

# A Case Study on iPad Use in Technical Writing Courses

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# List of Content

Abstract

Introduction and Background

Previous Research

Methodology

Discussion

Conclusion

Reference

# Abstract

*This study reviews the impact of exploring tablets as a new educational tool at the University of Minnesota in Department of Writing Studies. Part of this study reviews the impact of exploring tablets based on previous research. A recent article by Penn State states that Penn State's Education Technology Services (ETS) ordered 40 iPad tablet computers for faculty and students to use in a technical writing course. Students used Google Docs and other word processing apps on tablet computers to complete their assignments. Tablets and technology have a significant impact on learning in technical writing, as well significant change to instructional plans. Another study in 2011 provides a similar topic using iPads as a tool for education. Researchers have explored the impact of iPads in school and how access to and use of iPads will change the learning and teaching strategies in schools. At the University of Minnesota, I conducted two surveys: a web based student and staff questionnaire sent through Twitter and a Facebook group, and interviews with Ph.D students and graduate students in the Master of Science Scientific and Technical Communication program in the Department of Writing Studies. The iPad has a significant and positive impact on learning and teaching in technical communication courses, but there have been limitations in writing processes.*

# Introduction and Background

According to a market tracker, global sales of tablet computers will continue to see growth in 2015 after tablet sales growth of 4.4 percent in 2014 and more than 50 percent in 2013 (IDC Analyze the Future, 2014).

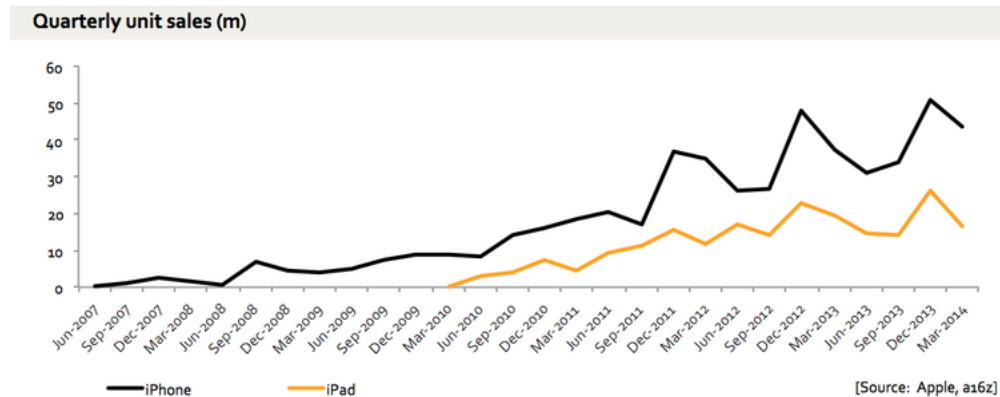


Figure 1

Another recent article, “Technically Speaking: Preservice Teachers’ Perspectives and Attitudes On the Use of Technology” in the *Technical Communication Journal*, states that pre-service teachers desire more creativity and better ways of communicating course content (Magolis & Homishak, 2014). Teachers have strong preference towards using Microsoft PowerPoint because the use of conventional computers is well established in schools. In the past, when the teacher used PowerPoint, the students were more interested in the lesson and the credibility of the teacher increased. This is an interesting fact, even though there’s no actual data to prove when instructors used presentation graphics, the students gain a better score in the lesson. In order to make a lesson exciting, using iPads could be a more creative and better way of communication.

Recently, Johnson High School and Harding High School are teaching the first iPad-only Math course and English course in the Saint Paul Public School district. The iPad education system is well established at the Saint Paul Public School district. A “Student and Family iPad Handbook” was designed to provide a guide for families and students after every student in Saint Paul Public Schools was provided an iPad. It includes:

- Introduction
- iPad basics
- Keeping the iPad safe
- Using the iPad at school
- Using the iPad at home
- Apps on the iPad
- Pictures, content and date

- Expectations for using the iPad
- Damaged, lost or stolen iPad

(Saint Paul Public School PERSONALED LEARNING )

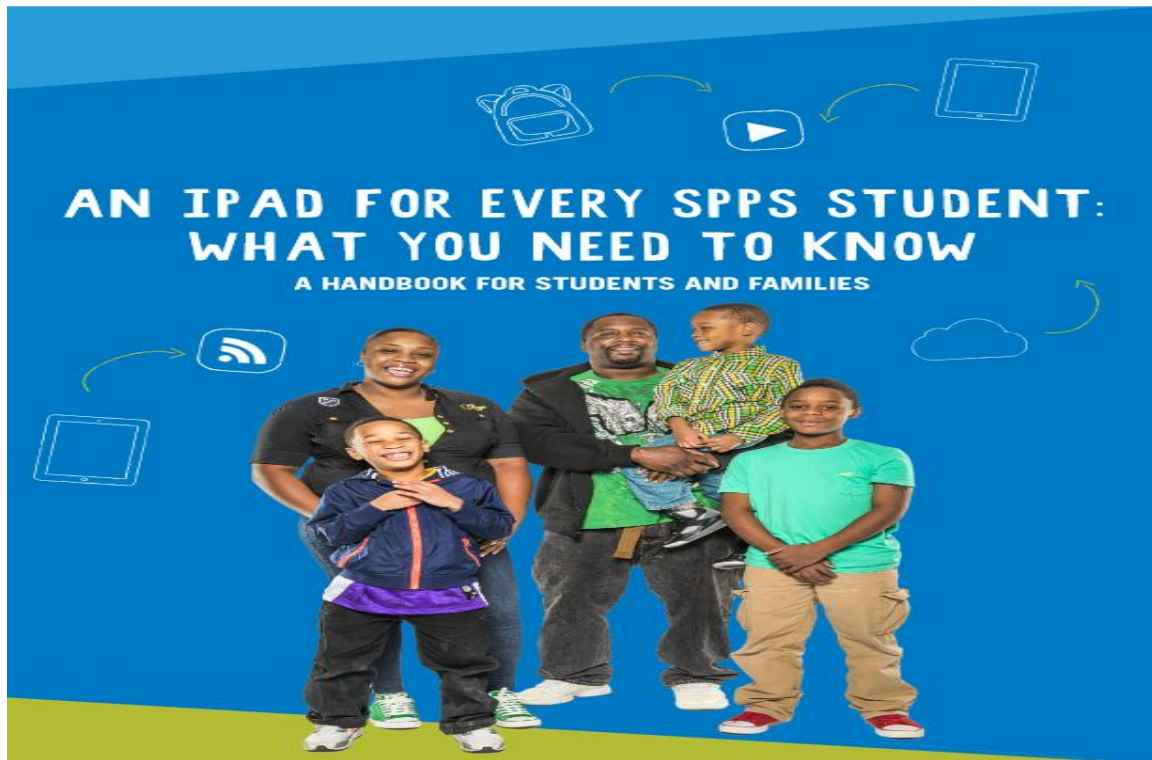


Figure 2. Student and Family iPad Handbook

There is also an online orientation on the Saint Paul Public Schools' website available in English, Spanish, Karen, Hmong, and Somaali. The majority of the students in Saint Paul Public Schools are Asian/Pacific Islander and Black (St Paul Public School District, 2015). The iPad orientation is well established in Saint Paul Public Schools.

There are ways technical writers can use iPads and there are apps for writing, drafting, outlining, editing, and brainstorming. "Technical communicators both produce information, in the form of manuals and other documents, and they also produce knowledge" (Grinnell & Hill, 2014). One reason to offer the iPad in technical communication courses in the university is because most writers are easily distracted. For researchers, part of the work is to capture information, organize data and collaborate with others and the increasing volume of digital information makes these more difficult (McCue, 2012). Fortunately, mobile devices offer researchers the opportunity to conduct their research and collaborate with others wherever they are when they are away from the office. Tablets are easy to carry and have a longer battery life than computers.

# Previous Research

There is currently only limited research published on the impact of iPad use in technical writing courses. The research at Longfield Academy, Kent includes much data, and the research at Penn State is focused only on a technical communication course. Reviewing current research was necessary before conducting the survey at the University of Minnesota. The majority of the survey is based on the previous research on how the iPad could be incorporated into a technical writing course similar to that at Penn State in 2012 and at Longfield Academy, Kent.

## At Longfield Academy, Kent

The Longfield Academy in Kent is a secondary school serving students aged 11 to 18 and has a strong intention to provide:

- Exciting and engaging lessons
- Each student technology to use in classroom
- Every student active and exciting learning online

(A study of the introduction of iPads at Longfield Academy, Kent)

At Longfield Academy, the ICT Association played the role of the principal investigator and reports the findings in the project. 9ine Consulting Ltd supported the research, an education consultant company providing services and solutions to educational organizations.

At Longfield Academy in Kent, questionnaire surveys of staff and students and parents were sent through SurveyMonkey with appropriate web links. The iPads were provided through the school leasing scheme totaling about 159 units in year 7, 145 units in year 8, 123 units in year 9, 125 units in year 10, 81 units in year 11, 60 units in year 12 and 33 units in year 13. In total about 726/960 units and additional 100 students have iPad not owned and managed by the school. The questionnaires were sent to the students with iPads, and 71 staff, 310 students, and 23 parents responded. The research questions included the following:

- Number of lessons in which iPad were used (per week)
- Subject use of iPads
- How students are using iPads in class
- Student activities using the iPad outside the classroom
- With the iPad I feel more motivated and can work better than without it
- Working with the iPad is helping me improve the quality of my work
- I am able to work more collaboratively with the iPad than without it
- I feel that I am making better progress with the iPad than without it
- I think that my achievement has improved since the iPad was introduced
- I feel that I am able to work more effectively with the iPad than without it
- Have subject specific Apps been used in any of your class?
- I think that using Apps has helped my learning
- I am happy to use the iPad regularly in my learning

- I have found the iPad easy to use in my work in class
- Technical issues with the iPad sometimes prevent me using it in class

(A study of the introduction of iPads at Longfield Academy, Kent)

According to a study of the introduction of iPads at Longfield Academy, Math and English have the strongest usage and higher levels of use. More than 65% of student respondents reported iPad was used in English lesson and about 55% of student respondents reported iPad was used in Math lesson. About 20% of teacher respondents reported iPad was used in English lesson and about 20% of teacher respondents reported iPad was used in Math lesson. The main use of the iPad in class is reaching topics online. It was agreed with the school that there's significant benefit to using personal devices to access web resources, and the iPad provides every student good network connections in the lesson.

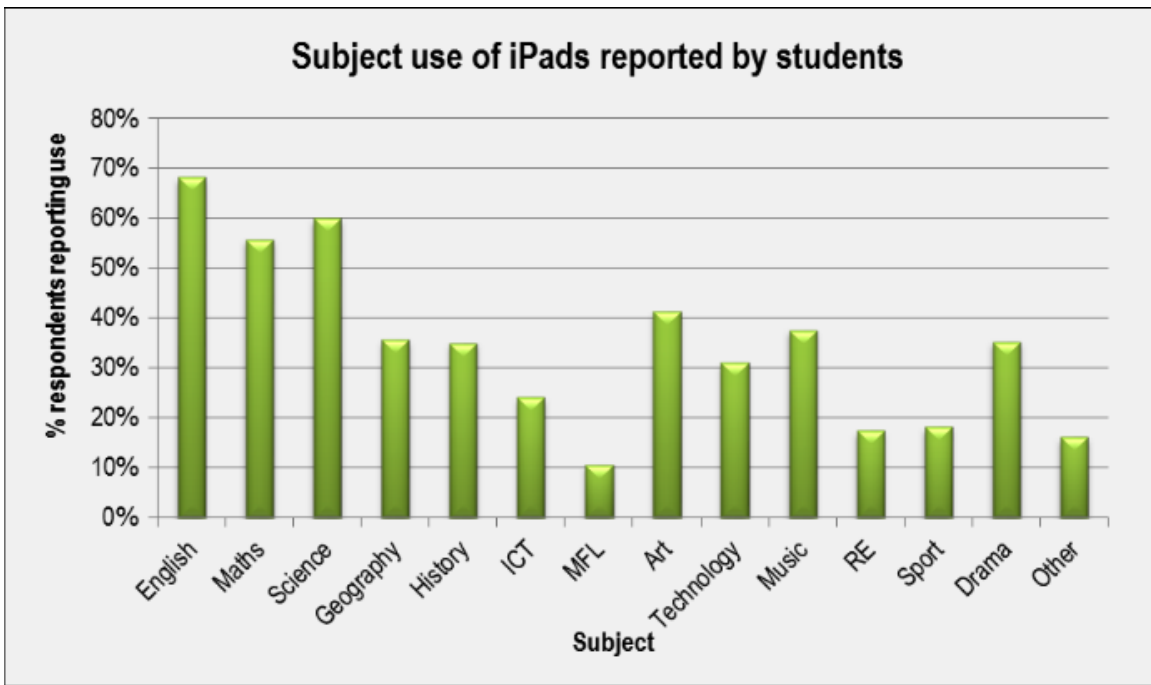


Figure 3

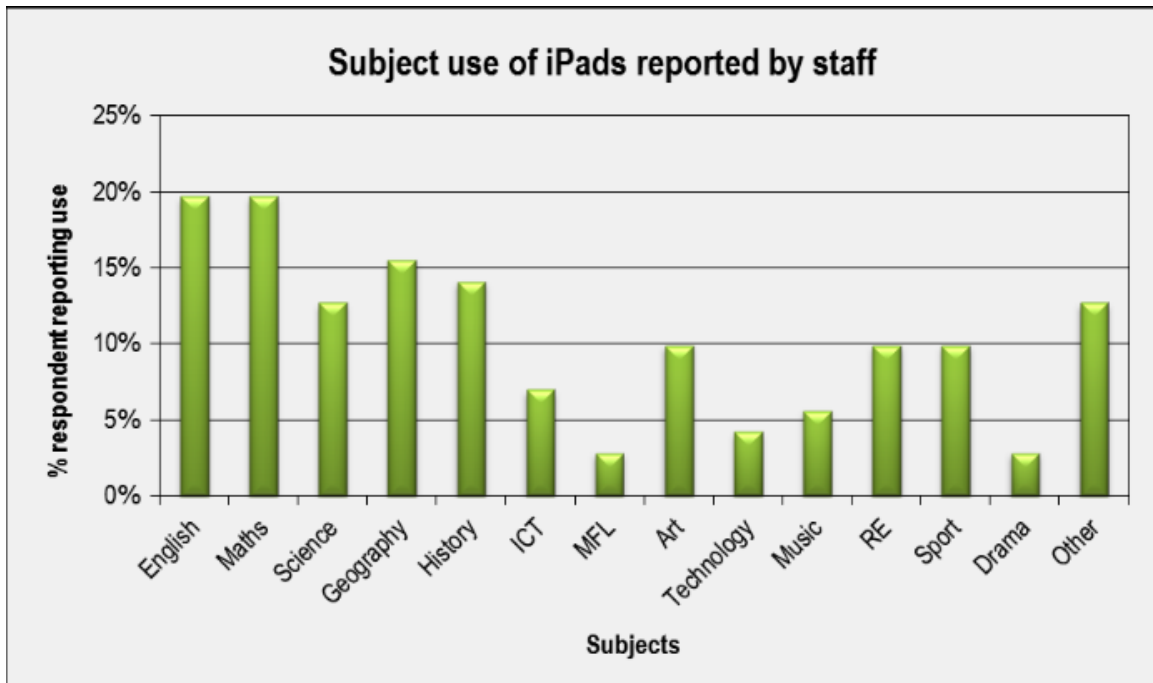


Figure 4

According to the data from the students, iPads were used to support more than 60% of the research work, which means the students completed the majority of research work in class through iPad. They were offered an alternative tool to research when they were away from home or school library. The teachers reported that about 80% of the research work was completed in class through iPad. With all the data showing the skyrocketing demand for mobile device in researching online, creating presentations and mind mapping in schools and colleges, I am interested in the following questions: How are tablets and other mobile devices currently being used in technical writing courses? How might tablets and other mobile devices be envisioned for use in technical writing courses? How important is this use for the technical communication field?



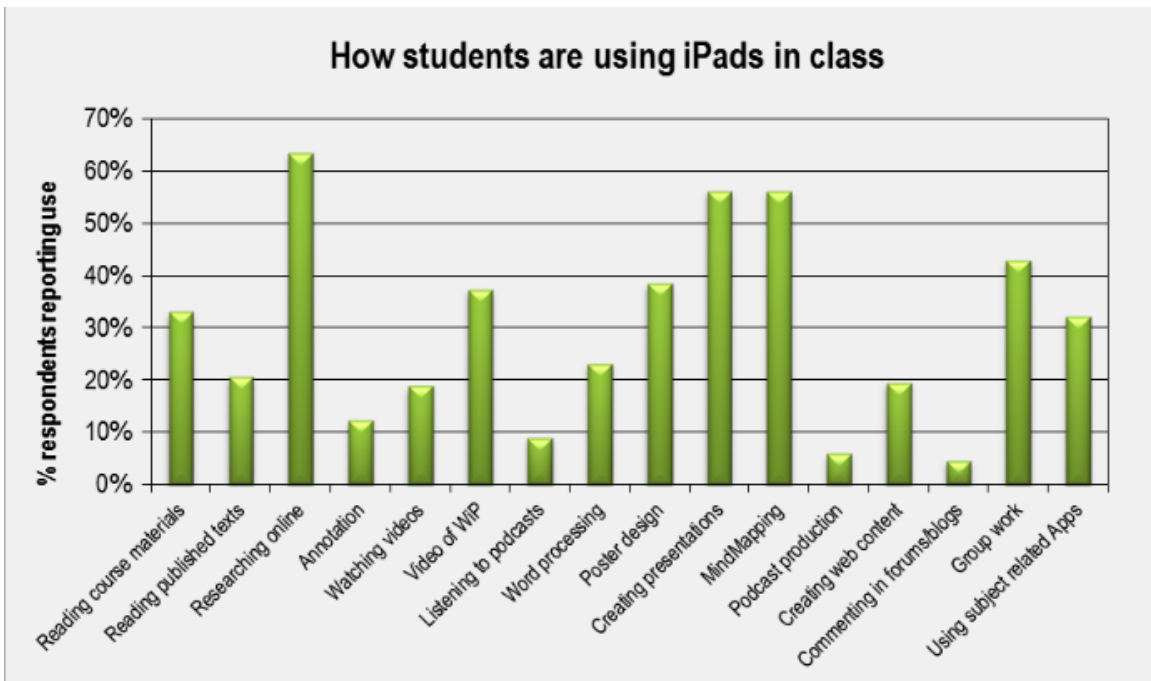


Figure 5

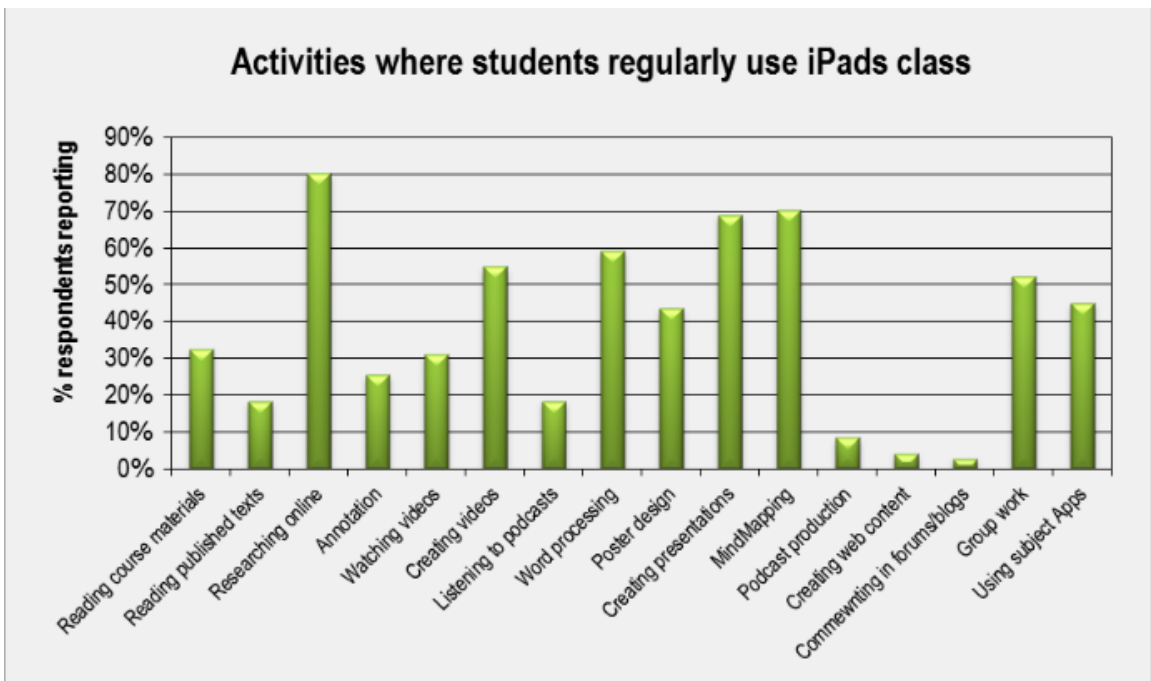


Figure 6

## Penn State University

At Penn State University, Michael Faris, an instructor in the Department of English, created a blog to document course resources and student feedback featuring the iPad in the technical writing course for fall 2012. Michael Faris and Stuart Selber also published the article “iPad in the Technical Communication Classroom: An empirical Study of Technology Integration and Use” in 2013 in the *Journal of Business and Technical Communication*. Michael Faris incorporated the iPad into a variety of activities that included the following:

- Students read the course textbook on the iPad
- Used the iPad for research on the Internet
- Pre-wrote and brainstormed using a word-processing application
- Did some other drafting on the iPad
- Accessed course documents using a cloud-based document sharing program
- Wrote blog posts from the iPad
- Peer viewed using an application that allowed making up and annotating PDF files

(Faris)

In summer 2010, Penn State’s Education Technology Services (ETS) purchased 40 iPad tablet computers for faculty and students to use in technical writing course. Michael Faris was the instructor of the technical writing course and used the iPad in his curriculum to plan the lesson for fall 2010. Penn State University hosted an initial survey and found that 14% of the students in the technical writing course owned iPhones and 22% owned iPod Touches (Faris & Selber, 2013) At Penn State, the technical communication service course is a general education requirement (around 2,000 students/year and 20-25 teachers/semester enrolled). The teacher-training course in the technical communication service course includes 10 people each semester for who are teaching technical communication for first time. Therefore, there were 20 teachers in training enrolled in the project who were graduate students in technical communication. The initial survey provided the teachers technology ownership and use was 11% for iPhones and 11% for iPod Touches.

Michael Faris said that “Students in my class were juniors and seniors who had already developed their reading, writing and research habits”, and “The iPad forced them to adapt to different strategies and change the way they think about their work.” (Faris) Michael Faris attached his syllabus in the blog:

*“Students in this course will be assigned an iPad (starting week 2) to use for course materials and procedures (including reading, note-taking, researching, and document production and delivery) through the term. In the spirit of this study, we ask that you try to perform as much as the coursework on your iPad as possible. Throughout the term, we will reflect on our experiences using the iPad for technical writing instruction and processes. You are responsible for bringing your iPad and keyboard, charged and ready to use, to class each day. Four times throughout the course, we will set aside course time for taped interviews about your experiences with the iPad.”*

In the project, Apple donated iTunes gift cards to each student in the class to buy apps through Apple’s App Store and each student received gift cards to buy/to download the digital textbook they needed. And to make the iPad not only a topic, but also a tool for the course, a usability report was assigned in the lesson to ask the students and teachers in training how they reflect iPad education based on their overall experience with the device. The sections meet in a computer room. Although the students of the 20 teachers in training were not provided iPad in their technical writing course, the 20 teachers were asked to use their iPad for key instructional tasks including:

- Reading the textbook
- Preparing and editing class materials
- Responding to student queries
- Exploring the challenges of electronic grading
- Making up pedagogical articles

The interviews were videotaped four times throughout the 16-week semester. The students and teachers were asked about their perceptions of the iPad, including:

- Reading
- Writing
- Teaching practices
- Challenges and opportunities for literacy
- Comparison (iPad/Computers/Printed materials)
- Textbook apps

		Writing Processes		
		Research	Design	
Task Difficulties	Low	Looking up definitions of terms or concepts E-mailing subject-matter experts for information Finding reference images licensed under Creative Commons	Styling headings Making columns and vertical lists Taking screen shots Managing negative space Inserting call-outs	↑ Accept interfaces  ↓ Reject or hack interfaces
	High	Analyzing examples Synthesizing information Testing usability	Comparing and contrasting prototypes Editing for coherence Creating and editing visuals	

Figure 7

According to the research report from Michael Faris and Stuart Selber, they listed task difficulties in the research “iPad in the Technical Communication Classroom: An empirical Study of Technology Integration and Use”. Research and Design have the strongest usage and higher level of use in technical communication course. Looking up definitions of terms or concepts, sending emails, and finding references were easy on iPads, analyzing examples, synthesizing information and testing usability were difficult on iPad. The research findings included:

One student noticed: “Having made an investment with my laptop into learning how to do the takes I cam interested, I have a hard time wanting to invest further energy in learning a new system to do the same tasks in a less efficient and less natural manner”. (Michael J. Faris and Stuart A. Selber, 2013) The comment revealed histories mattered to the participant’s attitude and the way the student used the iPad. Another participant revealed, “Usually I am not a creature of habit. In fact, I really enjoy changing daily habits for a refreshing feeling when it seems like I am falling into a boring work routine. I am excited to see what the iPad can do.” (Michael J. Faris and Stuart A. Selber, 2013) In this case, the personal history made the student more likely to use a new technology such as iPad. Since the 1980s, microcomputers have been available in universities for learning and teaching purpose in classroom. Compared to microcomputers, tablet computers are light weight, affordable and function as an e-book reader in modern technical communication.

Michael Faris, an instructor in the Department of English, taught the technical writing course in 2010 featuring the iPad in its class and documented the syllabus, external links, assignment sheets and class presentations in the blog. Students also blogged about their experiences throughout the term, and the research team kept a research blog about the progress of the research. Michael Faris is interested in exploring more apps, as well discovering a variety of ways the device can be used. He believes the iPad and similar multipurpose mobile may be the modern technical communication in the future. (Michael J. Faris and Stuart A. Selber, 2013) And since computers are getting smaller and cheaper, there's a hypothesis that iPad and similar computers may be the future of reading, writing and majority of technical communication. (Desprez, 2012)

# Methodology

I interviewed 3 instructors in the University of Minnesota's Department of Writing Studies. The purpose of this research is to collect feedback from these instructors and students feedback on iPad education based on their experience in technical writing course. Within the constraints of time and budget, I interviewed instructors and students through campus email and via google hangout to see what some students' perception are of:

- iPad and the associated course activities
- Reading, writing, and challenges and opportunities for literacy
- How working with iPad compare to working with computer and printed materials
- Textbook app

The students and alumni in the University of Minnesota Department of Writing Studies took the survey. Since the University of Minnesota agrees to gather data via questionnaire survey of the students in the University, the questions were sent through a group invitation on Facebook and Twitter to the students who have completed technical writing courses at the University of Minnesota. The structure used in the web based survey was reviewed by the IRB at the University of Minnesota and approved my research on April 14, 2015.

I designed a web based survey to see some students perception of: 1) iPad and the associated course activities 2) reading, writing, and challenges and opportunities for literacy 3) how working with iPad compare to working with computer and printed materials 4) textbook app I invited students - via their existing Facebook and Twitter accounts - to reply to my survey. I would like to share my ideas of the following research questions: What you use iPad for in class? How you feel about iPad education? Is it a more creative way than PowerPoint? Any changes on the way you want to communicate with your instructor? Rate your satisfaction from 1 to 5. I used iPad to access to Moodle page in technical communication class.

I also conducted a survey in the Department of Writing Studies in the University of Minnesota during the week of April 14, 2015. I sent invitations to all Ph.D students, instructors and graduate students who are in the master program to discuss their reflection and experience with iPads and technical communication. My research questions are:

- How are tablets and other mobile devices currently being used in technical writing courses?
- How might tablets and other mobile devices be envisioned for use in technical writing courses?
- And how important is this use for the technical communication field?

Student and instructor interviews were completed in late April 2015 through emails. Student and instructor questionnaires were also completed in late April

2015. A general analysis of interviews and questionnaires was completed in late April.

# Findings

## University of Minnesota

The University of Minnesota's Department of Writing Studies is a part of the University's College of Liberal Arts. The department offers popular courses, such as technical writing and communication, professional writing, and digital communication, through the first year writing program. Nearly every undergraduate student at the University of Minnesota and students who graduate from BS, MS and certificate program in scientific and technical writing have experience in technical writing courses. The Department of Writing Studies has a strong vision for technical writing and communication and intends to provide:

- Exciting and engaging lessons (Classroom)
- Every students using technology to improve learning experience (Online)

(Department of Writing Studies)

In the above project, the tablet computers were owned devices and managed by the school. Since iPads and similar multipurpose mobile are designed as personal devices, the idea of ownership will cause significant impact on learning, as well significant shifts on technology and knowledge. There's currently only limited published research on the impact of iPads owned by and managed by the student. Therefore, the research in the University of Minnesota may or may not have the same result as the project in the Penn State University and at Longfield Academy in Kent, where the students owned the iPads.

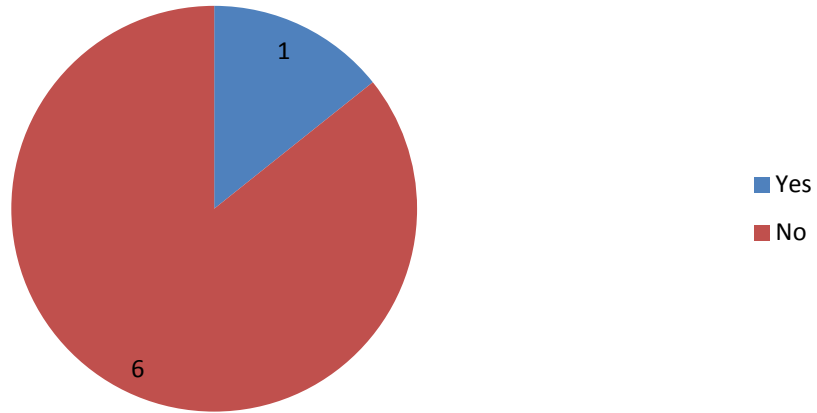
## How are tablets and other mobile devices currently being used in technical writing courses?

Within the constraint of time, a general analysis of responses to research questions began instantly in the week April 20. One student noted: "I read a lot class material on iPad because it is easy to carry when I am away from my office." Tablets are convenient because of the ease of portability. Tablets can be carried at coffee shops, airport, on planes and so forth. Another student asserted that writing on the iPad is difficult without a keyboard "I have noticed one student this semester who uses only iPad with a keyboard as opposed to a laptop."

## Would an iPad be sufficient for a college student?



## Would an iPad be sufficient for a college student?



3 instructors were asked the question in interviews and 4 students responded the question through Facebook. Only one student said “Yes” because of the wireless keyboard. Based on the student and alumni questionnaire, iPad for college cons: 1) can’t multitask such as surfing internet while writing paper and listening to music 2) get scratched easy 3) don’t work for flash drive or removable device. When iPad first introduced, the answer is solid “No”. The answer shifted to “Maybe” with the introduction of the Apple wireless keyboard. The iPad uses a touch interface and has no current support for a mouse now. And later, with the Apple wireless mouse – a advent of specialized equipment and service – the answer is qualified “YES”. (Gruberman, 2015).

### How might tablets and other mobile devices be envisioned for use in technical writing courses?

Two students noted that the iPad is affordable and have a longer battery life than computers. One student reported that “I have used the iPad Mini for reading journal articles on occasion from class assignments and for accessing Moodle or my campus email.” In the Department of Writing Studies, the iPad is sufficient to read journal articles and class assignments on Moodle. Since most of technical writing course requires much reading and writing, reading with iPad is convenient.

iPad is the perfect size tablet for taking notes in technical writing course if the student choose the right applications. The students found the iPad is light weight, it’s a great tool to read and to do simple writing tasks. One student agrees the light weight of iPad is a nice benefit and iPad makes Internet, class files, notes, calendar all located in one mobile device lighter than a laptop.

**Evernote:** The iPad's many uses include Evernote, Penultimate, Index card, Goodreader, Cloud on and etc. (Fauth, 2013) Evernote is perfect for storing text notes, photos, scans, web pages, and voice, which make this app a surprisingly capable helper. (Kendrick, 2012) And since it is a free app, Evernote captures any type of information for no cost. Moreover, Evernote will make text on pictures and in videos searchable on both mobile device and computers. Content captured by mobile device and data is automatically synchronized to computers.

**iAnnotatePDF:** an example of reviewing documents and research is using iAnnotate PDF to peer review offering comments, highlighting and feedback on overall writing on students' files and emailing them back. Teacher grade electronic paper instead of printed paper and students receive grade through iAnnotate PDF, which is a significant change in technical writing course. iAnnotate PDF is a great application for the iPad. Michael Faris found there were many benefits of grading this way:

- The mediation of the screen on the iPad narrows my focus so I get less distracted as I grade
- I am more willing to type suggested rewording than I am to handwrite it
- I am more likely to explain mechanical errors than just making them
- I found I was more forced to be concise in my overall comments because of the limited screen space

(Faris)

## Discussion

One student at University of Minnesota said that the first version of the iPad operating system did not support multitasking. Faris and Stuart quoted one student writer at Penn State: “Can I listen to music on the iPad? That will determine if I can be productive or not” (Faris & Selber, 2013). Participants were not able to play music while running another app at the same time on the operating system. This is a limitation of the first version of the iPad, but it was upgraded in the next operating system. The limitation was recognized, then solved in a short time.

Mr. Reiff, a technical writer, shared his idea on apps in his blog: “If there isn’t an app that does something I need, there will be sooner or later” (Desprez, 2012). Recently, a great demand for mobile devices has overtaken computer purchases, there’s a gap between technical writing and modern technical communication (Blog, Documentation, Technical Writers, Technology & Tools, 2011). Should technical writers focus on writing and delivering user assistance for mobile devices? Is writing for mobile the next big thing in technical writing? Some software developers explained that mobile apps are designed to be simple and easy to use; if a mobile app includes a great documentation, it probably means the mobile app is difficult to use.

According to *The New York Times*, and many experts in technical writing and communications, mobiles and tablets made the big change for writers (Hu, 2011). At the WritersUA conference and the Society for Technical Communication conference, mobile phones and tablets were referenced many times (Desprez, 2012). There is recently published research on how technical writers can use an iPad to become more productive, and there is also published research on the topic of whether the iPad is suitable for a technical writer. When the iPad education in technical communication is well established in schools and colleges, the iPad may be suitable for technical writers.

# Conclusion

Now, although mobile devices have been well used in the curriculum as an implementation, students complained that iPads do not utilize a pointer within their operating system. The iPad has a significant and positive impact on learning and teaching in technical communication courses, but there have been limitations in writing processes. At Saint Paul Public Schools, the district expected the student will be able to:

- Collaborate more easily on projects and sharing documents with each other and their teachers.
- Use multiple applications (apps) to explain concepts, such as drawing apps that make more sense to visual learners.
- Record or videotape teacher directions and play them back to help reinforce understanding and learning.
- Look up terms or facts instantly instead of leaving questions unanswered.
- Use video, sound, music and graphic design to creatively complete assignments or take notes.
- Explore Egyptian pyramids or far-away galaxies with apps that model real-world experiences.
- Break the boundaries of traditional classrooms to collect real-world data, analyze it using the professional tools and share conclusions with others in ways that empower students to make a difference.

(Saint Paul Public School PERSONALED LEARNING )

As the students use the iPad more than a year, they will be able to gain skills based on the iPad and gain experience using the mobile device.

At universities, with Apple soon to lease some specialized equipment and services, the iPad may be sufficient for college students. Also, since the iPad is affordable, it can save money for students and can be considered as a more creative way for teachers to present.

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## War-bixinta qoysaska laga siinayo isticmaalka iPad-ka (Soomaali)

Fomkani oo ah mid laga heli karo internet-ka waxaa loogu talo galay qoysaska ay u suurta gali waysay in ay ka qayb-qaataan xafiidii War-bixinta qoysaska lagaga siinayay isticmaalka iPad-ka ee lagu qabtay iskuulka ay ilmahoodu dhigtaan.

Gudaha foomkani waxaad ka heli kartaa link kugu xirayo bogga internetka ah ee "Student and Family iPad Handbook." oo aad ka daawan kartid video/muqaal ku saabsan isticmaalka iPad-ka. Sidoo kale foomkani gudahiisa waxaad ka heli kartaa foom kale oo aad ku buuxin kartid macluumaadka ku saabsan ardayga. Intaas waxaa dheer oo aad foomka ka dhex heli kartaa qayb aad ku aqbali kartid kuna saxiixi kartid heshiiska dayminta iPad-ka ee ardaygu laga rabo inuu galo (Student iPad Loan Agreement)

Waxaa haboon in waalidiinta iyo ilmahoodu ay isla akhriyaan fomkani si wada jir ahna u buuxiyaan meelaha looga baahanyahay. Ilmahaagu wuxuu isticmaali karaa iPad-ka ka dib marka aad bogtid akhrinta foomkani oo aad aqbashid heshiiska ku qoran.

WAXA LAGAA RABAA WAA IN AAD:

1. Akhrisid buuga gacan-qabsiga ah ee ardayda
2. Daawatid video/muuqaal ku saabsan qaabka loo daryeelo iyo qaabka si nabdoon loogu isticmaalo iPad-ka.
3. Dib u eegtid caqabadaha ka dhalan karo hadii iPad-ka marar badan ardaygu uu jabiyo, lumiyo ama laga xado
4. Akhrisid oo aad saxiixdid heshiiska dayminta iPad-ka ee ardaygu laga rabo inuu galo (Student iPad Loan Agreement.)

akhrinta foomka oo idil waxay qaadanaysaa 15-20 daqiiqo.

TILMAAMTA BUUXINTA FOOMKA:

Riix badhanka "CONTINUE" ee hoos kaga qoran bog kasta si aad oogu gudubtid bogga xiga ee foomka. Marka aad foomka dhamaysid riix badhanka "SUBMIT". Hadii marka aad foomka buuxinaysay aad ku buuxisay email-kaaga waxaad helayaa fariin cadaynayso in aad foomka gudbisay.

Macluumaad dheeri ah waxaad ka heli kartaa barta <https://personalizedlearning.spps.org>

Figure 10



## Qhia Txog iPad Rau Tsev Neeg (Hmoob)

Daim ntawv uas muaj nyob online no yog rau cov tsev neeg uas mus koom tsis tau lub rooj qhia txog iPad rau tsev neeg nyob rau hauv lawv tus me nyuam lub tsev kawm ntawv.

Daim ntawv nyob online no muaj kab txuas mus rau "Phau Ntawv Qhia rau Cov Tub Ntxhais Kawm Ntawv thiab Tsev Neeg Txog iPad," zaj duab mus kev qhia txog kev siv iPads, daim ntawv teev qhia txog tub ntxhais kawm ntawv, thiab chaw xee daim ntawv teev Cov Lus Yeem Qiv iPad rau Tub Ntxhais Kawm Ntawv.

Cov niam txiv thiab me nyuam yuav tsum ua qhov txheej txheem online nov UA KE. Thaum nej ua daim ntawv no tiav thiab yeem raws li cov lus uas teev tseg lawd, nej cov me nyuam yuav muaj peev xwm siv tau lawv lub iPad rau ntau yam.

YUAV UA LI CAS:

1. Nyeem Phau Ntawv Qhia rau Cov Tub Ntxhais Kawm Ntawv thiab Tsev Neeg Txog iPad
2. Saib ib zaj duab mus kev luv luv qhia txog kev ceev thiab siv lub iPad kom muaj kev ruaj ntseg.
3. Saib lub txim uas yuav nog rau tub ntxhais kawm ntawv yog ib sij ua iPad piam ib zaug, ua iPad pawv, los sis raug nyiag.
4. Nyeem thiab xee daim ntawv teev Cov Lus Yeem Qiv iPad rau Tub Ntxhais Kawm Ntawv nyob online.

Tas nrho daim ntawv no siv ntev li 15 mus rau 20 feeb xwb ua tiav lawm.

UA RAWS LI NRAM NO:

Nias lub pob "Continue" nyob hauv qab ntawm txhua txhia phab kom mus rau phab ntawv tom ntej. Nias "Submit" nyob rau qhov kawg ntawm daim ntawv. Yog hais tias nej twb muab nej qhov chaw nyob email rau peb lawm, peb yuav xa ib tsab email tuaj qhia rau nej paub hais tias peb txais tau nej daim ntawv lawm.

Muaj qhia ntxiv nyob rau hauv <https://personalizedlearning.spps.org>.

NCO NTSOOV: Cov tsev neeg yuav tsum ua ib daim ntawv rau txhua txhia tus me nyuam.

Nias lub pob "CONTINUE" hauv qab kom mus rau phab tom ntej.

Continue >

Figure 11