



UNIVERSITY OF NOTRE DAME
MENDOZA COLLEGE OF BUSINESS

ePublishing Working Group

Findings from eReader Project, Phase 1

Use of iPads in MGT40700, Project Management
Fall 2010, Module 1, August 23-October 8

With additional insights from a selection of 'iPad' courses
Fall 2010, Module 2, October 25-December 10

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ABSTRACT

The eReader Project, launched in the fall of 2010 by the *Notre Dame ePublishing Working Group*, was initiated with the intent of gaining insight into how Notre Dame could build an ecosystem to support the creation, distribution, and consumption of ePubs and eBooks on both present and future eReader devices. The first phase of the research project described here measured technology acceptance (ease of use, usefulness, etc.), technology value, and actual use of the iPad devices. The majority of this document describes findings from surveys, focus groups, and interviews of 40 students in an undergraduate Project Management course during the first half of the fall semester; however, we report some empirical comparisons between these 40 students and a second wave of 38 students who received the iPads in the second half of the fall semester. A related goal of this project was to conduct a real-world implementation of eReaders to identify unknown barriers, be they technical or behavioral. Considering our small sample size, we caution against generalizations or interpreting our findings as policy recommendations; however, our preliminary results suggest several interesting insights. First, our findings suggest the greatest value of the iPad may not be its ability to function as an eBook reader but instead its capacity to function as a consolidator or aggregator of information. Second, a statistically significant proportion of students felt the iPad, 1) makes class more interesting, 2) encourages exploration of additional topics, 3) provides functions/tools not possible with a textbook, and 4) helps students more effectively manage their time. While there were some technical and behavioral challenges associated with reading the eBook, overall impressions of the iPads were very favorable and students noted they would tolerate some of the shortcomings as technical improvements are being made. Because our results do not provide a comprehensive measure of the objectives related to consolidating/aggregating information, nor do they fully explore the extent to which learning outcomes vary with respect to iPad use, further studies that include natural observation, surveys, and student focus groups are recommended.

INTRODUCTION

As technology continues to advance at a rapid pace, our society is becoming increasingly digitized. This digital transformation has implications for higher education, and has the potential to change the way professors teach, how students learn, and the manner in which both parties interact with course material. Given the daily contact that institutions of higher education have with one of the largest demographics of new technology adopters (i.e. college students), colleges and universities are uniquely positioned to become partners in innovation for education. In addition, the increasing prevalence of technology in both academic and corporate settings necessitates that students become comfortable using technology to facilitate learning and productivity. The purpose of the eReader project is to evaluate the creation, distribution, consumption and usefulness of electronic course materials in an academic setting by examining the usefulness of the iPad as an eReader. Through natural observation and a series of surveys and focus groups, the ultimate goal of this study is to design an “ePublishing ecosystem” to serve faculty, students and staff by streamlining the creation, distribution, sharing, reading and annotation of eMaterials in a cost-effective manner. To that end, we provided iPads (see Appendix for distribution details) to all students enrolled in an undergraduate business management course (see details below in Methods) with very few directives issued relative to how to use (or not use) the iPads. We did this because we wanted to understand *how* or *if* the iPad changed the way students read, studied, participated, took notes, etc. We also anticipated that students would 'invent' ways of using the iPad to improve their course engagement.

In the next sections we primarily discuss findings from surveys conducted in the undergraduate business management course. That course was 7-weeks in length, ending just before fall break. After fall break, a new group of students were provided with the iPads. At the time of this writing, three surveys had been completed by the second wave of students. Where relevant we have provided comparisons between the business management students and the second wave of iPad students, which included a subset of graduate business students.

METHODS

There were 40 subjects in this study, all of whom were juniors (2) or seniors (38) at the University of Notre Dame and enrolled in Professor Corey Angst's Project Management course. The course spanned seven weeks (a module), and students were informed *after* they registered that iPads would be distributed to all enrollees with the intention that an eBook would be downloaded to the device in lieu of the physical textbook typically required. The content of the eBook was identical to that of the physical book, and students were given the option to decline use of the iPad for the module and purchase a physical textbook. Student response to this option unanimously favored use of the iPad, and not a single student opted not to participate in the eReader Project study.

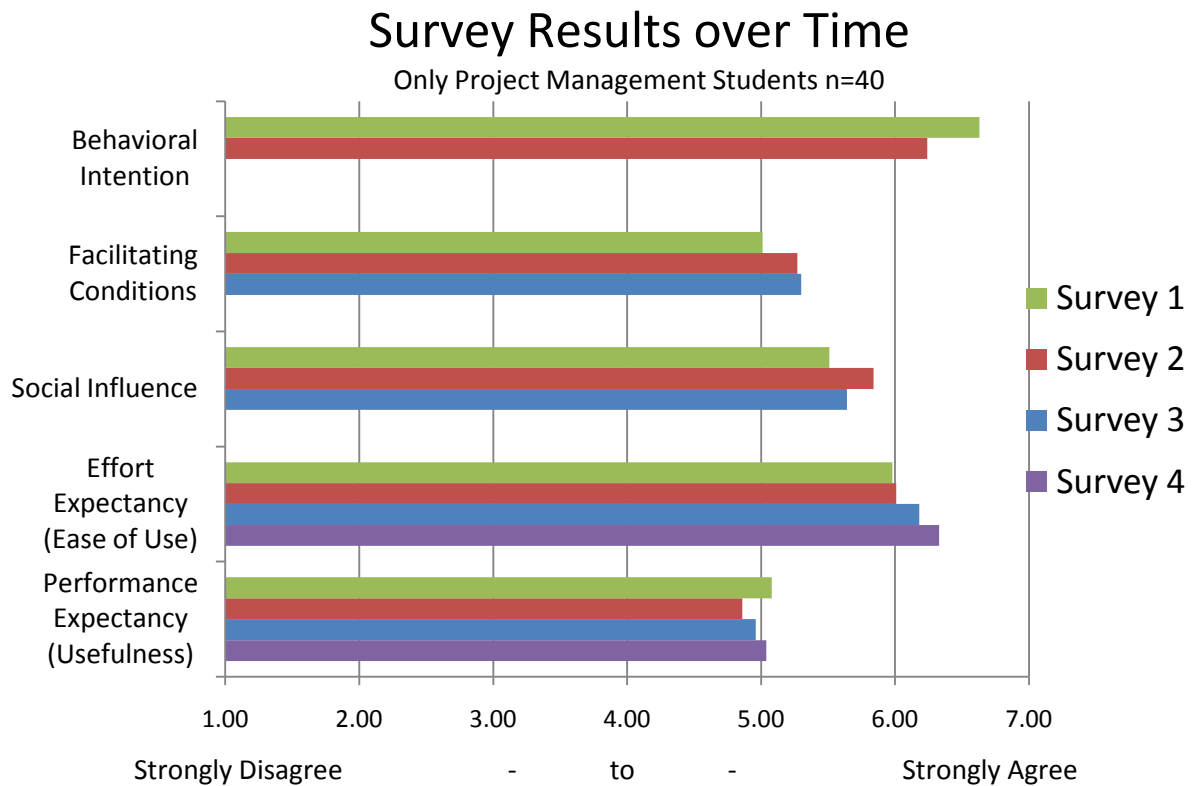
Online surveys were administered to the students one week prior to the first day of class before students were given the iPads (pretest), at the ends of week 2 and 7, and a post-course survey was administered three weeks after the iPads were returned. Surveys 1, 2, and 3 were comprised of identical content and were intended to measure five main effects:

- Behavioral Intention is simply whether or not the subject intends to use the iPad in the future (BI is not reported in survey 3 because the students were returning the iPads).
- Performance expectancy (usefulness) is defined as the degree to which an individual believes that using the system will help him or her to attain gains in performance.
- Effort expectancy (ease of use) is defined as the degree of ease associated with the use of the system.
- Social influence is defined as the degree to which an individual perceives it important that others believe he or she should use the new system.
- Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.

The fourth survey included Performance Expectancy and Effort Expectancy and was primarily designed to assess attitudes and beliefs about the use of the iPad after the students had been without it for two weeks.

RESULTS

Results of the main effects observed throughout the four surveys are outlined below. In the majority of studies involving participants' interaction with new technology, a drop in technology acceptance and perceived value of the technology are generally observed after initial excitement has subsided. No such lulls in acceptance or value were detected in the iPad study, as evidenced by the consistent values of Effort Expectancy and Performance Expectancy over time. We did not collect data on Behavioral Intentions in survey 3 or 4 because the iPads were being taken away just after survey 3. We also did not believe Facilitating Conditions or Social Influence were relevant after the iPads were returned and therefore did not collect that data in survey 4.

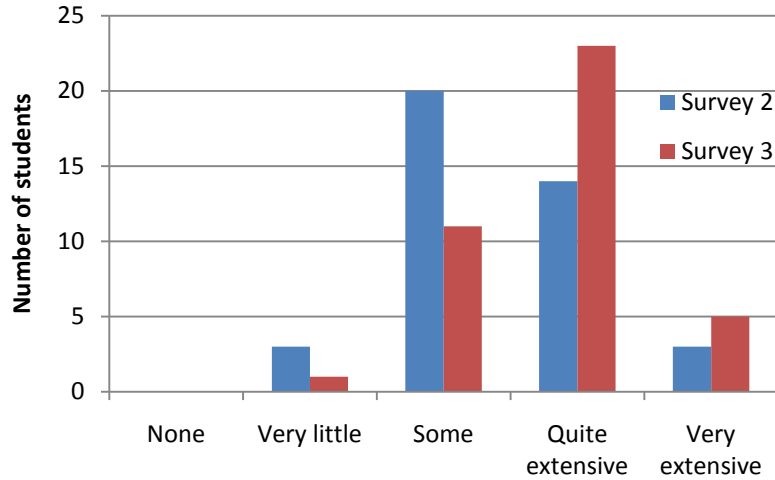


Takeaways:

- 1. Expectations were high due to the incredible hype surrounding the release of the iPad, but performance appeared to live up to the hype.*
- 2. Usefulness (PE) was very consistent throughout the entire study and it did not “wear off” even after the iPads were returned, suggesting this was not a transient effect that went away when students went back to the ‘traditional’ way of working.*

In the next section of this report, we provide several graphs and brief interpretations of the results if warranted.

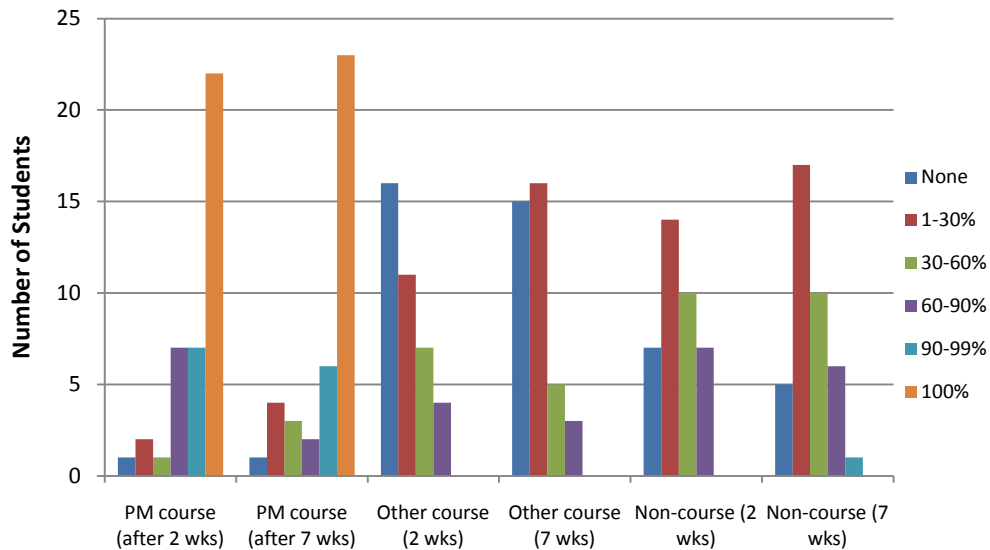
How would you rate your skill level of using the iPad?



Takeaways:

1. After 2 weeks of use (survey 2), students were already quite adept in using the iPads and only 3 students felt they had very little or no skill.
2. After 7 weeks of use (survey 3), skill level increased significantly and only 1 person felt s/he had very little skill.

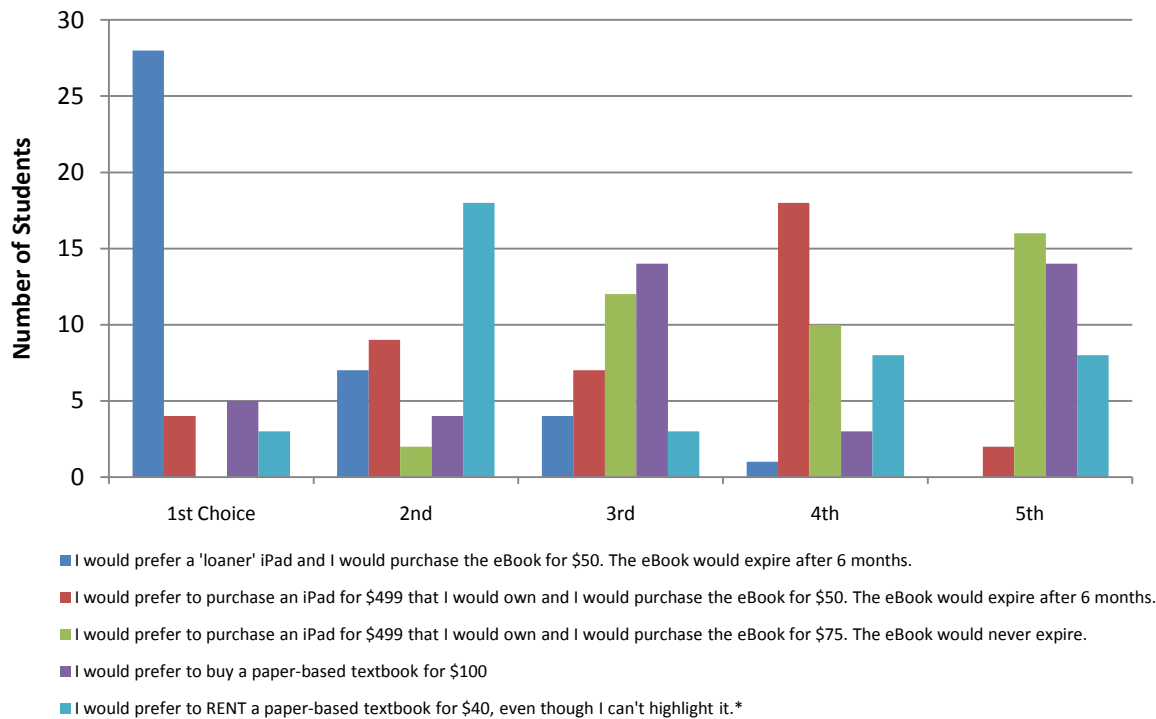
What percentage of the READING you do for _____ is done using the iPad?



Takeaways:

1. Number of students doing 100% of reading in PM class on iPad increased slightly over time, but generally the results were stable.
2. Most students are using the iPad to read at least some material for other courses and non-courses.

If you were to take another course from Prof. Angst, which option would you choose?

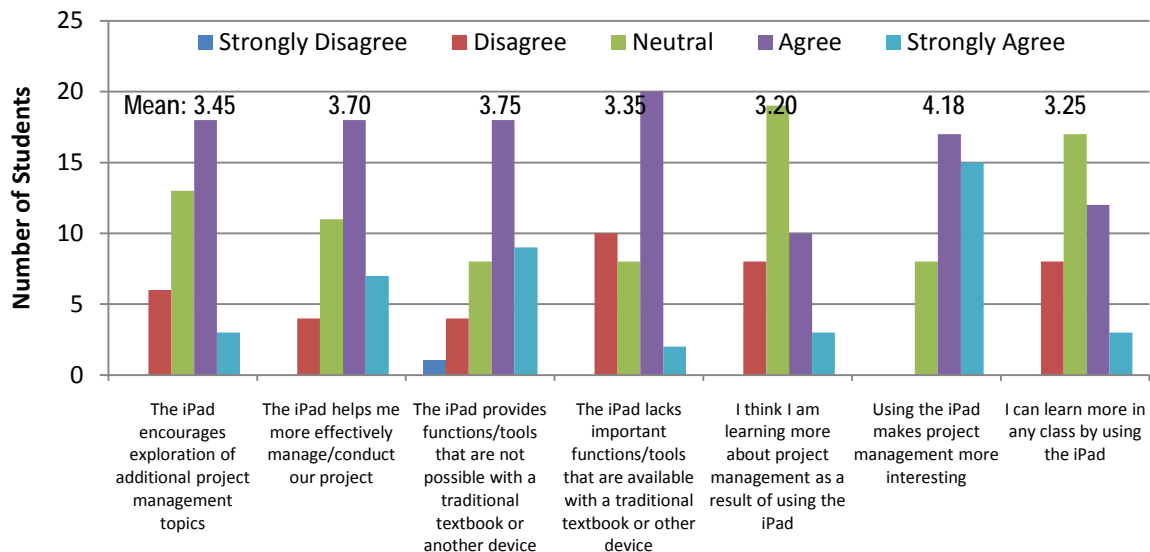


*I was informed after the survey was administered that the ND book rental policy allows students to highlight the textbook. This may have skewed our results in an unfavorable way relative to that option.

Takeaways:

1. Students preferred the iPad loaner model in which the book expires.
2. 35 students chose the iPad loaner model as their 1st or 2nd choice followed by 'textbook rental' with 21 students.

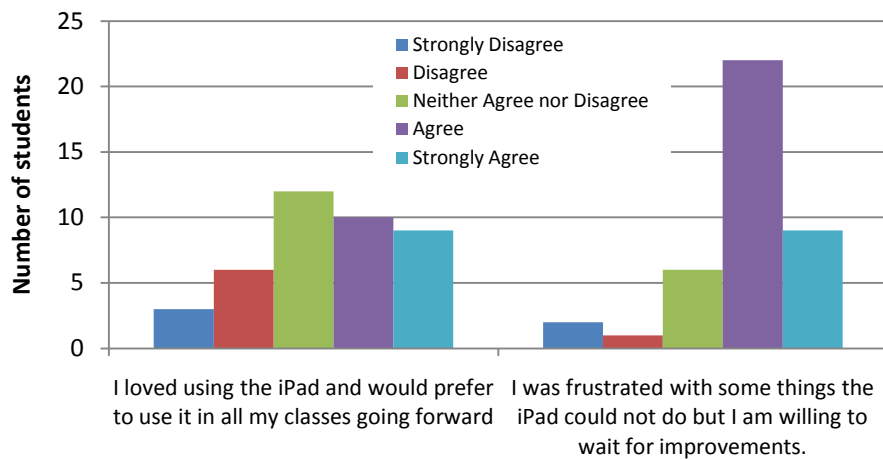
To what extent do you agree/disagree with the following statements?



Takeaways:

- 1. The perceptions of the students are that the iPad encourages exploration, allows them to more effectively manage the project, provides additional functions but also lacks important functions, and makes project management more interesting.*
- 2. Even in this admittedly small sample of 40 students, the means of all but items 5 and 7 differ significantly from the neutral response.*
- 3. While not statistically significant, the majority of students said they are learning more by using the iPad.*

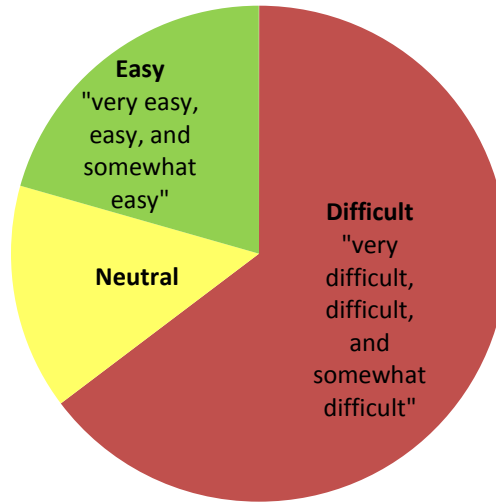
What are your general feelings about using the iPad in this PM course?



Takeaways:

- 1. This result demonstrates some of the dissonance in beliefs about the iPad.*
- 2. While a large proportion of students would like to use the iPad in all classes, there was still significant frustration with some of the limitations, yet students appear willing to wait for improvements.*

How difficult is it going to be to give up your iPad?



"Difficult" Very Difficult, Difficult, Somewhat Difficult
<ul style="list-style-type: none"> • Size, much lighter than laptop • Speed, much faster than laptop • Instantly 'on' • Easier to read/write emails than on iPhone • Convenience of having everything in one place – textbook, notes, articles, internet, email, games • Highly portable • Social perception – trendy image associated with iPad • Easy to use anywhere – in class, sitting in comfort of home • Primary schedule • Makes backpack lighter, easy to access information • Fun device but did not have time to explore • Not easy to take notes or annotate, so easy to go back to old way of working • Useful as a second screen or light work when necessary • Enjoyed quick access to internet, but did not make 'own' during study • Enjoyable to use, but 3rd party software severely lacking • Alternative to laptop • Convenient to read email, notes, news, etc. • Easier to open attachments than BlackBerry
Neutral
<ul style="list-style-type: none"> • Only enjoyed for out of class activities (email, news), did not enhance learning experience • Fun to play with but ended up using laptop (MacBook) for most work • Enjoyable to have, but not practically useful • Used for reading, but cannot justify cost because still relied on laptop for most things
"Easy" (Somewhat Easy, Easy, Very Easy)
<ul style="list-style-type: none"> • Tended to use iPhone more, although iPad was better for typing than iPhone • Still relied on MacBook because it had more functionality • Did not use much. Preferred PC. • Used to read PM text and check email, but can do that just as well on laptop • Used it initially, but ended up using iPhone more • Did not use often; continued to use laptop because it was easier to operate • Did not use much outside of PM course. Own other devices that are just as good or better (iPhone, laptop)

Takeaways:

1. Those who reported difficulty (ranging from “very difficult” to “somewhat difficult”) in giving up the iPad seemed to use the iPad more frequently as an alternative to a laptop or mobile device. While the iPad was not foreseen as being a substitute for a laptop or Smartphone, those who reported the most difficulty in returning the device seemed to use it as such.
2. Those for whom it was easy (ranging from “somewhat easy” to “very easy”) to return the device did not rely heavily on the device throughout the study. They continued to use the technology they were accustomed to, such as a laptop and/or iPhone.

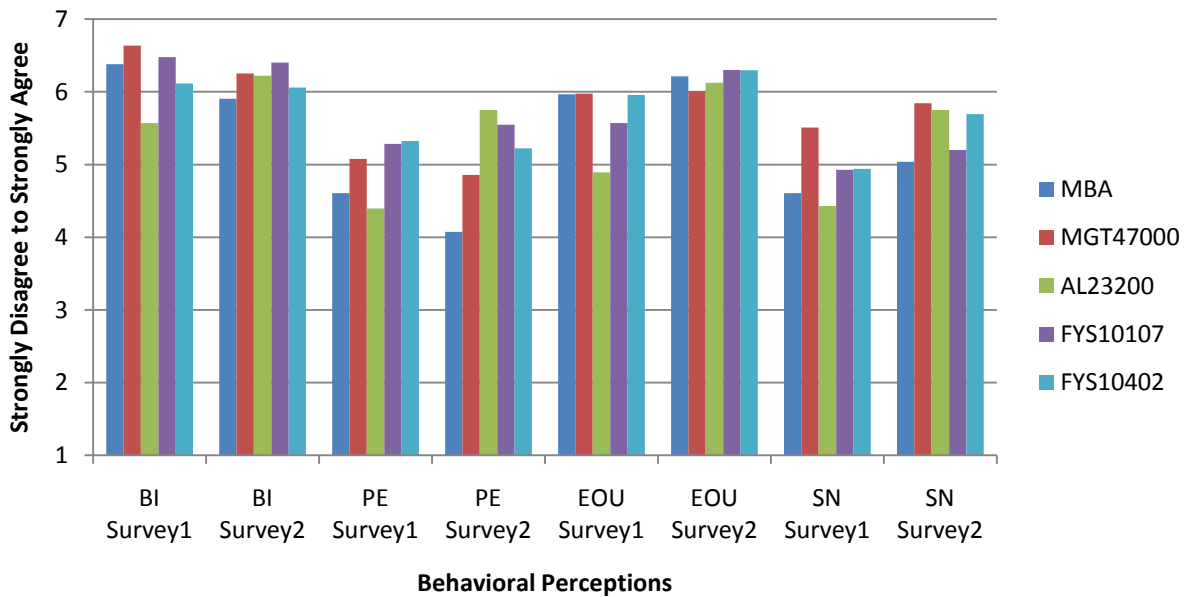
Comparisons across Courses

After the 7-week project management course ended, the iPads were redistributed to students in three different undergraduate courses and a small group of MBA students. We include this section of the report not as an exhaustive research inquiry but more so to provide some comparisons across course and academic levels. Descriptions of the courses and students are supplied in the table below.

	Course Number	Course Name	Course Description	No. Students and Academic Level
Module 1	MGT40700	Project Management	<i>Management:</i> Introduction to the process of managing projects	2 juniors 38 seniors
Module 2 (2 nd 7-week session)	FYS10402	Law School 101	<i>First Year Studies:</i> Intro to the law school experience for students considering law	15 freshmen 2 sophomores 1 junior
	FYS10107	Contemplation and the First Year Experience	<i>First Year Studies:</i> Introduction to collegiate thinking	7 freshmen
	AL 23200	Research Strategies for the Information Age	<i>Arts and Letters:</i> Intro to resources for students interested in research	2 freshmen 3 sophomores 1 senior
	MBA (variety)	Masters in Business Administration	Each student had multiple courses	7 students all in 1-year MBA program
Totals across Modules 1 and 2				24 freshmen 5 sophomores 3 juniors 39 seniors <u>7 graduate students</u> 78 total students

In this section of the report, we provide several graphs depicting comparisons across courses. Each of the participating undergraduate courses in module 2 was taught by a different professor who ‘self-selected’ to use the iPads in his/her course. The MBA students volunteered to participate and their professors were not made aware that the students were participating in this research. No students in our sample participated in more than one “iPad” course.

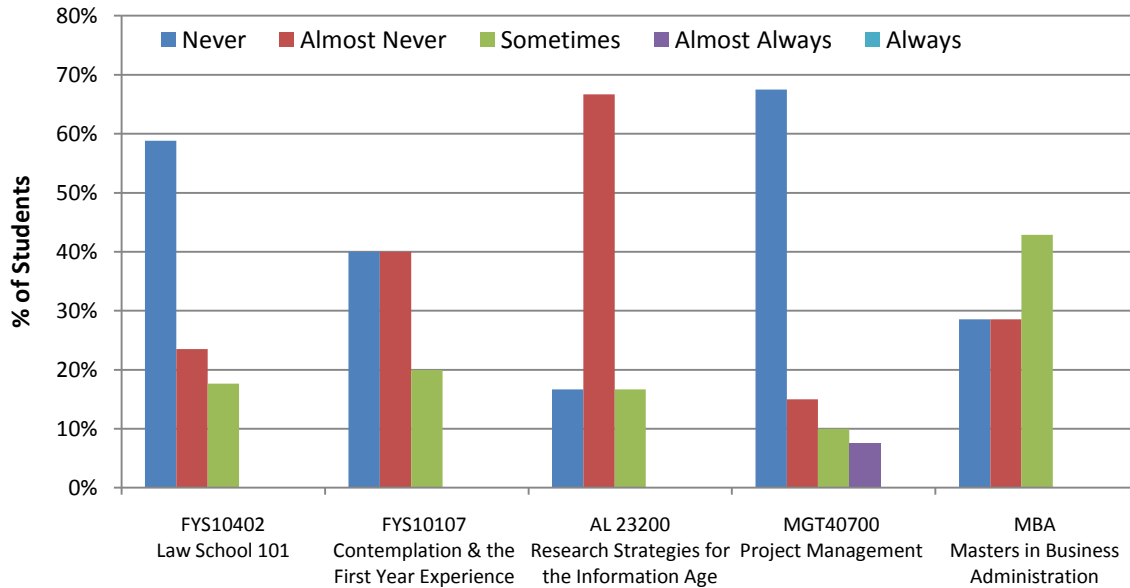
**Behavioral Perceptions across Courses over Time
(Survey 1-pretest and Survey 2-after 2 weeks)**



Takeaways:

1. Perceptions were very consistent across undergraduate courses, suggesting that the course itself and/or professor may not be predictive of the overall success of the program, however, it is important to note that each of the professors self-selected to use the iPads so this could introduce some bias in perceptions by the students.
2. On average, undergraduate participants perceived the iPad device to be over 17% more useful (PE) in attaining performance gains than did graduate students.
3. Graduate student perceptions of usefulness declined slightly after using the device, while undergraduate perceptions of usefulness remained steady or increased on average between surveys 1 and 2. It is possible that MBA usefulness declined because their use was entirely self-directed with none of their professors leading or participating in the iPad initiatives.

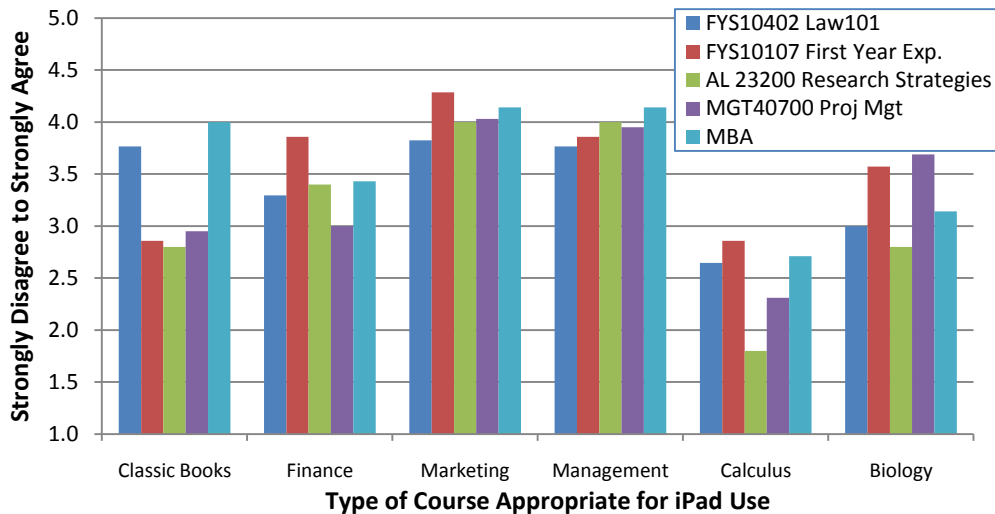
Specifically related to the articles/chapters that are available on your iPad, how frequently do you print the readings?



Takeaways:

1. More than 70% of the students NEVER or ALMOST NEVER printed material but there was some variation across courses.
2. Using the iPads does not appear to significantly increase printing

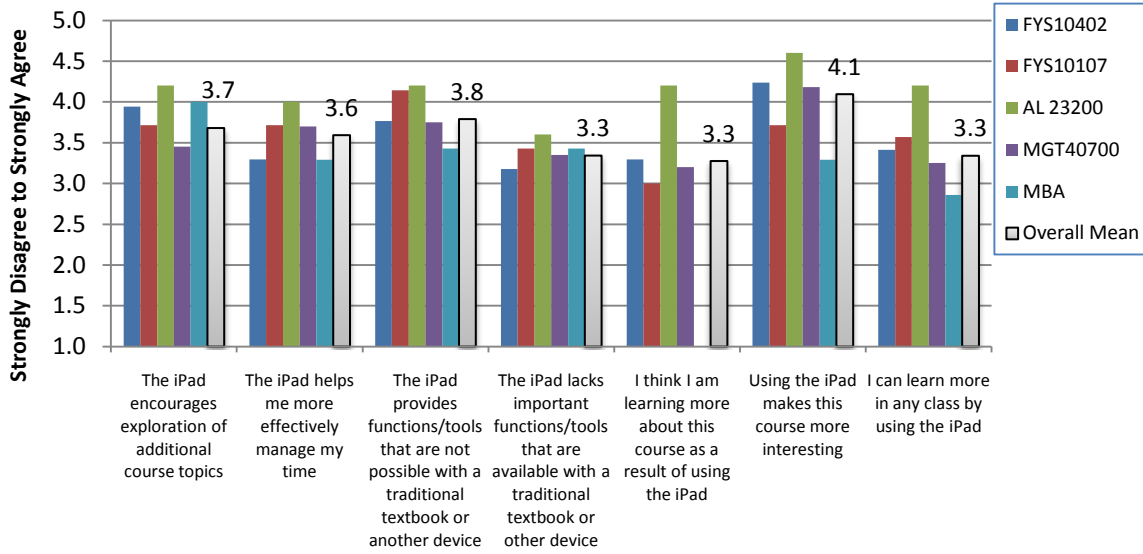
What type of courses would be appropriate for eReader/eTextbooks?



Takeaways:

1. The more technical courses appear to be less viable options for eReaders. But our student sample did not include students in the math/sciences disciplines.
2. From our focus groups we learned the Classic Books class generally rated lower because a) students felt they needed to really 'study' the books, b) the books are usually easier to carry and hold, and c) there was gratification in being seen in public with a "thick novel," i.e. makes them look smart.

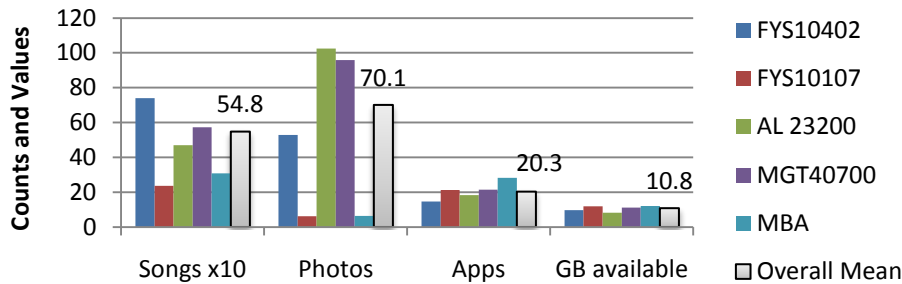
To what extent do you agree/disagree with the following statements?



Takeaways:

- The value 3.0 is a 'neutral' response, therefore the graph shows that in all questions the Overall Mean is statistically greater than 3.0 (pooled sample size of 77). This suggests that on average, students feel the iPad; a) encourages exploration of additional course topics, b) helps manage time, c) provides new functions/tools, d) increases learning, and e) makes courses more interesting.
- It is also true that the iPad LACKS important functions/tools that are available with a traditional textbook.

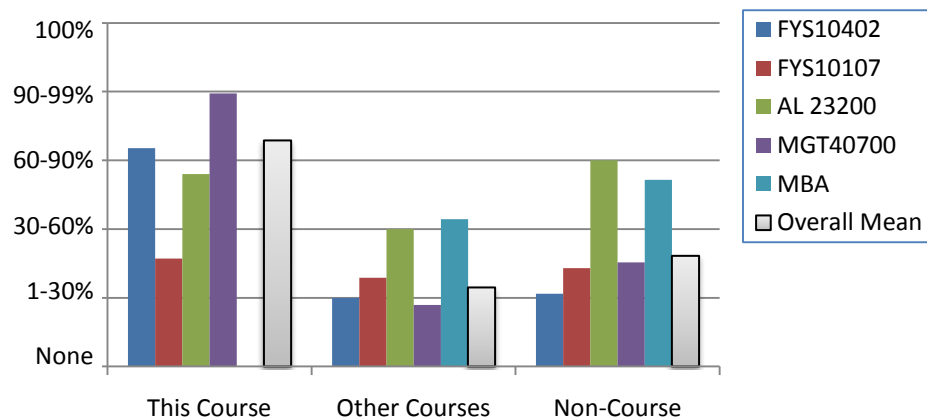
With this question, we attempted to capture an 'extent of use' variable. We asked the students to go to the Settings>General>About menu on their iPads and enter the values associated with the number of Songs, Pictures, Applications, and GB (gigabytes) available.



Takeaways:

- Type of usage varied considerably across courses.
- We found a correlation of .333 ($p < .01$) between the variables "I loved using the iPad and would prefer to use in all my courses" and "Number of Apps." We did not find statistical relationships between other perceptions of the iPad and actual usage. Interestingly, this might suggest that students weren't just saying they loved the iPad because of its ability to store music and pictures but instead that the Apps were what made it valuable as an academic tool. It also could be that the Apps being downloaded are games instead of academic tools in which case the interpretation is unclear.

What percentage of the **READING** you do for _____ is done using the iPad?



*MBA students did not have a specific course directed toward the iPad

Takeaways:

1. A significant proportion of the reading in the primary course was done using the iPad. Of the reading that was not done using the iPad, we do not know if it was available on the iPad.
2. A considerable amount of non-course-related reading was done using the iPad.

CONCLUSION

Our research is not comprehensive, yet it provides a strong foundation for future study and offers several key insights as outlined in the *Takeaways* above. Additional research should include natural observation, surveys, and student focus groups to further explore questions related to learning outcomes, types of use, and benefits beyond that of eReading which could contribute to learning. No major technical challenges with the devices were found and the distribution and retrieval processes were streamlined and efficient. All iPads have been returned in a timely fashion with no signs of misuse, which may be partially due to the fact that the students were required to keep their iPads in the Apple iPad Case. During the course of our study, one iPad was stolen from a locked car (the iPad was in a backpack and not visible) and two tech-support calls were received in Module 1 and two in Module 2.

It is the opinion of these researchers that it is premature to make a decision about widespread distribution of iPads or any eReaders. We are using the term ‘distribution’ to mean requiring students to adopt an iPad. The intent of this initiative was not to investigate, suggest, or endorse a specific means of funding the initiative, e.g. computing fee, University funded, course-specific fee, etc. While it appears perceptions of value are high amongst students, the technology is not yet mature as it specifically relates to the eTextbook. Highlighting and annotating are

cumbersome but improvements are being made rapidly. In addition, the cost of the devices (\$499 for the model we used) appears to be prohibitive for students, even considering that eTextbooks are usually 60-80% of the cost of a traditional textbook. Even if the technology were mature, with new competitive offerings coming to the market rapidly, it is unclear which device would be optimal for distribution.

What we can say is that in *some* courses, most students see value in using an iPad. In particular, we found it striking that on average, students feel the iPad; a) encourages exploration of additional course topics, b) helps manage time, c) provides new functions/tools, d) increases learning, and e) makes courses more interesting. These are potentially important findings worthy of further investigation. Our preliminary investigation suggests that many book titles are now accessible using iPads. We also note that there appears to be no reason why students could not adopt an eTextbook, even if it is not assigned by a professor. Technical support is available for students and faculty if either choose to adopt an eTextbook and our study did not reveal any negative outcomes.

ACKNOWLEDGEMENTS

We wish to acknowledge two people from Academic Technologies, Paul Turner and Jon Crutchfield, who have been invaluable to our pilot project.

APPENDIX

OPEN ENDED COMMENTS from STUDENTS

What benefits do you see from using iPad?

- Not having to carry around a textbook, better communication amongst the team, shared information
- It's very convenient to carry around plus it makes you look tech savvy
- I think staying up to date on the most current technology is extremely important in this fast paced world.
- If more classes adopted the ability to use this i probably wouldn't be carrying a backpack at all.
- It is obviously helping avoid unnecessary paper waste, but it also opens up a lot of possible collaboration that didn't exist with the normal textbook set up. That is assuming that the software continues to progress at a rapid pace.
- Instant information at your fingertips.
- I am more organized and my backpack is certainly lighter since I dont need to carry my laptop and cord everywhere. I also LOVE the long battery life.
- I carry it in my backpack instead of a heavy backpack and it is easy and fast to surf the net.
- I have a PC so using the iPad has helped me get used to Macs more.

SUMMARY of FOCUS GROUPS

Pros and Cons of the iPad: Summary of Focus Group Discussions	
Pros:	Cons:
Portability Consolidation – everything in one place Battery life Versatility – phone (Skype), text, email Connectedness Email much easier on iPad Calendar on iPad more effective than on iPhone Great for games	Annotated highlighting – not quite there Taking notes on device (whether typed or hand-written) is very difficult Helpful more for business – not so much classroom Uncomfortable with the fact that there is no “save” button Unable to multi-task when using device -- cannot have two windows opened side by side When using a textbook, difficult to flip back and forth between pages Glossy screen of device creates glare
*Recurring Theme: The ancillary benefits of the iPad (consolidation of personal/school lives, constant connectedness, etc.) outweigh the device's drawbacks as an academic tool.	

DISTRIBUTION of IPADS

*See wiki <https://wiki.nd.edu/display/oitepublishing/iPad+Configuration+for+Pilot>. It also includes an Enterprise Deployment Guide.

Training

For future course implementations, we would recommend a short tutorial on usage - not specifically on how to use the iPad but instead on some specific applications.