

The Use of iPad in Academic Setting: Ownership Issues in Relation to Technology (Non)Adoption

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Abstract

In this paper we discuss a pilot study involving the use of iPad for active reading in academic setting. This is part of the broader study of how introducing this new platform may transform the work and learning practices of students. The pilot was conducted in the context of master's course in Geology at the University of Oslo, involving 40 students, instructor and three teaching assistants. The overall result of the pilot was that the platform did not get taken into use as expected. We hope that our experience with this pilot may be of use and interest for wider community.

To collect data, we have used classroom observations, two surveys (one close to the beginning of the semester and one at the end), one workshop and three group interviews. In addition, three students and the course instructor have been interviewed individually. The data from interviews have been consolidated and mapped out into an affinity diagram. The resulting diagram shows clearly issues that need to be further addressed, as well as areas where changes in study related work practices might happen. While the usual variables for acceptance of technology such as perceived usefulness and perceived ease of use are found to be important, our findings show that the issue of ownership was the most interesting one. Deeper exploration of this issue and its effects on adoption of this new technology specifically for study purposes is the main contribution this study offers.

Keywords: iPad; Learning; Ownership; Technology Adoption; Use of ICT

1. Introduction

Education has a history of using new technology not originally intended for educational purposes, and attempting to adjust them to an educational context (Cuban 2001). Unlike more traditional 'desktop technologies' mobile technology, like the iPad, are interwoven into students' daily life. In that way, mobile technology has the capacity to redefine what constitutes a learning space, detached from constraints of fixed time and place and facilitate more robust situated learning practices. In other words, the iPad might serve as a catalyst for establishing a more constructivist learning practices and support just-in-time learning. In this

scenario, knowledge construction can take place through collaboration and open up for greater student autonomy and enhanced metacognition.

Like many other new media technologies an iPad may be used as a device to support learning, but it is important to keep in mind that it has not been designed primarily for educational purposes. For example, using this device in an educational context implies at the same time working in a cloud-based synced work of Apple. What this new mode of interacting with data in a cloud brings in terms of learning support needs to be determined by studying the actual use by students in real learning situations.

The opportunity to conduct a study in the real learning situation arose when the University of Oslo Library decided to try digital curriculum on iPad and equipped the entire geophysics class with iPads. The goal of the study was to see how students adopt this new technology in their learning environment. This pilot study was also part of the (Green University, 2010) project.

There is much hype in media about iPad-centered education (see for example (Hu, 2011), (Chen, 2010) or (Wilson, 2011)). A large number of educational institutions are taking iPad into use (White, 2010). One can connect with these institutions through (iPad Educators, 2011), follow iPad education on Twitter (#iPadEd), and participate in social media dedicated to improving education through iPad use. Some research articles such as (Roschelle et al., 2007), (Culén et al., 2011) have considered the use of tablets and eBook readers in education, but studies about the use of iPad and its effects on learning are yet to come.

Having an entire curriculum on the iPad was viewed as a factor that would increase perceived usefulness of the tablet for students. In addition, iPads are generally viewed as having an easy to use, intuitive interface, contributing to perceived ease of use. In (Davis, 1989), the influence of perceived usefulness and perceived ease of use are discussed in relation to acceptance of technology. Many other constructs have been relevant to the technology acceptance model (TAM).

“Over the years, the additions that have been made to TAM include constructs such as trust, cognitive absorption, self-efficacy, job relevance, image, result demonstrability, disconfirmation, information satisfaction, top management commitment, personal innovativeness, information quality, system quality, computer anxiety, computer playfulness, and perceptions of external control. While researchers have made sound justifications for the addition of each of these individual constructs to TAM, in the final analysis this approach has basically provided explanations or antecedents for one set of belief perceptions via another set of belief perceptions, without also increasing our knowledge of what makes an IT useful.” (Barki et al., 2007).

In the learning context (Ertmer, 2005) identifies the teachers pedagogical beliefs as an important factor in the acceptance and use of technology. For our study, trust, cognitive absorption, self efficacy, work practice relevance, images, information access, mobility, ecology of devices, the role of the teacher and playfulness have all come up. Yet another construct has emerged as important – the issue of ownership. The ownership in this case has many facets, the most relevant ones being the ownership of the iPad itself, followed by the ownership of the curriculum, annotations, and software. We could see, rather early into the study, that iPads are not used as expected or as much as expected. As described in section 4 below, many challenges in using iPads became apparent and contributed to the set of reasons as to why this technology was not accepted as expected (based on our perception of what is useful and what is easy to use). Much like in Aramis (Latour, 1996), an investigation of this adoption failure has identified many suspects, but the ownership issues were the ones we

chose to consider in some depth here. It is interesting to note that a similar study in an elementary school (Gasparini et al., 2011) does not identify ownership as an issue of significance. The fourth graders live in the now, with no worries as to what happens to whatever they have on their iPads when the semester is over. The university students were very concerned with this issue. Further studies would need to be carried out in order to understand the ownership variable in adoption of technology for the classroom. Thus, we will not attempt to add ownership to the TAM model, but try to understand its interplay with other factors that led to, although perhaps not final, non adoption of iPads as a work tool in academic setting.

2. The context of the study

40 students, 1 lecturer and 3 teaching assistants participated in this study in the fall of 2010. Each iPad had the class curriculum downloaded in advance. The curriculum for the course consisted of book chapters, lecture slides, maps and academic articles. The students have also received a gift card, approximately \$25, and were required to get iAnnotate, Elements and Dropbox applications from the Apple App store (amounting to approximately \$16, the remaining amount could be used as desired by each student). The students have signed an agreement to participate in our research (see Figure 1). They received the iPads, with curriculum, until the end of the semester, on a loan from the university library.

The research team consisted of four researchers (2 from informatics, 1 from education, 1 from digital services) and five graduate students in informatics.



Figure 1 – Students receiving the iPads and signing the contract

3. The method

The main method was based on ethnography. During the semester, informatics graduate students have been working with geology students, observing the use of iPads in the classroom, carrying out contextual inquiry, as well as doubling as technical support.



Figure 2 – Emerging affinity diagram

Additional data was collected from two surveys (the first one close to the beginning of the semester and the second one at the very end) , one workshop and three group interviews (each involving one interviewer and one observer and note taker per group of 4-6 students). After the course ended, additional four individual interviews were conducted: three of them involving students and one involving the course instructor. All interviews, group and individual, have been recorded and transcribed. The interview data was consolidated using the sticky notes method, with one observation per note, in order to map the observations into an affinity diagram (see Figure 2)

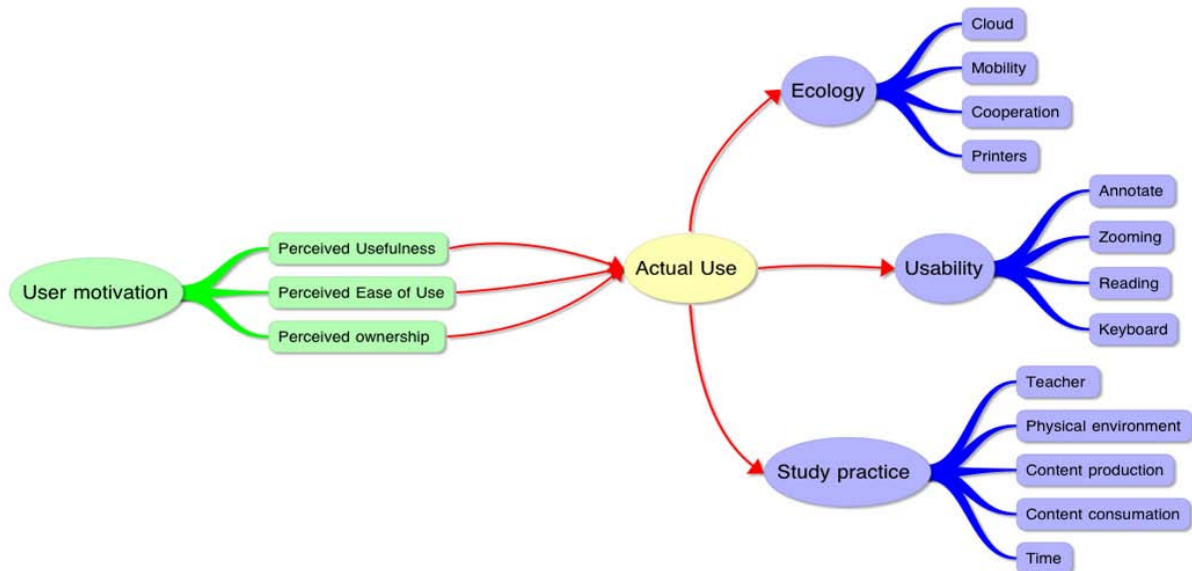


Figure 3 – Resulting affinity diagram

Figure 3 shows the resulting affinity diagram that will be used as the basis for discussion in the next section.

4. Challenges in using the iPad

Main areas of concern that were identified by sticky method were:

- 1) Study practice – including issues concerning time, consumption/production, teaching/teacher and the physical environment in which the learning takes place.
- 2) Usability – main issues here covering note taking and reading.
- 3) Ecology of devices – covering the issues of how iPads worked in conjunction with other devices such as mobile phones, laptops, printers and stationary computers both in labs and at home.

The perceived ease of use, usefulness and ownership are integrated in these discussions, and will not be discussed separately.

4.1. Study practice with iPads

Bringing an iPad into an already established institutional pedagogy turned out to be challenging for both the instructing team (the class instructor and the teaching assistants) and the students. The instructor has been teaching this well established course for many years. This particular course has been proposed for the pilot study in part because of the resources it needs. The text book is expensive. A number of additional articles and maps are used. Students traditionally print all the lecture slides, which are quite numerous. It has been

remarked in the proposal for participation in this study that students seem to like to read paper rather than screen based text.

It is easy to see how both the course leadership and the Green University project perceived the potential usefulness of iPad in collecting all course material on one platform and reducing the printing, at the least of the lecture notes, which are rarely saved for any period of time after the class exam is over. However, the course instructor did not adopt the new technology himself. He had difficulties finding the motivation and the time to learn how to use the iPad himself: *“When I have very long working days and I want to be as effective as possible, the effort of sitting down 2 -3 hours to learn the iPad is too big for me”*. As to why he was interested in participating in the study, the teacher answered in an interview after the course was over that he was interested in new possibilities for the students. His hope was that students would figure out this new technology on their own.

iPad was perceived as a tool that is intuitive and thus would be very easy to take in use. This proved not to be so. For those students, who would have liked to use the iPad in the classroom, the tempo of the lectures was too fast and actually, the iAnnotate tool too difficult to use. The informatics students provided the tutorial (see (Youtube, 2010), now seen by nearly 5000 viewers). Figure 4 shows one of the workshop participants showing how much easier it is to annotate on paper than on the iPad.

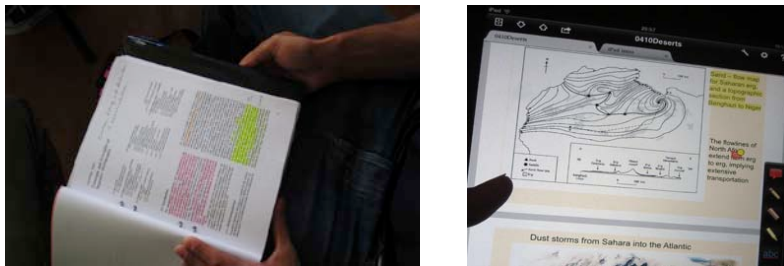


Figure 4 – Student showing notes taken during lectures in geology

The first survey shows that 50% of 28 students that have answered the question: “ Do you, in addition to syllabus on the iPad, use the paper version of the syllabus?”, have answered in positive. When asked: “What do you use to take notes during the lectures?”, only four students answered iPad, while 23 stated that they use paper. One student was using laptop and 3 said that they do not take notes.

A very relevant issue for those students who used the iAnnotate was who owns the notes taken during the lecture. They feel that the notes taken on paper are their own while annotations made on iPad felt less so. Why? Etymologically, the word ownership has the meaning of “to be the master of”. With paper notes, it implies that the one who took notes has the right to use them in mastering the subject, read them whenever and wherever, share with others, make copies of notes, store for later use etc. One owns the paper on which the notes are written, in most cases the pen they are written with, shelf where the notes are stored etc. In contrast, the notes taken on iPad were living in a cloud they do not own. Students were very conscious of the fact that the notes taken on the iPad are not their own. These notes were to be erased after the course as the iPads were to be returned to the library and “cleaned” for the next class to come. They have signed the statement, as part of their contract, that they will not save copies of the syllabus.

Thus, when we talk about the old media, paper, it is still in use in learning contexts (Sellen, 2001). Students in our pilot found it difficult to ‘make space’ for the iPad in their workflows as well. The iPad could not replace the robustness of reading paper books and making handwritten notes. Moving from paper based learning situation to a digital learning environment does challenge the ownership of especially notes and annotations. Copyright law

regulates the ownership of textbooks. Libraries are managing these rights among distributed users i.e., students and teachers. However, the ownership of self generated notes and annotations are challenged in the digital arena, especially when moving onto the cloud based computing. For example, the student receives a chapter from the curriculum book on the iPad that is borrowed from the library. Library has a licence for this digital curriculum for one semester. Students annotate the chapter, save their notes. Who then owns these notes? If they keep them, using some export functions, do they violate copyright laws? Our claim is that ownership of “own” (self generated) material is an important factor shaping the practice of taking notes/annotations and using these actively in order to master the knowledge.

In this pilot, the note taking was a significant example of content creation. It was interesting to note, though, that this content was not shared either via email or via Dropbox. In addition, searching the entire digital curriculum was at the start of the pilot considered to be potentially attractive for graduate students. This feature has not been used at all. Furthermore, the potential of using the iPads for collaborative work, using for example Dropbox, has not been explored by students at all.

Like every average student, the students in our project had different interests and digital competence. It is obvious that their main goal was to get a good grade in the course and not to spend the time on new technology. This included the entertainment they could have had on an iPad. More than 50% of students have not used the entire allocated amount of money they received as a gift card. All of them have purchased the required apps, but the remaining money, for most of them, remained unused.

In a group interview with 6 students, this was a discussion theme. “*We do not have the time for playing*”, said one student. Additional three students agreed with no time for playing comment, but also meant that, since they will not be keeping the device, there was no point in getting into gaming on the iPad. The remaining two students have downloaded some free applications, one of them being the Brainteasers; all of them short games you can leave any time. That actually, was the criteria for downloads.

It was also interesting to note that nobody has addressed the issue of AppStore applications that could be potentially useful for the course as supplementary material. Many educational and professional Apps are available, including Geology referencing system. In an interview after the course was finished, we asked one of the students about Geology applications on the iPad. The student did not look for them at all, and thus did not know what was available. When asked why, he said: “*they would be at a too low level for me*”. This comment addresses directly the perceived usefulness of applications in the AppStore.

Students have also brought up the software ownership issue. As one student said: “*I like to use what I like to use. I like open source software. I like to be able to work with my software. Here (implying the iPad) I have no choices.*” The same student comments that, while there are choices in the AppStore, they are all proprietary and thus, he cannot see the source code or modify the application.

The physical spaces where iPads were to be used were not always perfectly adjusted for that use. For example:

- 1) The seats in the room the students had lectures were not suitable for working with iPads.
- 2) Many of the students live in a student housing that does not provide a Wi-Fi connection.

The ownership issues were relevant here too. If the iPads were owned, the students might have considered the use of cushion tabletops for the classroom use or a mobile telephone plan that covers 3G usage.

The physical space where students got the most out of the iPad usage was the small classroom situation, involving group work in small groups around a table. Here, sharing of information including maps and videos was important. One of the students, who described herself as a conservative and not keen on the new technology said: *“I have used it (iPad) a lot in a group time; there it was very helpful, and we used it to see sediments in drill cores. But of course I could have also used my pc, because I can zoom in and out also there. Anyway I feel that the iPad and the laptop overlap a lot.”*

4.2. Ecology of devices

The comment above speaks also about the ecology of devices. Usually, the introduction of new technology creates a new ecology. Interestingly, it did not do that here. Most of the students felt that in any activity they had used the iPad for in their study practice they could have replaced it with a laptop. In fact, many students had problems deciding what kind of media they were actually using. In some situations, a particular student could think of the iPad as being a version of a laptop computer. In others, the same student could associate the iPad with an e-Book reader. Many saw mobility as positive and the reading from iPads perceived as superior to the reading from their mobile phones. But the mobile phone was theirs, while the iPad was not. At a workshop towards the end of the semester, a student brought the iPad to the workshop, packed in the original box. Big and thick, the box was taking a lot of space in the student’s back pack (see Figure 5). When asked why he carries it like that, the student said: *“I would not have liked the iPad with scratches, thus I am keeping it new for the next person”*. Carrying the iPad around in the box reduces the ease of use of the device in mobile situations, such as public transportation. In one of the group interviews, the students discussed the mobility of iPads and expressed satisfaction with how easy it is to read on a long bus or train trip. However, at the survey at the end of the semester, when asked “How do you read your syllabus?” only 3 students answered iPad, 3 book, 4 computer and the remaining 10 answered that they use combination of book and other devices. The 4 students, who chose computers, have stated that the computer is chosen because it is better and easier to use. Also, it may be noteworthy that the students got an offer to purchase the iPads they used; only 3 students accepted the offer.



Figure 5 – Student at the end of the semester, keeping the iPad safe in the box

Although the Apps for printing from the mobile phone or iPad do exist, they cannot connect to the printers at the University. This may have influenced how much of the digital material available on the iPads was printed. Our surveys indicate that students in the pilot study have printed much less than students usually do when taking this particular course. When asked: “Have you printed less curriculum documents because of the iPad?” 19 students have responded in positive, 4 negative, 4 did not change their printing habits and 1 was unsure. Of the 19 who responded positively, 11 printed much less than usually, 5 about half as much and 3 somewhat less than usually. However, how different these numbers would look, if printing from the iPad was available at the University, is hard to say.

4.3. Usability

The usability of iPad has been discussed in (Budiu, 2011). The students in our study have had a number of problems mentioned in the usability study, but the most important ones for geology students were:

- 1) One cannot have two applications open at the same time (for example, follow the lecture slides and browse at the same time). Students are used to multitasking in this field.
- 2) Reload of pages or slides in PDF format takes a very long time (for example, if the text references some figure that is on a different page, to find the figure can be quite time consuming; similarly when zooming on an image, something that these students routinely do, may be slow to reload).
- 3) Downloading files was difficult for many students.

Again, the proprietary software and software ownership was important, as the students felt that with a different choice of software, these problems could be remedied to a large extent. Several students expressed irritation over lack of Flash and thus some irritation and frustration with web pages that use it and that do not work on iPad.

In the second survey, several questions dealt with interface and how well it worked for their purposes. While 9 out of 18 students answered that navigation on iPad with a finger was very easy, when asked what they prefer, 8 said that they wish for an external mouse and a keyboard, while 2 chose a stylus and an onscreen keyboard (again, mostly for fast note taking and annotating).

As for perceived usefulness of the iPad and its relevance for the course, several students brought up how nice it would be if the iPads could handle 3D models they need for the course. One of the students said: *"It would be really splendid if one could have 3D models, 3D figures, with videos and with text. It would be really bombastic!"*

5. Conclusions

Our pilot study points strongly towards considering the perceived ownership as an important factor in adoption of the new technology in the higher education. In addition to having their iPads only on a loan from the library, students have had problems dealing with annotations of the copyrighted texts and note taking on the device. Annotation and note taking was their main arena for content creation. In the area of content consumption, the sentiment was that the digitalized content, although all of the teaching material was gathered in one place, just was not enough to make them perceive the tool as useful. By placing all of the material received into a Dropbox, whatever they needed to do was doable on a PC or a laptop. The impact of technology on meta-cognition and students autonomy in content acquisition was minimal in our pilot study, but these parameters may be highly dependent on the teaching leadership or instruction on the use and mastery of the required Apps, as well as the tool itself.

As future work, we envision a more in depth analysis of acceptance of tablets as a working tool in education, with focus on various ownership issues, their relation to the age of students and their correlation with perceived usefulness of this new technology.

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