Must use an active digitizer rather than a resistive (touch) digitizer
- Must be legacy-free (no serial, parallel or PS/2 ports)
- Must be able to rotate the LCD image between landscape and portrait without rebooting
- Must resume from suspend in less than 2 seconds
- Must last in suspend for more than 72 hours, starting with a full battery
- Must automatically hibernate (save to disk) upon battery exhaustion in suspend
- Must allow surprise removal from a dock; upon reinsertion, everything must work.

Although there are examples of early adopters, the TPC is not currently diffusing into the computing world at a rapid pace. Among the notable adopters of TPCs are textbook companies. Many textbook sales representatives use TPCs when calling on professors. Mobile professionals, such as salespeople, are often attracted to the features of the TPC. One feature that is advantageous to salespeople relates to the form factor of the TPC. The TPC form factor allows a user to close the device and write directly on the screen as opposed to typing on keyboard. This factor affords the salesperson the ability to use the computer without creating a physical barrier (the upright screen) between them and the client. Another valuable feature of the TPC involves the ability to access wireless networks. Many locations, including universities, are now Wi-Fi equipped. This degree of connectivity allows textbook representatives to instantaneously inform their clients regarding the status of their requests.

USING THE TABLET PC IN AN INFORMATION SYSTEMS DATABASE COURSE

Following the initial trial use of the TPC, a survey instrument was created to capture student perceptions of the use of TPCs in the classroom. The survey attempts to measure student perceptions of the use of the TPC as compared to lecture, PowerPoint, and textbook in this isolated context. The goal of this survey was to determine the perceived learning from the TPC relative to perceived learning for more traditional methods.

This survey was administered in two sections of our junior-level database course during the fall 2003 and spring 2004 semesters. The sections were taught by different instructors using different textbooks. The results of the survey are presented as rankings of learning and speed (time required to learn) which are then compared to the student perceptions from a slightly modified survey administered to a computer security course after they completed an activity involving the TPC.

The protocol for using the TPC follows. First the students were given a hands-on demonstration of how TPCs operate. Several students used the professor's TPC to share their diagrams with the class. This was done by dividing the class into groups and having a representative of each group come to the front of the classroom and use the TPC to diagram the group's ERD that had been created with pen and paper just prior to this part of the experiment. This insured that at least one member of the group understood how to use the digital ink feature of the TPC. Then the diagrams were displayed for the entire class to view and for subsequent discussion. The entire diagram file including all diagrams from all groups was then emailed to the class members. The file also included an additional homework problem for the student to work and return to be graded for the next class period. Figure 2 depicts an example of the ERD assignment.

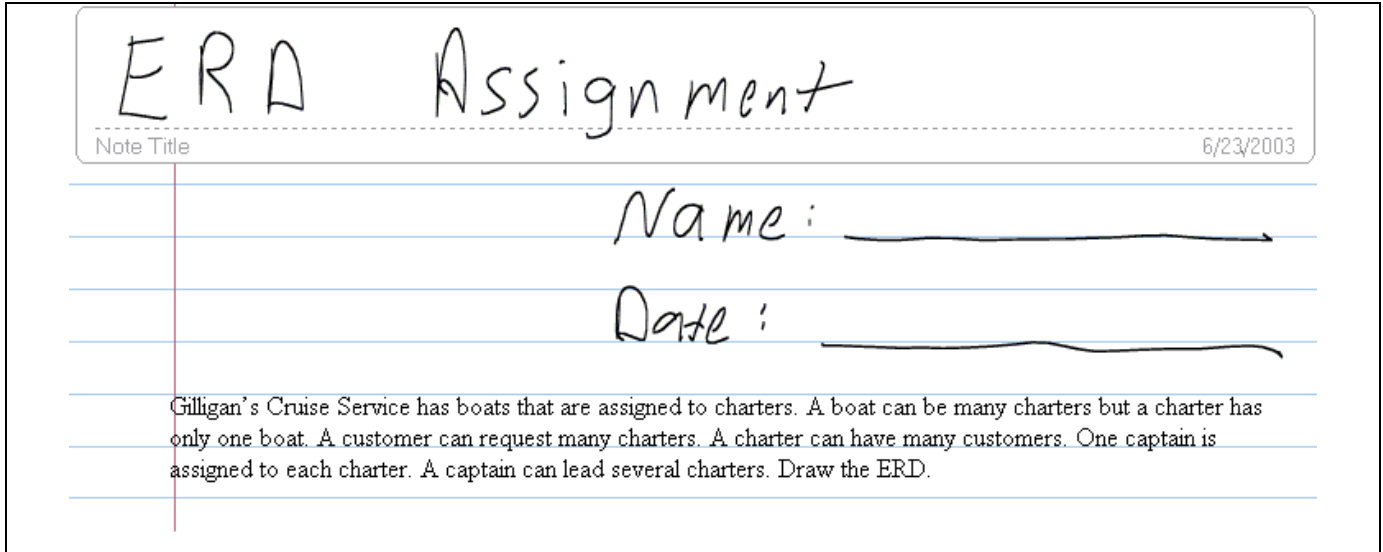


Figure 2. ERD assignment

USING THE TABLE PC IN AN INFORMATION SECURITY COURSE

The database course provided but one contextual use for the TPC. We also introduced the TPC to an information security course at the beginning of the semester in spring 2005. The students were asked to consider placement of a switch, firewall, and IDS in a small network. Obviously this problem had several correct solutions, but it could also have incorrect solutions. Similar to the database course protocol, the information security course students were shown a small company network diagram on the TPC during a normal class meeting and then discussed logic surrounding the company network configuration. In addition the TPC was demonstrated to the students and the students were selected to use the TPC to solve an in-class group exercise. At the conclusion of the class the students were emailed the small company network diagram shown below as figure 3 and were requested to hand draw the position of various pieces of network and security hardware on the diagram and to list reasons for their decisions.

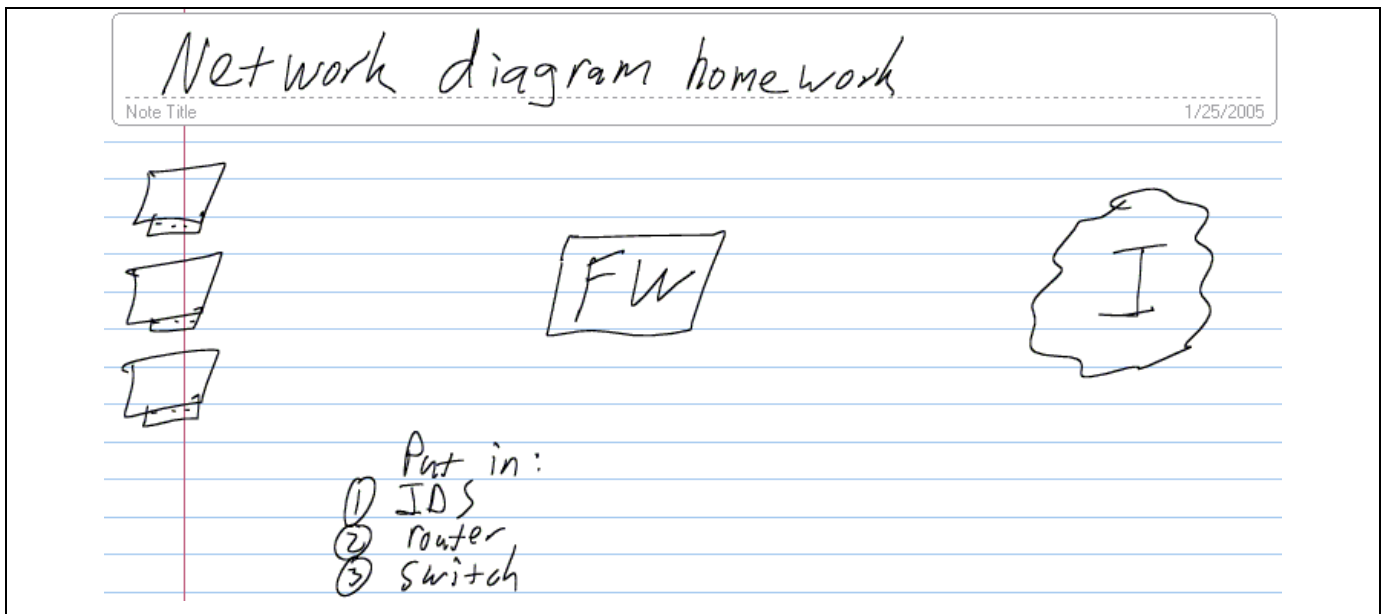


Figure 3. Network Diagram

This was a pen and pencil exercise from the students' view, so one additional TPC use was instituted. The students were to use a special laboratory built to support the information security course and then complete an introductory network assignment (see figure 4) and email the assignment to the grader. This email allowed the grader to review the assignments using the TPC and to make his own remarks with digital ink directly on the digital document. Then the graded, and annotated, document was returned by email to the student.

Exercise:

1. Determine the IP address of each machine on the network
2. Ping one of the machines on the network. Ping is a command that is used to verify that a computer has an active connection to a network
 - a. Click Start -> run
 - b. Type cmd
 - c. Type ping <IP address of another machine>
3. Change the IP address of one of the machines to 14.2.0.12
 - a. Right click "My Network Places"
 - b. Click properties
 - c. Right click "Local Area Connection"
 - d. Click properties
 - e. Select "Internet Protocols (TCP/IP)"
 - f. Click properties
 - g. Change the IP address to 14.2.0.12
 - h. Confirm the IP address change using the ipconfig command
4. Repeat the ping command in step 2
5. As a courtesy to other students set the IP address back to its original value

Questions:

1. After changing the IP address to 14.2.0.12 what happened? Why?
2. Use any digital drawing tool and create a diagram of the network configuration. Be sure to show all connections and original IP addresses. This diagram should be included on a Word document.
3. Email the word document to the grader account. This should include the answers to relevant questions and the digital drawing.

Figure 4. Introductory Network Assignment

RESULTS

Following the completion of the assignments in the information security course the original survey (reworded for the security course) was administered to the information security course students. Table one presents the results of t-tests comparing the questionnaire results between the database and information security course responses. The results indicate that the TPC was equally well received in both the database and security course (all the t-tests indicated that there was no difference in student perceptions of the TPC in teaching ERD in database and teaching network diagramming in security). The scale endpoints span from very ineffective (1) to very effective (5).

Additionally the findings show that the students did not find the TPC to be a top-rated instructional tool in terms of learning network security diagramming or ERDs. Students were also asked to rank the three instructional elements of text, PowerPoint, and TPC. Each of these three items was ranked both in terms of how much they assisted in learning the concepts as well as how much time was spend on each activity. Table two presents the rankings for the database course while table three presents the rankings for the security course. The results of the combined surveys do allow us to make some projections regarding the use of the TPC in MIS courses. The survey instrument will be presented at the conference.

	Perception in Database Course N = 63	Perception in Security Course N = 28	P value
How effective was reading the book in furthering your understanding of ERD (network diagramming)?	3.48	3.75	.14
How effective was the Chapter PowerPoint/lecture in furthering your understanding of ERD (network diagramming)?	4.03	4.00	.82
How effective was working the examples on the Tablet PC in furthering your understanding of ERD (network diagramming)?	3.67	3.93	.14
How effective were in-class small group exercises in furthering you understanding of network diagramming?	3.98	3.79	.39
If given a network diagramming problem on a test, what marks (grade) would you expect to make on the ERD (network diagramming) problem on the test?	8.8	9.04	.20

Table 1. T-tests of Respondent Perceptions Regarding the TPC

Perception in Database Course N = 63	Please rate the following items as to how <u>much they assisted you in learning</u> network diagramming: (1 was most helpful & 3 was least helpful).	Please rate the following items as to how <u>much time you spent with each</u> : (1 was the most amount of time & 3 was least amount of time).
Ranking 1	Lecture	Lecture
Ranking 2	Text	Text
Ranking 3	Tablet PC	Tablet PC

Table 2. Student Ranks of Lecture, Text, and Tablet PC from Database Classes.

Perception in Security Class N = 28	Please rate the following items as to how <u>much they assisted you in learning</u> network diagramming: (1 was most helpful & 3 was least helpful).	Please rate the following items as to how <u>much time you spent with each</u> : (1 was the most amount of time & 3 was least amount of time).
Ranking 1	Lecture	Lecture
Ranking 2	Text	Text
Ranking 3	Tablet PC	Tablet PC

Table 3. Student Ranks of Lecture, Text, and Tablet PC from a Security Class.

QUALITATIVE RESULTS

Student rankings of the TPC as an instructional tool in comparison with the more traditional tools for classroom use provided the emphasis for this study. But, we should also answer to the recommendation of (George, Valacich, and Valor, 2004) to maintain touch with the contemporary concerns facing students. To this end we collected student perceptions of the value of ownership of a TPC in open ended questions. Although there is no consensus, many students had a positive reaction to the TPC. Table 4 shows some of the comments to those open ended questions. These results do nothing to indicate that the gap in the critical mass of TPC ownership by students will be closed in the near future.

<p><u>What were your overall impressions of using the Tablet PC in class?</u></p> <p>“Good – It would be better if the price wasn’t so high. It would be great for student to have as well.”</p> <p>“Thought it worked well for demonstrating the network diagrams.”</p> <p>“I think it is great because of the many things the tablet can used for. Even more uses for a student than a teacher –because of the note taking and organization capabilities.”</p> <p>“I don’t think it added anything to the class. It could have been done as effectively on the chalkboard or paper.”</p> <p><u>How do you think Tablet PCs could be used effectively to teach IS classes?</u></p> <p>“I think they could save time as far as teaching IS classes. Faster to give examples to teach the class.”</p> <p>“Anything that needs to be drawn (i.e. ERD or networks) it is much easier to see how it is done and what steps are taken.”</p> <p>“IS curriculum could possibly become paperless. Assignments will not get misplaced.”</p> <p>“Being able to draw & edit diagram for network, databases, file structures and so on would be more effective that using the blackboard”</p> <p><u>If you were to purchase a new computer, what are the chances that you choose a Tablet PC, given that it is a little more expensive than a laptop? Why?</u></p> <p>“If the Tablet PC were more expensive, I would purchase the laptop. The way that I use my computer, I would probably have little use for the extra features in the Tablet PC.”</p> <p>“None. I don’t need it.”</p> <p>“About 50 / 50, I like the extra features but money is a big factor in college.”</p> <p><u>Do you think the Tablet PC will catch on in education? Why or why not?</u></p> <p>“No, at some point, pagers, cell phones, PDAs, Blackberries etc. become more of a distraction, than a help. I feel business people are getting to this point; hence Tablets will not catch on because they are counter-productive.”</p> <p>“Yes, technology evolves & it’s the next step.”</p> <p>“Yes, the Tablet PC should catch on because it allows the instructor to have an easy way of showing examples & illustrations to their students in the classroom or through the internet.”</p>
--

Table 4. Representative Responses to Open Ended Questions

These comments indicate that the respondents, like consumers in general, have mixed beliefs concerning the utility of TPCs. Clearly there are places where they have proven successful – restaurants, college textbook representatives, etc. But, it is still too early, even after five years, to say whether TPCs will become popular to the masses.

COMPELLING REASONS TO USE THE TABLET PC?

One possible motivation for an instructor’s use of the TPC is to save time preparing for class. “I have found that the tablet PC shortens my preparation time, as I no longer have to design elaborate slides or graphics in PowerPoint; now, they can be done quickly in freehand on the tablet” (Lindsey, 2003, page 18). This is important and time is precious for academics. But, we must examine the TPC, not only as a device for delivery of instructional material, but also as one to improve student learning or reduce the amount of time involved in learning a set amount of material. In the initial database course experiments and in the information systems security course experiments the TPC did not become the panacea that we had hoped. Students did not rank the TPC as number one 1 for learning relative to the text and PowerPoint lectures. So, at this point we conclude that

TPCs provide another convenient weapon for the teacher's arsenal, but TPCs should not today be the main weapon. Rather TPCs simply have a place in the classroom.

The TPC is not by any means a replacement for diagramming tools such as Visio. Instead it provides an alternative to creating diagrams on the board in the classroom. Once students have mastered the diagramming principles, they will need to transfer that tacit knowledge to application software such as Visio. The TPC has advantages over drawing diagrams on the board due to its capacity to store the results in a digital form. The diagrams created in class and stored in digital form allow the professor to send or post the work electronically for students to access after class. Despite the TPC's advantages, it has not diffused rapidly in academia or the business world. It may be that over time that the TPC will become more popular, more affordable, and better accepted for students and teachers. Although the TPC has already impacted some classrooms, "we are reminded that its full potential is far from realized" (Barton and Collura, 2003, page 41).

CONCLUSION

The authors integrated technologies by using the TPC along with traditional tools to assist students in learning topics in management information systems (e.g. ERD and network diagramming). The authors use a face-to-face class session to work through some examples of ERD and network diagramming and then save the files for later reference. The files can be saved in journal note format or as a web image (.mht) or as a graphics file (.tif). Those students who have TPCs will be able to complete the assignments on their TPCs using digital ink and email the results back to the professor. Those students without access to TPCs will be able to download an .mht file, print the diagram, complete the diagram, and submit a paper copy for grading. It is anticipated that utilizing these technologies to reinforce a sometimes difficult and complex task, such as ERD creation or network diagramming, will be beneficial to the student learning process. There are several educational institutions using the TPC, for instance, Georgia Institute of Technology's Regional Engineering Program utilizes a similar procedure to combine hand written diagrams with PowerPoint slides to facilitate web-enhanced learning (Lindsey, 2003).

TPCs can be important tools for the effective instructor to supplement the student learning experience. However, student opinions appear to suggest that these technologies are just additional tools available to instructors and not replacements for the classroom experience. The lack of critical mass may be an impediment to the widespread use of TPCs in the classroom. There are a few educational institutions that are adopting the TPC on a large scale. Such a school is Winona State University (WSU), who has one of the largest academic TPC programs in the world (Whetstone, 2005). Professors at such schools will be able to easily implement the TPC in their programs as all students will be able to work with digital ink on their documents.

REFERENCES

1. Barton, C. and Collura, K. "Catalyst for Change." *T.H.E. Journal*, November 2003, pp. 39-41.
2. Computer Technology Research Corporation, *Multimedia Technology*, Charleston: Computer Technology Research Corp., 1992.
3. George, J. F., Valacich, J.S., Valor, J. Senior Scholars Forum: Does Information Systems Still Matter? Lessons for a Maturing Discipline *Proceedings of the twenty-fifth International Conference on Information Systems*. December 2004.
4. Lindsey, Stanley D. "On-Demand Lectures Create an Effective Distributed Education Experience." *T.H.E. Journal*, November 2003, pp. 16-20.
5. Shim, J. P., Arnett, K. P., and Schmidt, M. B. "Using Streaming Technology and Tablet PCs for Teaching Information Systems," *Proceedings of the Americas Conference on Information Systems (AMCIS)*. August 2003, Tampa, FL.
6. TechEncyclopedia. Accessed 2-25-05. <http://www.techweb.com/encyclopedia/defineterm?term=tablet+pc>
7. Walker, Geoff. "Tablet Taxonomy" January, 2002. Accessed 2-24-05. http://pencomputing.com/frames/textblock_webpads_taxonomy.html
8. Whetstone, J., Vice President of Computing & Information Technology Services, Winona State University. Telephone interview. February, 2005.