

# THE QUEST FOR THE PERFECT NOTE-TAKING MEDIUM

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## NOTE-TAKING

Diligent note-taking is one of the most important keys to being a successful student. I have found that recording information helps me slow down and remember it better. It also forces me to process and review the information in order to make it more concise for the page. One of my teachers, Dr. Reilly, agrees that writing down the information helps students remember. I have even developed formats for taking notes, such as the Headline Note-taking Format I developed in American Studies which tries to shrink the information to one line of loose leaf formatted like a newspaper headline. These efforts have paid off. At the Pennsylvania Governor's School (described below), Professor Song, the UML/Systems professor at Drexel's Graduate School in Information Science said that I would "graduate *summa cum laude* from Harvard" due to the quality of my notes.

I also post my notes online at ThePlaz.com, my website with about 4,000 pages of content viewed over half a million times. As I describe in the site Mission Statement, I try to share my knowledge with the world. In addition, I have found that knowing that others will read my notes motivates and focuses me to do my best, even on days when I don't feel like it.

Notes are critical for me to succeed in school; however, the process and overhead of taking them on paper slows me down. I set out to find a better way of taking notes that would give me more time to concentrate on my class work, my business, and my volunteer efforts. I purchased a Fujitsu T4220 Tablet PC several months ago and I decided to use it to take notes in school.

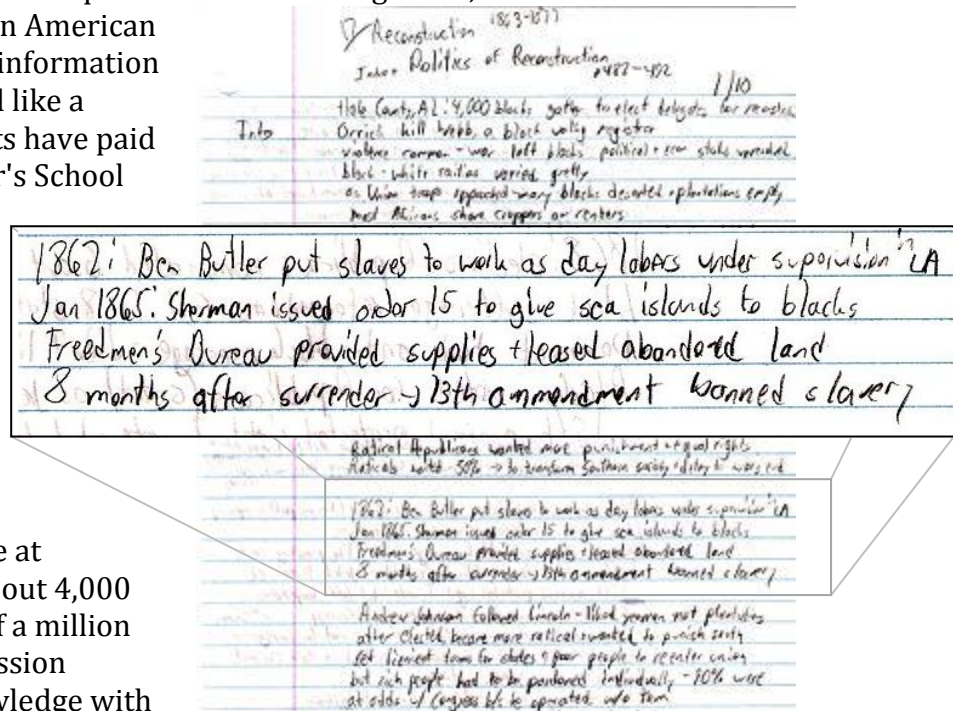


FIGURE 1 - EXAMPLE OF HEADLINE NOTETAKING FORMAT

## COMPUTER

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Carrying a computer around school is useful. I am able to quickly look up unfamiliar words. I can research more information about a topic by Google-ing or reading an encyclopedia. I remain connected to the outside world with email and the news. I can maintain my to-do list in one place as it is automatically synchronized between computers. I can get a quicker start writing papers because I can type whenever I get inspiration rather than waiting until I get home.

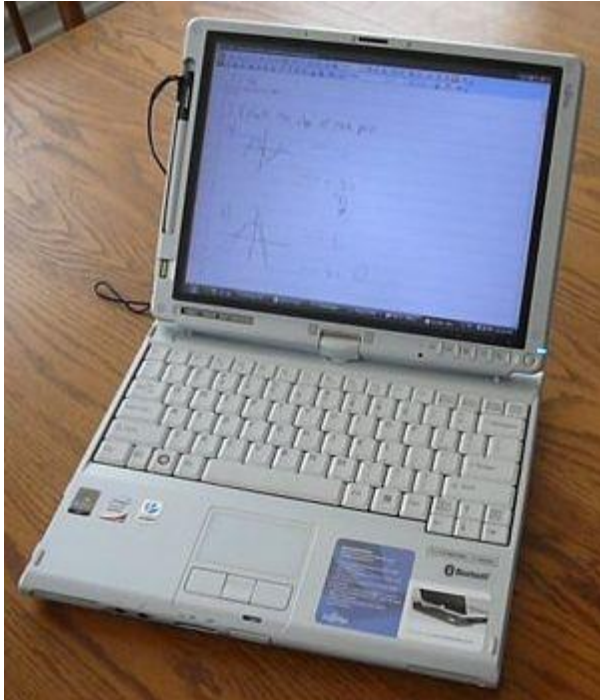


FIGURE 2 - A FUJITSU T4220

But the most useful part of having a laptop is the ability to collaborate. During a group project, I can write or type what we talk about and email it to the group with four clicks. For the American Studies Decades Project, I set up a group discussion forum where we could all post ideas. However, at this point in time, my other group members were not carrying around laptops. This slowed the discussion down, but it was still beneficial for me to have a laptop because I could integrate group member's work into our project when they sent it to me. This streamlined my day, enabling me to take care of simple tasks as they come up without having to wait for the end of the day, which is less efficient.

Efficiency is key. For years, I have been trying to be more efficient and more effective. Carrying a laptop means I can take care of simple tasks immediately. I do not have to write them down on paper and then process them when I get home to my computer. For example, if I want to change something on this essay draft, I can make the change immediately. If I have a spare moment, I can open my laptop and start editing this very essay. I don't have to remember to print it out the day before, make changes on paper, and then type in those changes. Thus I can accomplish more in less time.

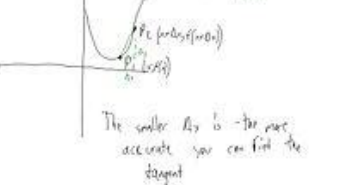
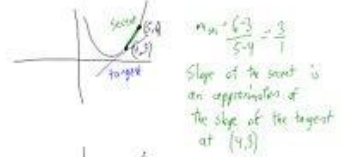
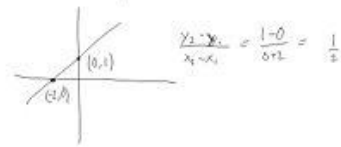
## TAKING NOTES

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The greatest difference with taking notes on the computer rather than on paper is the ability to easily add information from the internet. For example, one of my teachers posts assignments on the internet. I can easily copy the assignment into my OneNote notebook and highlight key points. If a teacher distributes notes on a PowerPoint, I can import the PowerPoint and write on top of it. If I need to research something, I can go

2.1 Differentiation

slope,  $\frac{\text{rise}}{\text{run}}$ , average rate of growth



$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{f(x_2) - f(x_1)}{(x_2) - x_1}$$

As  $\Delta x$  gets smaller - the better approximation of a slope of a tangent line which tells us the slope of a curve

$$\lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x} = \text{slope of tangent line}$$

Call it the difference quotient  
 (used to find the slope of a tangent line)

ex)  $f(x) = x^2 - 6x + 11$

$$\lim_{\Delta x \rightarrow 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

$$\frac{((x + \Delta x)^2 - 6(x + \Delta x) + 11) - (x^2 - 6x + 11)}{\Delta x}$$

$$\frac{x^2 + 2x\Delta x + (\Delta x)^2 - 6x - 6\Delta x + 11 - x^2 + 6x - 11}{\Delta x}$$

$$\frac{2x\Delta x + (\Delta x)^2 - 6\Delta x}{\Delta x}$$

$$\Delta x \left( \frac{2x + \Delta x - 6}{\Delta x} \right)$$

$$2x + \Delta x - 6$$

$$\lim_{\Delta x \rightarrow 0} 2x + \Delta x - 6$$

$$2x + 0 - 6$$

$$2x - 6 = m$$

$2x - 6$  is the equation for finding the slope of the tangent line at

FIGURE 3 - CALCULUS NOTES

online instantly and I can import my research into my notebook and highlight important info.

In addition, electronic notes can be easily searched. With only a few clicks I can search everything I ever wrote in a class. If someone missed a class, I can also easily provide them with a copy of my notes. If I had used paper, I would have had to find a copy machine.

Electronic notes are also more flexible. I can move around every word, image, or diagram. With paper, I sometimes realize after the fact that what I have written should have been on a new page. However, with a computer, I can select what I want to move, cut, and paste. In addition, when something needs to be erased, it erases clearly with no trace.

### TYPES OF CLASSES

I have discovered that using a computer and electronic notes is more helpful in some classes than in others. In one class, the teacher taught mostly from PowerPoints and would often spontaneously turn to the internet to look something up or research a topic. This was partially because she was a new teacher and did not have the course locked down in a format she had been using for years. In addition, the other students in the class were using laptops provided by the school as part of the "Classrooms for the Future" program. Since the other students were also working electronically, it was easier for me to work electronically as well.

However, this experience is not shared among all of my classes. In most of my other classes, the teacher did not let students use the provided laptops most of the time or they were not part of the CFF program that provided the laptops. These teachers also taught mostly from a textbook or from their own experiences. They did not make much use of PowerPoint or the internet. They also handed out many, many worksheets. In most cases, these types of classes have also been taught almost exactly the same year after year. It is harder to work electronically in these types of classes. I must manually scan handouts into my notebook or keep them separate. In addition, the key benefit of being able to quickly import internet research or teacher-provided notes into my notebook is diminished.

## HANDWRITING WITH INK

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The Fujitsu Tablet PC also has the ability to be written on using a pen. The writing is then converted to electronic ink which appears on the screen. Using the pen to write onto a OneNote notebook is like writing on a big pad of paper.

Using a Tablet PC's writing capabilities (called "ink") rather than typing has some pros and cons. It is much slower to actually write on my computer than it is to type. Even just surfing the web using the pen as a mouse feels slower than using a trackpad.

On the other hand, ink is useful in 3 cases: for drawing diagrams, writing on top of other documents, and writing is less "intimidating" than typing. Fortunately, the program I use, Microsoft Office OneNote, can combine typed text and written ink fairly seamlessly.



FIGURE 4 - T4220 IN TABLET MODE

Drawing using a pen is much faster than creating diagrams using the drawing tools in Microsoft Office or even making something in Photoshop or InkScape. I need diagrams because, as a visual learner, I need to see things, and diagrams are the most efficient way to communicate. As the saying goes, a picture is worth a thousand words. I can draw in 30 seconds (and have it digitally stored) what would take me 5 minutes using a mouse and drawing tools.

In addition, when I get content either from a teacher or off the internet, it is helpful to be able to draw on top of it. First of all, using existing notes lets me skip recording the basic information and write more advanced notes or personal anecdotes which help my memory. Plus, being able to write *on top of* lets me add material without disturbing the original and lets me see where my notes stop and the given ones start.

In my AP Psychology class, the teacher handed out PowerPoints of each chapter in the beginning of the year. I did not have my tablet then, but I used this "write on top of" strategy on printed paper PowerPoints as I read the textbook. I found it useful, because as a visual learner, I was able to connect the notes I created with the PowerPoint as the teacher went over the content in class. As the teacher reviewed the slides, I added what he said around the margin of the slide he was talking about. Using this method, I had all of my notes in one place. I started with the basic information already printed, added helpful explanations from the textbook, and finally I added the useful stories the teacher gave. All of this was centralized onto one stack of paper.

Lastly, writing is less intimidating than typing, especially in class. When I have a laptop open for typing, the screen cuts me off from other people. Typing is louder than



writing on paper. Writing feels more natural than typing. My American Studies teacher thinks that writing helps one memorize and that typing does not provide the same benefit. In all, writing feels more open than typing.

## GOVERNOR'S SCHOOL

The figure shows three screenshots of presentation slides with handwritten annotations in red and black ink.

**Slide 1: Methods for Evaluating Interactive Systems**

- User Modeling / Usability Testing
  - **User modeling** involves modeling users' behavior (i.e., actions) when using a system
  - **Usability testing** involves measuring users' performance (e.g., number of errors) when using a system
- Both of these techniques are:
  - Expensive
  - Time consuming

*Handwritten notes:* "no standard definition", "theoretical", "video depends", "I way mirror", "Count # of error", "time how long", "Count # of steps".

**Slide 2: Methods for Evaluating Interactive Systems**

- Heuristic Evaluation
  - Heuristic evaluation involves using a set of usability principles called "heuristics" to evaluate an interface
  - This technique is:
    - Inexpensive
    - Faster, but also probably less informative
  - We'll look at it in more detail a little later

*Handwritten notes:* "general principles", "\* Rules of Thumb".

**Slide 3: Decide What Questions to Ask**

- What is it that is **most important** that you know **now**?
- Be specific
  - NOT "Will people like it?"
- Be **quantitative**
  - e.g., can 90% of users learn this system in 10 minutes?

*Handwritten notes:* "esp. for certain things", "-oxygen masks", "-etc".

FIGURE 5 - SCANNING EXAMPLE FROM GOVERNOR'S SCHOOL

In the summer of 2008, I attended the Pennsylvania Governor's Schools of Excellence in Information, Society and Technology at Drexel University in Philadelphia. The Governor's Schools are free 5-week summer programs paid for by the Pennsylvania State Government. They are open to rising high school seniors, and in some programs, rising high school juniors. There are eight subject areas, each one held at a different university or college throughout the state. Tuition, as well as room and board, is paid for by the state. The entire program is free for the student. Admission is very competitive because, unlike most for-profit summer camps that tend to accept anyone willing to pay, there is no financial barrier to entry.

Because I had purchased the tablet to test streamlining my note-taking for college, I thought that the Governor's School, as a college precursor, would be a perfect test. I decided to take all electronic notes. The key benefit of electronic notes existed; with computers, topics tend to have much information available online. So, in Linux System Administration class, I imported tutorials from the internet into OneNote and highlighted the important steps and added notes in the margin about what worked for me. I did not have to write out every step and command - I only had to add clarification every so often.

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## PAPER VS COMPUTER

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As a result of using a tablet, I discovered that there are a few places where paper outshines a computer. I am familiar with paper, and writing on a computer just feels different. In addition, being on a computer can be distracting if one is not disciplined. However the main disadvantage, which I mentioned earlier, is that paper handouts given out by teachers need to be scanned in. In addition, items that have to be turned in that day must be printed, and a printer is not always easily accessible. In the future, more teachers may accept, or require, electronic submissions of work. Power and battery issues also do not exist on paper but must always be in the back of one's mind when one uses a laptop.

Lastly, some teachers may have reservations about a student using a computer in a classroom since many students are unable to focus if they are in front of a computer.

<u>Paper</u>	<u>Computer</u>
A few sheets: not so bad; a few binders: heavy	Medium heavy always
Uses paper from trees	Uses electricity from coal
Not easily searched	Easily searched
Find a copy machine	Email in 4 clicks
Print info from the internet	Paste in information from the internet
Does not sync	Syncs with all of your computers
Does not crash	May break down
Not easy to backup	Easy to backup
I am more neat with it	Can be a distraction
<b>\$5</b>	<b>\$1,300</b>

So all in all, I look forward to giving computer note-taking a try in 12th Grade. I think my trial run at the Governor's School showed how much overhead of time and "mental cycles" I was able to save. Having all my notes on the computer will significantly reduce the weight and volume of things which I need to carry around. I'm also looking forward to the day when electronic note-taking becomes so easy and viable that everyone is able to enjoy the benefits I will find next year on my digital journey.