The beginning or end? iPad Pro 9.7 + Apple Pencil: A Case Study of User Engagement

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Abstract: The purpose of this study was to investigate the impact of the iPad Pro 9.7 + Apple Pencil on user engagement. A mixed method research design was used for this project which included a retrospective analysis of user log data and an end user survey. The iPad Pro 9.7 + Apple Pencil distribution in the fall of 2016 demonstrated significantly higher end user engagement than did previous models of iPad throughout the fall of 2016. End of semester comparisons of user engagement with the iPad Pro 9.7 + Apple Pencil®, compared to other iPad® models, was significantly higher in 2016 ($p<0.05$), 2015 (0.05), and 2014 ($p > 0.05$).

Introduction

On January 27, 2010 Apple introduced the iPad. When released on April 3rd, 2019, the iPad became one of the electronic devices in the fastest selling tablet device in history and continues to be the most popular tablet in the United States and globally (Bouchard, 2016). Since its introduction numerous studies have demonstrated the positive impact of using the iPad in a variety of educational settings. The iPad has been found to be highly motivating for students of all ages (Falloon, 2013; Burden et al., 2012; Manuguerra and Petocz, 2011; and Saine, 2012) and has developed beyond initial functions as an eBook reader, also demonstrating its capacity to consolidate or aggregate information (Ansk & Milinoski, 2011). The iPad was found to strongly engage and potentially enhance students' learning experience (Brand et al, 2011; Diemer, Fernandez & Streepey, 2012; Fontelo, Faustorilla, Gavino & Marcelo, 2012; Perez et al, 2011). Nguyen, Barton & Nguyen's (2015) systematic literature review of peer-reviewed publications found that uses of the iPad have coalesced around academic functions such as accessing course resources and library databases, note-taking, communicating, presenting content and taking online assessments.

While the iPad had little competition when released in 2010, competition in wireless mobile computing hardware has expanded dramatically. Quarterly sales of the iPad peaked in the second quarter of 2014 and have been declining since (Apple: iPad sales, 2010-2016). While the iPad continues to maintain the largest (24%) market share of tablets globally, total global tablet shipments declined for the first time sin Apple introduced the iPad in 2010 (Bouchard, 2016). The increased sales volume, increased physical size, and increased functionality of smartphones, combined with competition from lower cost tablet devices, has changed the mobile computing landscape. The worldwide rise of smartphone ownership, currently estimated between 68% (Anderson, 2015) and 79% (Sterling, 2016) in the United States, has coincided with a decline in iPad sales revenues (Apple: iPad sales, 2010-2016). In contrast to iPad sales, the double-digit growth of smartphones in 2015 of 10.4%, compared to 2014, is expected to decelerate to a single digit growth rate in 2016 (Gartner, 2016). Over half of US teens surveyed reported having a have a tablet computer (58%), comparable to the adult population (45%), while 73% of teens reported having a smartphone (Lenhart, 2015). Smartphone adoption among American teens has increased substantially and mobile access to the internet is pervasive (Lenhart, 2015). One in four teens are "cell-mostly" internet users, who say they mostly go online using their phone and not using some other device such as a desktop or laptop computer Lenhart, 2015). Increasingly, the iPad platform must compete with smartphones and lower cost tablets to deliver educational, services, communications, social networking, video, and location based services. Many of the original affordances of

the iPad over laptop computers, such as being smaller, lighter and easier to carry, and the capacity to store ebooks (Gabarre, 2014) have accrued to smartphones.

The case site was Shenandoah University, a moderately selective liberal arts university of 4,000 students. The researchers were members of Institutional Computing and Academic Computing Technology (ACT) which is housed in the Center for Teaching, Learning, and Technology (CTLT). The two units provide training and support to faculty and staff who are recipients of technology distributed through the iMLearning program. There are more than 90 programs of study at the bachelor's, master's, and doctoral degree levels in seven schools which provide numerous settings for teaching and learning with mobile technology. In 2009 Shenandoah University introduced the mobile learning initiative the iMLearning, designed to enhance learning and engagement, make learning materials available at the students' convenience and focus classroom time on discussion and interaction. The iMLearning program established a common technology platform across campus and aspired to increase and enhance the learning opportunities available to all students. In 2012, Shenandoah University was the only higher education institution in the United States to be recognized with two Apple Distinguished Programs spanning the curriculum from the Music Production and Recording Technology in the Conservatory, to the Pharmacogenomics program in the School of Pharmacy.

Since 2013 students have received a MacBook Pro and an iPad in Shenandoah University's 2:1 initiative. Anecdotal evidence suggested that adoption of the iPad as a learning tool by faculty and students was not as robust as initially hoped for. The number of technology options including desktop, laptops, and smartphones had appeared to marginalize the classroom use of the iPad by faculty and students. Literature supports the notion that both attitudinal change and pedagogical change are more problematic than is providing hardware (Banister, 2011). Despite the availability of iPad devices, institutional support for faculty training, fiscal support for volume app purchases, as well as faculty development activities to promote the use of the iPad, widespread faculty adoption of this 'game changing' device for teaching and learning has been elusive. This project aspires to add to the literature by examining faculty and student engagement of the current iPad Pro 9.7 + Apple Pencil distribution and faculty and student engagement with past iPad distributions. To our knowledge, Shenandoah University was one of the first higher education institution in the United States to provide a 13-inch MacBook Pro Retina display laptop, an iPad Pro 9.7 + Apple Pencil to all new students and new faculty beginning in the summer, and continuing through the fall of 2016. It is within this context that this pilot study aspired to examine users' engagement with their iPad Pro 9.7 + Apple Pencil in its first semester distribution.

Method

The Institutional Review Board approved of this study on 11/14/2017. The 878 participants in the fall 2016 iMLearning iPad Pro 9.7 + Apple Pencil distribution primarily consisted of students, 98% (857/878) including undergraduate students 72% (637/878) and graduate 33% (227/878) students. Graduate students were enrolled in health care programs including Physician Assistant, Physical Therapy, Pharmacy, Athletic Training, and Occupational Therapy. Faculty members 2% (14/878) were also included in the distribution. The Center for Teaching, Learning, and Technology offered a pedagogy innovation grant in the fall of 2016. To receive an iPad Pro 9.7 + Apple Pencil Faculty members had to propose the use of the iPad Pro 9.7 + Apple Pencil in their course in fall semester. A total of four awards were given to faculty members from Accounting, Math, Mass Communications, and Religions Studies. In addition to these four faculty members, ten new faculty members received an iPad Pro 9.7 + Apple Pencil as part of the fall distribution.

A mixed method research design was used for this project. A retrospective analysis of user log data from the JAMF Pro (Minneapolis, MN) enterprise mobility management platform and an end user survey were considered to quantify user engagement. Engagement has been considered in previous studies (Mango, 2015) as a multi-layered construct including behavioral, cognitive and emotional components. The construct 'engagement' in this study was in part operationalized by metrics from user activity logs. When iOS devices were powered on and connected to the internet, or the local area network, a handshake, or connection, occurred that was registered in the JAMF Pro mobile management systems' user logs. A report was generated on a weekly basis to quantify the number and percent of iOS devices that had registered any activity with the JAMF management system in the previous 30-day period. Institutional computing has run weekly 30-day activity reports that query the network activity of all iOS devices.

Historical data were available beginning in December 2013. The construct 'engagement' was further informed by self-reported survey data concerning the frequency and nature, personal versus academic, use of the iPad Pro 9.7 + Apple Pencil.

This project used a two-tailed Fisher's exact test to 1) compare the engagement metrics between the iPad Pro 9.7 + Apple Pencil devices and previous iPad models, and 2) to compare the end of semester engagement of the iPad Pro 9.7 + Apple Pencil devices and previous iPad models in previous semesters. SPSS version 240. (SPSS, 2004) was used to analyze the data. Basic descriptive statistics were used to calculate frequencies, means, and standard deviations for much of the data.

A survey (see Appendix) was designed to assess end users' perceptions and comments regarding their engagement with the iPad Pro 9.7 +Apple Pencil in the first semester of its introduction. The survey was administered electronically between November 20 and December 1st 2016. The survey consisted of 15 total questions. Students and faculty members each answered five general and demographic before answering a separate five question set. Participation in the survey was voluntary. The overall response rate for the survey was 28 % (251/878). Students accounted for 94% (237/878) of the total survey responses, and faculty members accounted for 6% (14/237). Of the 14 faculty respondents, 21% (3/14) had 1-3 years of experience, 57% (8/14) had 4-6 years of experience, and 21% (3/14) had over 6 years of experience. Student responses included graduate 61% (92/237) and undergraduate 61% (148/237) students. This study is guided by the following research questions:

Research Question 1: Did the iPad Pro 9.7 + Apple Pencil increase user engagement in fall 2016 semester relative to previous iPad models?

Research Question 2: Did the user engagement of the iPad Pro 9.7 + Apple Pencil at the end of the semester, exceed previous years' user engagement of other iPad models?

Research Question 3: What apps are driving user end user engagement?

Research Question 4: What apps drive end user engagement?

Hypothesis 1: Student engagement with the iPad Pro 9.7 + Apple Pencil will be significantly higher than other iPad models in fall 2016, the first semester distribution.

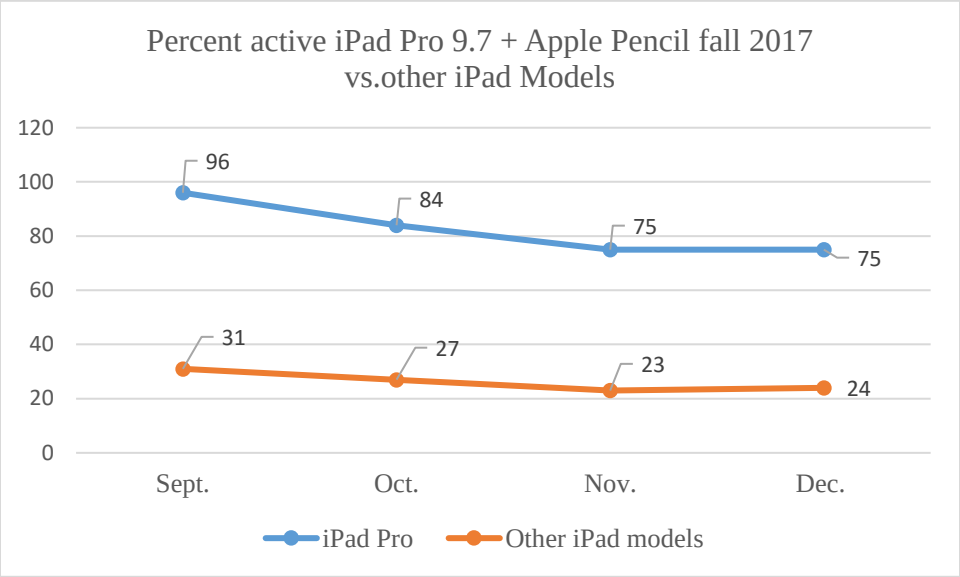
Hypothesis 2: Student engagement with the iPad Pro 9.7 + Apple Pencil will be significantly higher than other iPad devices in previous years.

Results

Research Question 1: Did the iPad Pro 9.7 + Apple Pencil increase user engagement in fall 2016 semester relative to previous iPad models?

In order to answer research question 1, a series of two-tailed Fisher's exact tests were conducted to assess end user engagement with the iPad 9.7 + Apple Pencil relative to other iPad devices during the fall of 2016. In order to register the devices with the management system, all devices were required to log into the system upon receipt of the device. To control for the high per cent of user engagement resulting from the initial registration process at the commencement of the semester, four comparisons were made, between the iPad Pro 9.7 + Pencil devices and other iPad models, beginning in September. Significantly higher user engagement for the iPad Pro 9.7 + Apple Pencil, compared to other iPad models was found in each comparison including: September 12th ($p<0.05$), October 10th ($p < 0.05$), November 14th and December12th ($p < 0.05$). Hypothesis 1 was confirmed.

Figure 1: User engagement iPad Pro 9.7 + Apple Pencil compared to other iPad devices in the fall semester 2016. Percent of devices connected to the JAMF Pro mobile management server within a 30-day activity period.



Engagement was also viewed through survey responses regarding device usage. Student responses (n = 237) to the question "How often do you use your iPad Pro together with the Pencil for school this semester?" included: "Daily" 22% (53/237), "Weekly" 37% (89/237), "Monthly" 14% (22/237), and "Never" 26% (62/237). Graduate student (n=99) responses for "Daily" 13% (32/99) and "Weekly" 37% (89/237) engagement were slightly higher than undergraduates "Daily" 8% (21/237), and "Never" 19% (46/237). Faculty members' (n = 14) responses included self-reported use including: "Daily" 36% (5/14) and "Weekly" 28% (4/14), "Monthly" 21% (3/14), and "Never" 14% (2/14) engagement were slightly higher than undergraduates "Daily" 8% (21/237), and "Never" 19% (46/237).
User engagement within a 30-day period for the iPad Pro 9.7 + Pencil was 75% on November 14th 74.9% (656/876) and 75% (662/878) December 12th. The user engagement from the JAMF mobile management reporting comports with the survey, which was available between November 20th and December 1st. Summed responses of survey data for user engagement 74.5% (187/251) for the categories "Daily" 23% (58/251), "Weekly" 37% (93/251), and "Monthly" 14% (36/251) usage were similar to the user log data.

Research Question 2: Did the user engagement of the iPad Pro 9.7 + Apple Pencil at the end of the semester, exceed previous years' user engagement of other iPad models?

A series of two-tailed Fisher's exact tests were also conducted in order to answer the research question 2 by assessing differences in the activity between the iPad Pro 9.7 + Apple Pencil and other iPad models at the conclusion of each semester since 2013. Comparisons were made between devices, based upon 30-day activity reports for the second week of December for each year since 2013. Hypothesis 2 was confirmed by significantly higher engagement with the iPad Pro 9.7 + Apple Pencil compared to other iPad models in December 2016 ($p<0.05$), December 2015 (0.05), and December 2014 ($p > 0.05$). No significant differences were found between user engagements of the iPad Pro. Apple Pencil in 2016 and the first semester of the introduction of the iPad in 2013. Table 1 displays the increased user iPad engagement since 2013 at the end of the fall semester. Hypothesis 2 was confirmed in 2016, 2015, and 2014.

Table 1: Longitudinal user engagement: Percent of devices connected to the JAMF Pro mobile management server showing 30-day activity in the week of December.

Year	Total devices	Active iPad Pro 9.7	Inactive iPad Pro 9.7	Active Other iPads	Inactive other iPads	
2016	3241	662 (75%)	216 (25%)	992 (42%)	2363 (58%)	p < 0.0001
2015	2551			1436 (56%)	1115 (44%)	p < 0.0001
2014	1790			1150 (64%)	640 (46%)	p < 0.0001
2013	918			720 (78%)	198 (22%)	p = 0.13

Figure 2 displays the iPad devices that registered activity with the JAMF mobility management services by week for the fall semesters 2013 through 2016.

Figure 2 Percent of active iPad devices weekly during fall semesters between 2013 and 2016.

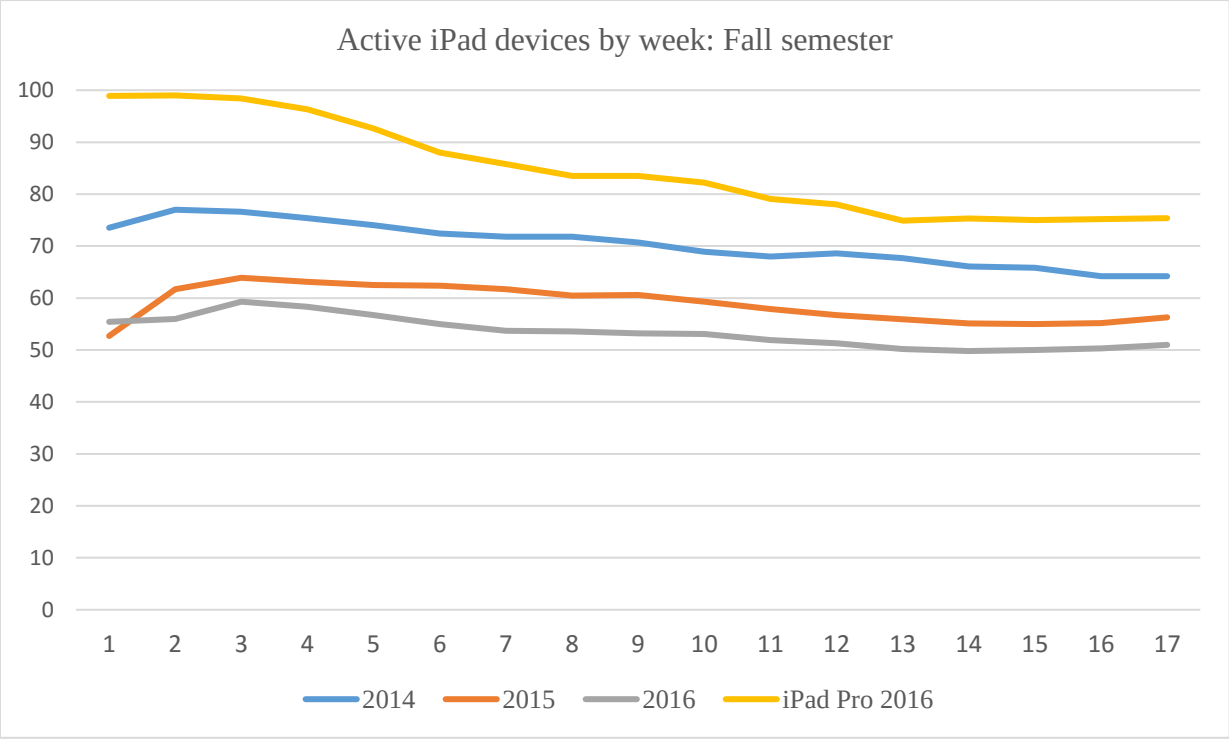


Table 2: Students' perceptions of faculty expectations for using the iPad Pro 9.7 + Apple Pencil by program.

Program	Total responses	Does not encourage use	Encourages use	Requires use
Athletic Training	3	3	0	0
Occupational Therapy	18	13	5	0
Pharmacy	19	15	4	0
Physical Therapy	29	14	5	0
Physician Assistant	30	15	12	2
Undergraduate	138	111	22	3

Research Question 3: What apps are driving user engagement?

The JAMF mobility management platform also verifies the installed software on each device. The top ten apps used, that are not part of the original image appear in Table 3. Slightly over half of the iPad Pro 9.7 devices used the app to connect to the Canvas (Instructure, UT) learning management system. The apps used indicate the devices were used for both academic and personal uses.

Table 3: Top ten 1-10 downloaded mobile apps in fall 2016 iPad Pro 9.7 + Pencil distribution

App	Number of installations	% of devices installed
Canvas	455	52%
Netflix	386	44%
YouTube	365	42%
Google Drive	287	33%
Facebook	285	32%
Gmail	236	27%
My SU	211	24%
Messenger	207	23%
Google Docs	189	21%
Word	165	19%

Table 4 contains the second set of the ten most popular apps supports survey responses that continue to show mixture of social and academic apps, but also indicate the adoption of workflows that include note taking.

Table 4: Downloaded mobile apps (11-20) in fall 2016 iPad Pro 9.7 + Pencil distribution

APP	Number of installations	% of devices installed
Spotify	161	18%
Notability	153	17%
Twitter	145	16%
Snapchat	135	15%
Instagram	129	14%
Anatomy apps	99	11%
PowerPoint	79	9%
OneNote	79	9%
Penultimate	78	9%
Notes	30	3%
Good Notes	7	1%

The survey also sought to gain background and demographic information. Student responses to the question "Prior to this semester, did you have any previous experience using the iPad or a tablet device in school?" included 56% (236/251) students had no previous experience using iPad or tablet devices in school. Question 2 sought to capture respondents' perceptions of the nature of their engagement (personal versus school) with the iPad Pro 9.7 + Apple Pencil in the first semester by asking: "How would you describe the mix of your iPad Pro 9.7 + Apple Pencil use this semester?" Response choices included: primarily personal use, even between personal and academic use, and primarily academic. The majority of respondents 38.6% (97/251) considered their use evenly mixed between school work and personal use while 33.5% (84/ 251) of respondents considered their use primarily school use. Question 3 "How often have you used the iPad Pro 9.7 and Pencil for school this semester?" was concerned with respondents' perceptions of the frequency of use for academic use. Over half 60% (151/251) of respondents indicated they used the iPad Pro 9.7 + Apple Pencil on a daily basis 23.1% (58/251), or a weekly basis 37.1% 93/251), while 40% (100/251) indicated they used the combination of the devices on a monthly 20% (50/251) basis or never 25% (64/251). Response options for the question "How would you describe the mix of your iPad Pro + Pencil use this semester?" included: Primarily school use; Even use between school use and personal use; and Primarily personal use. The perceptions of faculty members 42% (6/14) were similar to students 38% (91/237) in perception of using the iPad Pro 9/7 + Apple pencil primarily for school use. Faculty responses for mixed use 42% 6/14), personal and school use, was higher than students' responses 38% (91/237). Student response rates for 'primarily personal use' of the iPad Pro 9/7 + Apple Pencil were double that of faculty 14% 2/14).

Students responses to the question "What best describes most of your faculty members' approach to the iPad Pro 9.7 + Apple Pencil" revealed students' perceptions of faculty expectations for using the iPad Pro 9.7 + Pencil usage trends between graduate health care programs, and between graduate and undergraduate programs. A series of Fisher's exact test were performed to assess differences between graduate/undergraduate programs, as well as between graduate programs. Significant differences were found ($p = 0.02$) between graduate and undergraduate students' perceptions of faculty members expectations of iPad Pro 9.7 + Apple Pencil usage. No significant differences were

found among any of the graduate program students' perceptions of their faculty members' expectations of using the iPad Pro 9.7 + Apple Pencil. In contrast to the other graduate health science programs, a majority of the Physician Assistant program's students responded that faculty members either encouraged 40% (12/30) or 6% (2/30) required the use of the iPad Pro 9.7 + Apple Pencil. Table 2 contains the students' perceptions of faculty expectations of using the iPad Pro 9.7 + Apple Pencil. The results suggest that there is a non-significant trend within the graduate health sciences programs with regard to students' perceptions of their faculty members' expectation of using the iPad Pro 9.7 + Apple pencil in classes.

Discussion

The iPad Pro 9.7 + Apple Pencil distribution in the fall of 2016 demonstrated significantly higher end user engagement than did previous models of iPad throughout the fall of 2016. Consistently higher use of the iPad Pro 9.7 + Apple Pencil was also evidenced throughout the semester, compared to previous semesters. Engagement with the iPad Pro 9.7 + Apple Pencil in academic settings was promoted in settings in which the faculty members had identified an authentic workflow that leveraged combinations of ubiquitous cloud based apps such as Dropbox, Evernote, Google Drive, among others. The four faculty members who applied for the teaching innovation grants were required to identify potential pedagogic affordances of the new technologies prior to the start of the semester in order to have the technology. The innovation grant promoted the development of unique and authentic pedagogical uses of iPad Pro 9.7 + Apple Pencil in the first semester of adoption.

User logs of software downloads to the iPad Pro 9.7 devices indicated overall use, including academic use of the iPad Pro 9.7 + Apple Pencil, devices remained stubbornly low, and likely below that of competing devices such as laptops and smartphones. The iPad Pro 9.7 devices registered download volumes for ubiquitous apps that were routinely accessed on a daily basis, such as the learning management system Canvas 52%, Facebook 22%, and the institutional email server Gmail 27%. It is a safe assumption that student access to these services was being driven by other devices. This project adds to the literature in regard to the expectation and hope for the iPad in education by showing increased student engagement using the iPad Pro 9.7 + Apple Pencil relative to previous distributions and the continued evolution of instructor led mobile app centric pedagogy as a driver for student engagement.

New pedagogies emerged from the first faculty cohort. Notetaking on the iPad Pro 9.7 + Apple Pencil using a variety of apps was a contributing factor to increased academic engagement relative to previous iPad models in this project. Students listed several note-taking apps including: Notability, Penultimate, Notes, OneNote, Notepad+. Math and Statistics classes used the Notability app to create interactive worksheets that were collaboratively worked on, and shared in real time, were one example of a promising synergy between the iPad Pro 9.7 + Apple Pencil and innovative/transformative pedagogy. Affinities between mobile apps such as Body 3D, Complete Anatomy, Anatomy Lite, Essential Anatomy and Anatomy Map, were widely used by graduate health sciences. As administrative and pedagogic educational practices continue to evolve, additional studies may provide further evidence into the action potential of the technologies (Siemens & Tittenberger, 2009) and behaviors that coalescing around the iPad Pro 9.7 + Apple Pencil. Additional studies are required to more precisely assess the impact of these practices on faculty productivity, student engagement, student performance, and students' satisfaction.

Questions remain about the impact of the iPad Pro 9.7 + Apple Pencil on user engagement, especially the role of Apple Pencil. Stylus devices have been available for all previous models of iPad, and the availability of apps for teaching have been available in previous semesters. This site is unique in that it contains a podium computer in every classroom, a laptop in everyone's hand, an iPad, and a smartphone in over 70% of students' pockets. A variety of factors have combined to relegate the iPad to a secondary or tertiary position in the hierarchy of devices at this site, based on the quantitative user log data and the survey data. While some evidence supports trends toward the emergence of program specific instances of using the iPad Pro + Apple Pencil in teaching and learning, a comprehensive view of all iPad use at the site comports with the wider trend away from tablet devices in general.

Decisions regarding the affordances of each device pedagogy are typically made in real time, in a context of longstanding traditions of creating content, communicating, and assessing student knowledge. The iPad quickly became the most popular tablet in history, yet the paucity of management tools to integrate these devices in educational settings were slower to come online. The original single user experience, accompanied with the single user account further contributed to a delay in institutional acceptance of the devices. The ability to quickly integrate mobile devices

into existing wireless network infrastructures and room display systems is an evolving barrier that has evolved since the 2010 release of the iPad. Network security continues to be an obstacle. The cost and time demands associated with scaling the ability to stream via wireless from mobile devices to displays, projectors, and other legacy infrastructure in classrooms across an institution are significant. Infrastructure to support seamless integration of mobile devices, including the iPad Pro 9.7 should not be discounted as a mitigating factor in the historical patterns of adoption by institutions, faculty and students in educational settings, relative to other available classroom device choices such as desktop, laptop devices and increasingly smartphones. As infrastructure obstacles are resolved, and enterprise management tools are improved, the universal ascent of the smartphone, and the proliferation of low cost tablets continue to challenges the iPad as a tool for learning and student engagement in many academic settings. Further study is required to develop a longitudinal view of this iPad Pro 9.7 + Apple Pencil's impact on student engagement. Given these findings, the investigators of this study offer the following recommendations for subsequent research in this area.

1) Administer the instrument used in this study to a larger sample in order to: (a) to allow for increased participation rate in the survey, and (b) to better generalize to a larger population this type of study.
2) This investigation relies on a combination of retrospective data analysis and self-reported data provided by students enrolled in a variety of educational settings.
3) Narrowing the focus of analysis to the program or the instructor level might provide more granular evidence of best practices and motivating factors in user engagement. Refine the items of this survey by expanding some and deleting others as needed. In achieving balance between breadth and brevity, items that can clarify broader constructs (e.g. "value for your money") can be added, while redundant items can be deleted.
4) Future research may wish to investigate the relative priority of importance that students place on Apple Pencil.

The investigators in this study welcome comments and suggestions from others who share an interest in how to improve teaching and learning outcomes and increase student satisfaction through technology enhanced educational practice.

References

Apple: iPad sales 2010-2016. Retrieved January 06, 2017, from https://www.statista.com/statistics/269915/global-apple-ipad-sales-since-q3-2010/

Anderson, M. (2015, October 29). Technology Device Ownership: 2015. Retrieved January 6, 2016, from Monica Anderson - http://www.pewinternet.org/2015/10/29/technology-device-ownership-2015/#fnref-14935-1

Angst, C. & E. Malinowski (2010). "Findings from eReader Project, Phase 1: Use of iPads in College of Business, http://www3.nd.edu/~cangst/NotreDame_iPad_Report_01-06-11.pdf

Banister, S. (2010). Integrating the iPod touch in K-12 education: Visions and vices. Computers in the Schools, 27(2), 121-131.

Bouchard, J. (2015, May 1). Worldwide Tablet Market Shares, 2015. Retrieved January 17, 2017, from http://www.idc.com/getdoc.jsp?containerId=US41336716

Brand, J., Kinash, S., Mathew, T. & Kordyban, R. (2011). iWant does not equal iWill: correlates of mobile learning with iPads, e-textbooks, BlackBoard Mobile Learn and a blended learning experience.

Burden, K., Hopkins, P., Male, T., Martin, S.,Traka, C. (2012). iPad Scotland evaluation final report Faculty of Education, University of Hull. http://www.janhylen.se/wp-content/uploads/2013/01/Skottland.pdf

Diemer, T., Fernandez, E. & Streepey, J. W. (2012). Student perceptions of classroom engagement and learning using iPads. Journal of Teaching and Learning with Technology, 1, 2, 13–25.

Falloon, G., Khoo, E. (2014). Exploring young students' talk in iPad-supported collaborative learning environments. Computers in. Education. 77, 13–28.

Fontelo, P., Faustorilla, J., Gavino, A. & Marcelo, A. (2012). Digital pathology—implementation challenges in low-resource countries. Analytical Cellular Pathology/Cellular Oncology, 35, 1, 31–36.

Gabarre, C., Gabarre, S., Din, R., Shah, P. M., & Karim, A. (2014). iPads in the foreign language classroom: A learners' perspective. 3L: Southeast Asian Journal of English Language Studies, 20(1), 115-127.

Gartner Says Worldwide Smartphone Sales to Slow in 2016. (2016, June 7). Retrieved January 20, 2017, from http://www.gartner.com/newsroom/id/3339019
Hoover, D., Valencia, J. (2011). iPads in the Classroom: Use, Learning Outcomes, and the Future. Presentation, 2011 EDUCAUSE Annual Conference. Philadelphia, PA. October 20.
Lenhart, A. (2015, April 9). Teens, Social media & Technology Overview 2015. Retrieved January 17, 2017, from http://www.pewinternet.org/2015/04/09/teens-social-media-technology-2015/
Lynch, J., & Redpath, T. (2012). 'Smart' technologies in early year's literacy education: A meta-narrative of paradigmatic tensions in iPad use in an Australian preparatory classroom. *Journal of Early Childhood Literacy*, 14(2), 147-174. doi:10.1177/1468798412453150
Manuguerra, M., Petocz, P. (2011). Promoting student engagement by integrating new technology into tertiary education: the role of the iPad. *Asian Social Science*, 7 (11) (2011), pp. 61–65.
Mango, O. (2015). iPAD USE AND STUDENT ENGAGEMENT IN THE CLASSROOM. *Turkish Online Journal of Educational Technology*, 14(1), 53-57.
Nguyen, L., Barton, S. M., & Nguyen, L. T. (2014). IPads in higher education-Hype and hope. *British Journal of Educational Technology*, 46(1), 190-203. doi:10.1111/bjet.12137
Perez, A., Gonzalez, V., Pitcher, T. & Golding, P. (2011). Work in progress: analysis of mobile technology impact on STEM based courses; specifically, introduction to engineering in the era of the iPad. Paper presented at the 118th ASEE Annual Conference and Exposition, Vancouver, BC, Canada, June 26-29, 2011.
Saine, P. (2012). iPods, iPads, and the SMARTBoard: Transforming literacy instruction and student learning. *New England Reading Association Journal*, 47(2), 74.
Siemens, G., Titterngerger, P. (2009). Handbook of emerging technologies for learning. University of Manitoba. http://elearnspace.org/Articles/HETL.pdf Retrieved 1/17/2017
SPSS 24.0. (2004). SPSS Inc.: Chicago.
Sterling, G. (2016, March 3). Smartphone Ownership Just Shy Of 80 Percent [comScore]. Retrieved January 7, 2017, from http://marketingland.com/167275-167275

Appendix

All RESPONDENTS

1. Prior to this semester, did you have any previous experience using the iPad or a tablet device in school?
2. How would you describe the mix of your iPad Pro 9.7+ Apple Pencil use this semester?
3. How often have you used the iPad Pro 9.7 and Apple Pencil for school this semester?
4. How often do you use your iPad Pro 9.7 together with the Pencil for any purpose (personal or academic)?
5. What best describes you? (student or faculty)

STUDENT

1. What best describes you? (graduate or undergraduate)
2. What is your major / field of study? (graduate programs)
3. What best describes most of your faculty members' approach to the iPad Pro 9.7 + Apple Pencil.
4. List your top 3 apps you have used in classes this semester.
5. List your top 3 apps you have used for personal use this semester.

FACULTY

1. Have you used the iPad Pro 9.7 +Apple Pencil in your class this semester?
2. In what school is your academic appointment?
3. How long have you been teaching in higher education?
4. List your top 3 apps used to support teaching and learning.
5. List your top 3 apps you have used for personal use this semester.