Baseline Study: Assessing HP Tablet PC features

The HP tablet PC was introduced to students who had not yet used it before. After a brief overview of its unique features the students were given tasks to accomplish using the Tablet PC pen.

Objectives:

- To initially test the use of the tablet pen and determine reaction of students to pen technology
- To determine speed of learning pen technology
- To determine ease and convenience of using the technology in required tasks and activities in the System Dynamics course

Study Sample:

Ten, three female and seven male, undergraduate students in Industrial Engineering.

Background:

Only five of ten had pen technology experience usually with PDA. They used it for doodling.

Tasks:

At the start of the session, the students were asked to give their impressions of the HP Tablet PC based on what they have heard or read about it. They were asked to rate the Tablet PC with 1 as the least and 10 as the highest.

At the end of the sessions and experiments, the students were again asked to rate the Tablet PC from 1 to 10.

Task A:
Use input panel and pen to write the following:
- Name and Address (insert)
- Center for Lean Systems and Management
- The quick brown fox jumps over the lazy dog.

Task B:
Using the Calculator function, manually solve:
- $256817 + 766813 + 5567790 = \ ?$

Task C:
Using draw tools, draw the following:

The tasks were done twice while the time to undertake the tasks was recorded. The times were compared.
Results:

The time to do the tasks quickly improved in the second round of doing the task as shown in the graph below:

![Graph showing time for tasks in first and second rounds](image)

Moreover, there was a marked increase in impressions of students of the Tablet PC. From an initial average rating of 1.2, the students’ rating improved to 5.4 at the end of the three hour sessions.

**Initial Comments after first round:**

- Complicated – High end
- Curious on how it would work
- Interesting on how Tablet PC works
- Why the need to have tablet pc? Would possibly surpass regular pc
- Afraid to use. Tablet might get destroyed.
- Possible difficulty of using Vista
- Tablet PC is notoriously slow compared to regular laptop performance
- Expensive
- Most appropriate for field or art courses
- Commercially not acceptable in the mainstream. Wait until it is acceptable
- Have heard about it since 3 years
- Have heard from commercials or journals that Tablet PC is really slow

**Problems with the Tablet PC:**

- Slow processing
- Recognition of handwriting has delay
- Unfamiliar with software (vista, open office)
- Pen pointer positioning is not easy to control
- Clicking using pen has lag. Specially when constructing diagrams
- Surface seems to be too smooth
After two rounds with tablet PC

- Less stress for the hand (using only one hand)
- Feels more natural like writing
- Using only one input control (compared to mouse + keyboard)
- For not so fast typists, pen is easier
- Special symbols not easily recognized (ñ, (, {, [, etc)
- There is some delay in recognizing numbers with letters. Depends on the handwriting style of the user
- Generally tablet is able to recognize long hand (cursive) writing than by character.
- Tablet is good for free hand drawing. Windows Journal
- Software is a big factor when using the tablet PC

Observations:

There were significant improvements in task times. Task A time improved by 27%, Task B time improved by 11% and task C improved by 64%.

The time to accomplish Task A, in both trials, indicates that writing capability of pen technology was rather easy to learn. The students comments suggest that pen technology is comparable to ordinary pen and paper technology and thus require little adjustment and learning. Indeed, the second trial suggests that use can be easily learned and task times can still improve with practice over time.

The second task was intended to compare pen technology with the regular manual calculator tasks in many engineering courses. While the task was rather similar to use in PDAs and expectedly easy, the task time was comparatively longer than the two other tasks. Perhaps the lack of familiarity of the students to PDAs did not help in this task. Still, there is some marked improvement in the second trial.

The third task showed the most improvement in the second trial. The use of icons and drag and paste facility seemed to be very compatible with pen technology. While the students claimed that the mouse technology was superior for this task, the second trial with its 64% improvement indicates that pen technology is promising in diagramming tasks.

For this study which focuses on the use of the Tablet PC for the System Dynamics course, the results of the first and third task as of primary interest. The pen technology and task accomplishments in this initial set of experiments indicate compatibility with the course as it requires a lot of modeling exercises using text and symbols. The marked improvements in diagramming activities time indeed point to the potentials of pen technology in teaching and learning System Dynamics modeling.

The graph also shows the student evaluation of the Tablet PC, focusing on the use of the pen technology. Their lack of familiarity of the use of Tablet PC and lack of exposure to its features were shown in the low rating they gave the Tablet PC. But with a brief 30-minute introduction to its features and the trials, the students perceptions improved by 350%! 
Overall, the usefulness of the Tablet PC for teaching and learning is largely dependent on what skill in the use of its facilities. More specifically, this initial set of tasks highlighted the possibilities of convenience in diagramming that is required in System Dynamics. More practice and continued use can improve skills development. To its credit, the Tablet PC is easily learned as indicated by the initial tests. In addition, the two-course program in System Dynamics which covers a total of 26 weeks over two terms provides ample learning time and practice for the Tablet PC use.
Study 1: Initial use of pen technology for System Dynamics Modelling

The Tablet PC was used as the main tool for System Dynamics modelling. A problem was given to the students and three levels of models were created.

Objective:
- To test the use of pen technology for drawing causal loop diagrams in System Dynamics
- To test use of Tablet PC for group modelling and discussions.

Tasks:

The following case problem was given to the students:

Carl and Marilyn are parents of three children. Carl is now the only breadwinner and he and his wife are unhappy with his income. They are dissatisfied with the quality of food, housing, transportation and entertainment they can afford on Carl's income.

Using Open Office Journal, the students were tasked to draw the feedback loops that cause the dissatisfaction with Carl’s income with the HP pen technology.

Task A:
Individually work out the case. Use pen to draw the causal loop diagram.

Task B:
Group into twos and use Tablet PCs to exchange and discuss their individual diagrams. Find similarities and differences with the two models and create a new improved model.

Task C:
Class will share their models and discuss accuracy of each model. The two-group models are projected on the screen. Comments are made and a final class-accepted model is attempted.
Results:

Some of the resulting causal loop diagrams are shown below:
Comments:

*General first impressions before sessions:*
- Smaller than laptops
- Portable
- Nice visual appearance
- Initially appears to be intimidating with its technology

*Positive comments after sessions:*
- easy to use and learn
- pen is easier to use than mouse
- pen feels natural
- pen is less tiring and stress on the house

*Difficulties:*
- sometimes it can't recognize the pen at one touch
- the tablet pen hangs often
- finding particular commands in the program present
- Special characters are not applicable when using the pen
- becomes tiring after sometime as I avoid pressing on the monitor
- right-clicking is a bit hard to learn
- the writing pad assumes that only letters or words will be written. It searches first the closest letter or word before knowing it is a number.
- shortcuts are not available

*Observations:*

The new technology and features of the HP Tablet PC still presents some initial hesitation among the students. While the base line study presented very structured tasks, this second set of tasks was more open ended and required them to discover
features of the Tablet PC on their own as they needed them. Their unfamiliarity with its features initially presents some fear and challenge when solving the case. With some practice, they overcome the hesitation and fear, and get to focus on the problem instead. They begin to see how pen technology can help them accomplish their task. As they get the skill to manipulate and use the pen, they find the advantages and disadvantages. Overall, the comments focus on pen usage and features and there is no consensus on whether the pen is better than the mouse.

However, there is clear agreement that the pen is indeed very helpful in diagramming as it emulates actual handwriting on paper. One student said,

“I find it more handy. (And) I can see its usefulness in SD. I believe that it can quicken the output of students once they get the hang of it.”

The student also adds:

“It feels more natural. I can see myself getting used to it. I've always been hampered with the interchange uses of the keyboard and mouse.”

While conceding that the Tablet PC does not have definite advantage over the normal PC or laptop, another student more specifically, pointed out that

“These tablet PCs could probably be best used in applications that do not require precision in text or graphics. Probably, the tablet can be best used on the field or applications that require spontaneous inputs.”

Finally, the students indicate that while there are difficulties with the new technology, they are not as complicated and can easily be overcome with practice.