

AN EVALUATION OF THE IMPACT OF USING IPADS IN TEACHER EDUCATION

Ying W. Shen, Ph.D.

Associate Professor of Education
Coordinator, Educational Programs in China
3003 Snelling Ave. North, St. Paul, MN 55113
Phone: 651-286-7514
Email: ywshen@unwsp.edu

Abstract: One hundred and fifteen teacher candidates completed an online survey for this evaluation study from 2013-2015. Teacher educators were also interviewed to share their experiences and insights of using iPads in their courses. Teacher candidates and faculty in the study had an overall positive experience of using iPads and they were willing to share their feedback to improve the implementation of iPads in the School of Education. Findings from the study have been used to inform the School of Education to revise its policy and plans for further implementation of iPads in its teacher education programs.

Keywords: evaluation, iPads, teacher education

INTRODUCTION

Mobile technologies including iPads have become pervasive in the United States. iPads are being used in more and more PreK-12 classrooms (Murray & Olcese, 2011; Riley, 2013). There is also an increasing trend in using mobile devices such as iPads in teacher education programs. Implementation of iPads was primarily reported as being beneficial. At the same time challenges were also reported (Baran, 2014). In addition, there has been a lack of research studies on and evaluation methodologies as well as learning theories of mobile learning (Levene & Seabury, 2015).

In order to prepare teacher candidates to best utilize mobile technologies in their future teaching practice, the School of Education in a Midwestern private university in the United States acquired two carts of 40 iPad minis in the summer of 2013 for faculty to check out and use during class time. A faculty study group was formed to identify apps needed for different teacher education programs in the School of Education. All iPad minis were preloaded with apps recommended by the faculty study group. A training workshop for faculty was conducted to kick start the iPad initiative. An evaluation study was planned to measure the impact of using iPads by teacher candidates and faculty. By the end of the fall semesters of 2013, 2014, and 2015, teacher candidates were called to complete an online evaluation survey. Faculty members were interviewed on their experience and insights of using iPads in their classes, too. Findings from this evaluation study will contribute to the understanding of how iPads impact teacher candidates' preparation of using mobile technologies for teaching and learning.

LITERATURE REVIEW

Mobile Devices as a Useful Learning Tool in Teacher Education

Wu, Kao, and Lin (2012) stated that mobile learnings engage learners in educational activities and use mobile devices for access and communication through wireless technology. They reviewed research studies on mobile learning published between 2000-2010 in a meta-analysis and summarized two directions of research: evaluation of the effectiveness of mobile learning, and design of the mobile learning systems.

Geist (2011) conducted one of the early studies on using iPads in teacher education to examine the practicality and efficiency of the technology. Results of the study indicate that the use of iPads changed teacher education students' interaction with their class and the instructor, and added convenience of using eBooks and e-books,

Kearney & Maher (2013) studied pre-service elementary math teachers' use of iPads in professional learning activities, such as math-specific activities and more generic organizational, communication and reflective activities. They found participants used iPads to mediate and enhance their professional learning. Pre-service math teachers in the study were able to use iPads to increase their productivity and ability to capture evidence of their learning, too. In addition, participating pre-service teachers developed their knowledge of using technology to support their teaching of math from using iPads.

Mourlam and Montgomery (2015) reported a year-long 1:1 iPad initiative for elementary education teacher candidates where 22 teacher candidates were each given an iPad to use in their coursework and field experience

following the Diffusion of Innovations framework (Rogers, 2003). They found that teacher candidates' teaching philosophy impacted their use of iPads. Some candidates changed their instructional approach to technology while some did not. Their findings suggested that "learning how to effectively integrate technology in an intellectual way is part of a developmental process that takes time, much longer than one academic year" (p.114). Teacher candidates need continuous support of faculty facilitation and critical self-examination of their pedagogical approach and philosophical stance as an educator in order to achieve effective adoption of iPads in their teaching practices.

Bryne-Daviss and other researchers (2015) reported findings from a large-scale (n=443) survey study of UK-based medical students using iPads for studying and clinic experiences. They found students were positive about the impact of using iPads on their learning. Their findings confirmed previous studies that college students as "digital natives" vary in their perception and use of iPad as a new technology for learning, and many are not capable and motivated in terms of adopting new technology for learning.

Evaluation Studies Contribute to Research on Mobile Learning

Levene and Seabury (2015) called for evaluation of mobile learning to inform decisions for determining the effectiveness and continuation of mobile learning. They outlined three themes in evaluation research on mobile learning: 1) student achievement comparison, 2) usability, and 3) student attitudes/perceptions. They also recommended instructional designers to focus on using the themes in evaluation of mobile learning research to inform design.

In Jackson, Brummel, and Pollet's (2013) study of evaluating interactive tabletops in elementary math education, they collected both self-reported data and performance data of grades and benchmark scores to examine the effectiveness of using interactive tabletops (pads) for computer-supported collaborative learning of math. Their findings indicated that elementary math education students generally demonstrated increases in their math performance and the mobile technology of interactive laptops could be an effective instructional aide and promising tool for effectively learning math.

Haydon and colleagues (2012) compared math performance of students with emotional disturbance using iPads and worksheets and found students had noticeable increases in the number of correct answer to math problems per minute using iPads than using worksheets. They believed the immediate feedback provided by iPads contributed to student engagement and performance increases. Students and the teacher also responded positively to the use of iPads.

Hargis, Cavanaugh, Kamili and Soto's (2014) examined faculty perception of the early (first month) effectiveness of implementing an iPad initiative in United Arab Emirates (UAE) using the strengths, weakness, opportunities, and threats (SWOT) framework. They conducted a case study through interviewing four teachers, utilized an adapted Faculty Attitudes Towards Technology-Supported Learning Environment (FATTSLE) survey and collected feedbacks from iPad lead faculty to triangulate their findings. Faculty perceived strength appeared to outweigh perceived threats of implementing iPads.

This study aimed to evaluate the effectiveness of teacher candidates' use of iPads. Teacher candidates were asked to report on the benefits and challenges of using iPads in their courses. Teacher educators were also interviewed on their insights of using iPads in teacher education. The findings of this evaluation study have been used to improve the iPad initiative and modify how the School of Education implement and manage the iPad technology.

METHOD

Evaluation Research

Patton (2002) described evaluation research as a form of applied research when conducting "systematically and empirically through careful data collection and thoughtful analysis" (p.10). The purpose of evaluation research is to "inform action, enhance decision making, and apply knowledge to solve human and societal problems" (p.12). Some researchers tend to believe evaluation studies are usually conducted to inform practice within specific situations instead of contributing to knowledge and theory and illuminating social concerns by traditional research studies. However, Pinch (2009) call for researchers and practitioners to change their view of the distinctions between evaluation and research with less rigidity and great nuance and start seeing evaluation as "where the margins of research and practice have the potential to intersect with greatest ease" (p392).

"[E]valuation often attempts to assess the *effectiveness* of a program or service. On a more specific level, evaluation can be used to support accreditation reviews, needs assessments, new projects, personnel reviews, conflict resolution, and professional compliance reports" (Powell, 2006, p.105).

Data collection options and strategies for evaluation studies depend on the answer to the questions of “(1) *Who* is the information for, and *who* will use the findings of the evaluation? (2) *What* kinds of information are needed? (3) *How* is the information to be used? For what purposes? (4) *When* is the information needed? (5) *What* resources are available to conduct the evaluation?” (Rutman, 1984, p34). The challenge of evaluation studies is to communicate the findings to policy-makers and use the information in decision making.

This evaluation study utilized a mix-method data collection and analysis method. Faculty members who checked out and used iPads in their classes were contacted at the end of the fall semester of 2013, 2014 and 2015. After obtaining faculty’s permission, a short in-class presentation was conducted or an email message was sent to teacher candidates in that class to call for participation. During the short in-class presentation, iPads with the online survey were passed to students for them to complete the survey on site. The link to online survey was included in the email message if an email message was sent to teacher candidates. Faculty members were called to participate in a semi-structured interview in person or via email. All faculty interviews in fall 2013 were conducted in person. The interviews were recorded and transcribed. In the second round of the evaluation study in fall 2014 and 2015, interview questions were sent to faculty members through email. Their responses to the interview questions were also collected through email.

Participants

Fifty-six teacher candidates from fall 2013, 29 from fall 2014 and 30 from fall 2015 completed the online evaluation survey. Among the total of 115 participants, the majority were juniors and seniors (see Table 1). Participants were from different teacher education programs including early childhood education, elementary education, middle school mathematics education, middle school social studies education, English as a Second Language education, music education, Spanish education, and physical and health education. The 10 graduate student participants were all from fall 2013.

Table 1: Participants

Level	<i>n</i>	%
Sophomore	7	6
Junior	31	27
Senior	67	58
Graduate Student	10	9
Total	115	100

Evaluation Survey

The evaluation survey was created based on the review of literature and research studies. The survey was posted online and contained questions on teacher candidates’ experience of using iPads in their courses and their insights of the impact of using iPads on their learning (see Appendix A). When collecting data, the researcher went to different teacher education classes for students to fill out the survey on iPads and also sent the link to teacher candidates for them to complete the survey online. Survey data were analyzed quantitatively and qualitatively.

Faculty Interview

Faculty who checked out iPads were asked to reflect on their experience and observation of using iPads in their classes and their suggestions for improvement (see Appendix B). Five faculty members participated in the fall semester of 2013, four in fall 2014 and three in fall 2015. The three faculty participants in fall 2015 were the same from fall 2013 and 2014. Faculty members were interviewed face-to-face in fall 2013 and via email in 2014 and 2015. Face-to-face interviews were recorded and transcribed.

Procedures

The call for participation was send out at the end of the fall semester of 2013, 2014 and 2015. Teacher candidates were either presented with an iPad with the link to the survey for them to complete in class or sent the link to the survey for them to complete online. Faculty interviews were conducted at the end of fall 2013 and 2014. Survey and interviews were analyzed right after data were collected. Findings based on the results of data were used to modify the policy and practice of managing and using iPads in the School of Education.

RESULTS

Results from Analysis of Survey Data

Teacher candidates reported using iPads in a variety of education courses from core courses to methods courses. Ten graduate students responded based on their experiences of using iPads in an instructional media and technology course. A one-way ANOVA was conducted to compare survey responses among the three different semesters of evaluation: fall 2013, fall 2014, and fall 2015. No significant difference was detected in any of the items, indicating teacher candidates from 2013 to 2015 held similar perspectives towards using iPads in their classes. Teacher candidates were also grouped based on their grade levels (groups of sophomore and juniors versus seniors and graduate students) in order to compare difference of their perspectives using independent sample t-tests. No significant differences were found between the groups. Therefore, their perspectives were reported collectively.

Overall teacher candidates reported a positive overall experience of using iPads (Mean=4.25 on a scale of 1-5 with 1 represents “Very Negative,” 2 “Somewhat Negative,” 3 “Neutral,” 4 “Somewhat Positive”, and 5 “Very Positive”). It was common for teacher candidates to have already used mobile devices like an iPad or smart phone before the semester when they used iPads in their classes. Participants rated their experiences based on a 5-point Likert scale: 1. Strong Disagree, 2. Disagree, 3. Neutral, 4. Agree, 5. Strongly Agree. They rated their instructor’s modeling of effective usage of iPads in class high (Mean=4.26). Participating teacher candidates agreed that the use of iPads helped them gain more knowledge and skills of multimedia (Mean=4.17) and the use of iPads engaged students of different learning styles (Mean=4.14). They reported that they would like more opportunities to use mobile devices like iPads in classes (Mean=4.13). They also agreed that iPads facilitated multiple learning activities (Mean=4.11) and made them more confident in using mobile devices for learning (Mean=4.08) (See Figure 1).

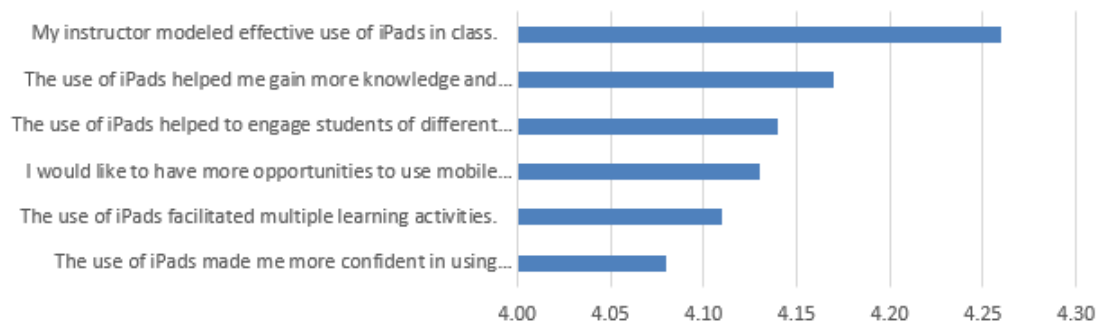


Figure 1: Highly rated responses in the evaluation survey

Two questions were worded negatively: The use of iPad distracted me from learning; The use of iPads added unnecessary complexity to accomplish learning activities. These two questions were reversely coded for analysis. The items in the evaluation survey received lowest rating from teacher candidates were: 1) The use of iPads helped me connect with the instructor (Mean=3.19); 2) The use of iPad added convenience in completing course assignment (Mean=3.23); 3) The use of iPads added unnecessary complexity to accomplish learning activities (Mean=3.23, reversed); and 4) The use of iPads helped me connect with classmates (Mean=3.25) (See Figure 2).

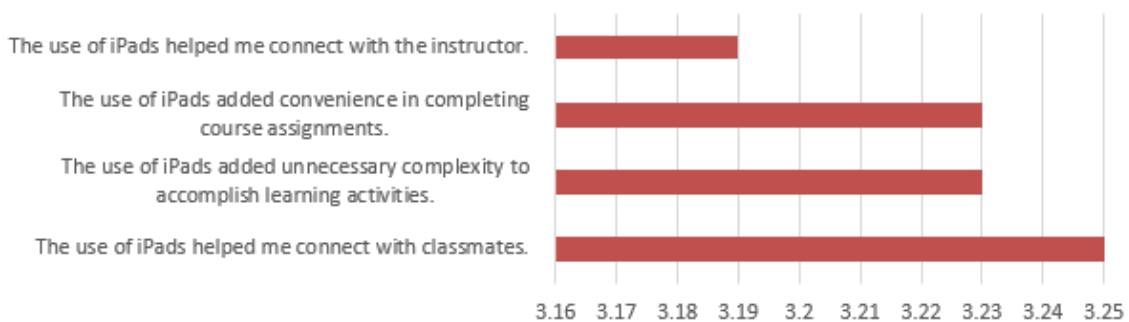


Figure 2: Low Rating Items in the Evaluation Survey

Teacher candidates also reported what they liked the most and the least when using iPads in classes. Their responses were analyzed based on the frequency of occurrences. They viewed the variety of apps for them to

complete different learning tasks as their favorite (85%). The other top-rated items of what they liked include: portability (83%), ease of access to the Internet (59%), ease of use (58%), and easy recording of images, audio and video (50%). On the other hand, what they liked the least about iPads included: It is too hard to type on the screen (55%); I cannot take it out of class (32%); It distracts me from learning in class (25%); It takes too long for the apps to load (22%); The screen is too small (21%) (See Figure 3).

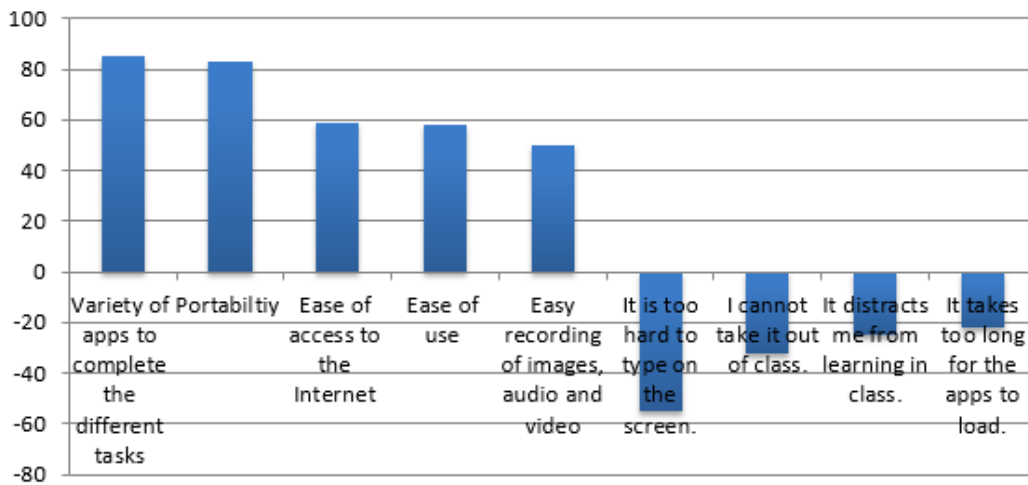


Figure 3: What Teacher Candidates Liked the Most (positive numbers) and the Least (negative numbers)

Results from Analysis of Interview Data

Five faculty members in fall 2013, four in fall 2014 and three in fall 2015 participated in the interviews for their feedback on the impact of using iPads in their classes. The three faculty participants in fall 2015 were the same from both fall 2013 and fall 2014. One faculty (Professor A) checked out iPads regularly once or twice a week throughout the semesters.

In the first semester when iPads were implemented, all of the five faculty participants rated their experience of using iPads as good (n=3) or excellent (n=2). Faculty reported using a variety of features and apps, such as camera, Educreation, NearPod, Haiku Deck, EverNote, Popplet, Notability, KidDoodle, StarFall, StoryKit, Brotranica Books, Storia, and so on. One faculty member (Professor A) checked out iPads weekly and used them regularly for teacher candidates to create word webs, take notes and create presentations. All other faculty checked out iPads for a few times to arrange class activities. They mainly used iPads for teacher candidates to explore apps and activities that they may engage students in teaching. One of them used iPads as an option for teacher candidates to design stations for her elementary methods class and the other used iPads to engage teacher candidates in interactive presentation as an alternative to PowerPoint for her lectures.

From the first semester of fall 2013, faculty reported challenges such as limited time in class for using iPads, slow internet connection, slow loading and updating time for some apps. All participating faculty expressed their desire to go beyond exploration for future use of iPads in their classes, but also voiced concerns of the limited time in class to go beyond exploration:

“...it would be nice if student were able to have access to the iPads to really do some lesson building or planning as a tool. When it is limited to the time in class, [anything] beyond exploration is difficult.” (Professor B)

“We still need time for exploring. But perhaps the next time around I will give the specific assignments in class, specific tasks to accomplish if we cannot check them out still.” (Professor E)

In the second year of evaluating the impact of using iPads, faculty members responded to the interview questions through email. Three of them participated in 2013’s evaluation. Their overall rated experience of using iPads ranged from “So so” (n=1), “Good” (n=2), to “Excellent” (n=1). Two faculty members reported to continue with exploration of iPads but more specifically focused on a certain topic, for example, exploration of reading support for struggling students as one activity in the reading methods class. Faculty also reported more specific learning activities beyond exploration, for example:

“Created short video and audio recordings for plans, projects, and role-plays- such as Audacity, Garageband, and iMovie. Created scaffolding tools for concepts using different applications for various learning styles and strategies- such as Mindmap, Skitch, Drawing tools. Utilized note-taking applications and presentation applications weekly- such as Notability, Evernote, and Haiku Deck, Google Drive, etc.” (Professor A)

Limited time for using iPads in class was also reported as a challenge by faculty in the second year of evaluation: “I learned I must be very intentional with plans, with time, and with ways to transport them to class—even when I have multiple materials to carry to class. I learned I need to provide explicit instruction in addition to exploration. I wish there was a way for students to complete assignments on them [outside of class].” (Professor E)

“we had to use during class time, but students could not check out or continue use for learning. So everything we created was simple and needed to be done in a short time frame or developed over class time for several weeks- I had to scale back 1-2 assignments in complexity because of this.” (Professor A)

In addition, faculty voiced the need for teacher candidates to have more access to iPads in order to practice creating learning activities and a supportive learning environment:

“Many are still unfamiliar with management of tablet or pad as a teacher, even if they have device themselves. For example, even those with devices don’t necessarily have familiarity with educational apps.” (Professor A)

DISCUSSION AND IMPLEMENTATION FOR CHANGE

Findings from teacher candidates’ responses to the evaluation survey and faculty interviews indicated teacher candidates and faculty had an overall positive experience of using iPads in different teacher education courses. They enjoyed the variety of apps available for completing different learning activities, great portability, ease of use, and easy recording of images, audio, and video by using iPads. The use of iPads helped them gain more knowledge and skills of multimedia and made them more confident in using mobile devices for learning. Teacher candidates rated their instructor’s modeling of effective use of iPads high in their responses. On the other hand, faculty members were reflecting on their curriculum as they implemented iPads in their classes (Rosenthal & Eliason, 2015) and seeking ways to incorporate iPads for effective teaching and learning practices.

This evaluation study supports other research studies on teacher candidates’ recognition of the benefits of using iPads (Baran, 2014; Geist, 2011; Oz, 2015). It confirms the need to grant teacher candidates’ continuous access to iPads in order for them to be able to use iPads as an effective tool for teaching and learning. In addition, the findings provide evidence for the School of Education to move forward with its programmatic decisions on integrating iPads in teacher preparation programs. Geist (2011) found that mobile devices such as iPads could be integrated into classroom instruction easily. However, the attitudes and pedagogical ideas of the teachers need to change in order to accommodate and meet students’ needs. Teacher educators need continuous training in order to adopt iPads as an effective tool in classrooms.

One of the disadvantages reported from Fall 2013 was the limited access to and time of using iPads during class. Based on the findings from this evaluation study, the School of Education started to allow teacher candidates to check out iPads for classes and field experiences in order to provide them with sufficient access and time to complete more complex learning activities beyond class time. However, very few teacher candidates checked out iPad outside of their class time.

Findings from this evaluation study also indicated the need for continuous training and sharing to help faculty effectively incorporate iPads in their classes to go beyond exploration. After the initial faculty workshop on using iPads, limited professional development was provided at faculty meetings such as faculty demonstrations and sharing of how to use iPads in their classes. More comprehensive professional development is needed (Herro, Kiger, & Owens, 2013) to ensure faculty to continue their modeling of effective use of iPads for teacher candidates, especially on how to use iPads to expand student-student connection and student-teacher connection for learning. The School of Education also used findings from this evaluation study to revise the list of preloading apps on all iPad minis for each academic year.

CONCLUSIONS

As a type of applied research instead of a basic or theoretical research, evaluation research is usually treated as a research method for finding out information as the evidence for changes in policy and practice. Findings from this study have been used to implement changes in the policy of managing iPads at the School of Education and practices, which fulfilled the purpose of evaluation studies.

During the three years of implementation of iPads in the School of Education, faculty who regularly used iPads in their classes made iPads an integrated part of their curriculum. Faculty who did not check out iPads or only checked out once or twice a semester remained as the majority in the School of Education. This contrast of the positive experience by teacher candidates as reported in the survey and teacher educators’ reluctance of using iPads calls for further action to bridge the gap.

In addition, this evaluation study had a small sample size and localized procedures for limited generalization. The researcher would call for continuous efforts for more evaluation studies on the impact of using iPads in teacher education, including both teacher candidates' self-reported data and other empirical data such as observation of their use of the iPads and artifacts such as lesson plans and reflections. In addition, more evaluation studies at different scales beyond one teacher education institution are also needed in order to provide more evidences and information to assist policy makers to make, modify and implement changes of the effective ways of managing and implementing mobile devices in teacher education.

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APPENDIX A: Teacher Candidate Survey Questions

Questions 1-5 uses the Likert scale: 1. Strong Disagree, 2. Disagree, 3. Neutral, 4. Agree, 5. Strongly Agree

1. I had used mobile devices like an iPad or smart phone before this semester.
2. My instructor modeled effective use of iPads in class.
3. I would like to have more opportunities to use mobile devices like iPads in classes.
4. I plan to use mobile devices like iPads in my future classroom.
5. The use of iPads:
 - Made me more confident in using mobile devices for learning
 - Enriched my learning experience
 - Engaged me more in class
 - Encouraged my active participation in class activities
 - Distracted me from learning
 - Increased my excitement to learn
 - Facilitated multiple learning activities
 - Added convenience in completing course assignments
 - Added unnecessary complexity to accomplish learning activities
 - Promoted discussion in class
 - Helped me connect with classmates

- Helped me connect with the instructor
 - Helped me better understand course materials
 - Helped me develop a more positive attitude towards using mobile devices like iPads in my future classroom
 - Helped me gain more knowledge and skills of multimedia
 - Helped to engage students of different learning styles (e.g. visual, auditory, kinesthetic) in class
6. Which of the following do you like the most about iPads:
- Ease of use
 - Portability
 - Pleasure of use
 - Easy access to Internet
 - Variety of apps for different asks
 - Display of audio and video materials
 - Easy recording of images, audio and video
 - Easy sharing of my work with others
 - Usefulness in completing learning tasks
7. Which of the following do you like the least about iPads:
- The screen is too small.
 - It is too confusing to use it.
 - It takes too long for the apps to load.
 - Apps do not work properly.
 - It is too hard to type on the screen.
 - I cannot take it out of class.
 - It distracts me from learning in class.

Question 8-13 are open-ended questions:

8. Please describe your most favorite iPad activity in class:
9. Please describe your least favorite iPad activity in class:
10. In what way do you feel the use of iPads helped your learning this semester?
11. In what way do you feel the use of iPads did not help your learning at all?
12. What suggestions do you have for using iPads in class?
13. What other comments do you have regarding the iPad Lab?

APPENDIX B: Faculty Interview Questions

1. How often have you used iPads from the iPad lab this semester?
2. How would you rate your overall experience with using iPads in your class this semester? Please explain your answer.
3. What activities have you done with iPads in your class(es)?
4. What apps have you been using the most in your class(es)?
5. What activities do you find most effective with using iPads in your class(es)?
6. What are your students' reaction to the use of iPads as your have noticed?
7. What have you learned from using iPads this semester that you will carry on to next semester?
8. What changes are you planning to make in the ways that you would use iPads in your class(es) next semester?
9. What challenges and/or frustrations have you encountered when using iPad this semester?
10. What suggestions do you have for the university and department to manage the iPads and apps?