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CHAPTER FIVE

CONVERGING LINES: APPLE'S iPAD AND ACTIVE LEARNING IN HIGHER EDUCATION[1]

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Abstract

This paper investigates ways in which convergent devices such as Apple's iPad can enhance active learning in a higher education setting. The iPad, with an ever-growing availability of educational apps, is often understood as a new technology for learning. The personal nature and portability of the iPad makes creating and presenting multimedia material through innovative platforms such as Prezi and Explain Everything simple. Both innovative and disruptive, the iPad can also act as a convergent device that is an agent for recording, editing, and broadcasting a range of media. Linking these technologies to enable new actions and opportunities presents an opportunity to develop alternative structures in learning. Working in-depth with an instructor and students, we used observation and interview techniques to gain insight into the iPad's effectiveness at creating a new dynamic for teaching in a demonstration/workshop environment. The experiences and responses of the instructor and students from this case study warrant further research.

Keywords: iPad, mobile, convergent, innovative, active learning

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Introduction and Literature Review

Figure 5.1. A fixed position iPad set up to record a warping reel in preparation for the demonstration.

The iPad as a multipurpose device for classroom use is well documented in blogs and early-stage research across the Internet. The University of California-Irvine reported a 23% increase on their med students' national exam scores after implementing an iPad program (UCI's iMedEd Initiative, 2013). Likewise, Auburn Schools in Maine reported improved literacy results in kindergarteners who use iPads (Dalrymple, 2012). Further, special needs teachers reported increased engagement by students using iPads (Baca, 2012).

Three years ago our university invested in development and implementation of modern learning technologies by hiring five Learning Technologists (LTs) who would reside in each of the university's five schools. At the time, because most of the university's teaching spaces were not set up for newer technologies, the LTs were tasked with finding ways to help enhance presentation and increase student participation within the limitations of existing facilities. The authors, as LTs for the School of Art & Design and the School of Music & Performing Arts, were aware that the active nature of studio- and workshop-based teaching often requires the use of physical materials and resources. We believed that the mobile, wireless nature of iPads combined with Apple TV technologies would meet these two challenges. Considering the iPad as an innovative/disruptive (Flavin, 2012) and convergent device, we therefore wanted to explore its potential as an agent for change. The iPad is often

used as the focus of learning because of its immediate access to search capabilities and educational apps. As a convergent device it allows active learning and demonstration tasks to be created in real time, broadcast, and time shifted. This paper presents a qualitative case study of how the iPad acted as an intermediary in a university studio-based textile design class.

Innovative/Disruptive Device

Christensen et al. (1997, 2011) have written extensively about the nature of technologies being innovative/disruptive. The former term replaced the latter in later writing, but the meaning remains the same. Christensen (1997) explained, "Products based on disruptive technologies are typically cheaper, simpler, smaller, and, frequently, more convenient to use (than older technologies)" (p. xv). Flavin (2012) added, "Disruptive technologies are those that disrupt established practices…" (p. 103). Although the iPad is considered to be representative of innovation in the classroom, in use it often functions merely as a smaller, lighter, and more convenient blackboard. We contend it is not disruptive when used in this way. However, it does become disruptive when used as a convergent technology.

Convergence

The term convergence becomes a loose and somewhat impractical term when used within the world of digital devices and digital media because its definition depends on the context and the author. For our purposes, we define convergence within a device as occurring when two or more discrete functions co-exist, thereby permitting capabilities greater than each independent function. For example, a combination radio and cassette recorder permits broadcasts to be recorded on one device rather than two separate devices. Adding a timer to this combination enables radio programs to be time shifted, a disruptive step that fundamentally alters listener behaviour.

Dahlstrom (2013) learned that despite the increasing presence of smart phones and tablet devices within university student bodies, these devices have little impact on learning and teaching because they are often banned in classrooms. However, Conole, de Laat, Dillon and Darby (2008) learned that students are changing the ways that they are working and that there may be "a rich and complex interrelationship between individuals and tools" (p. 521). Chen and Denoyelles (2013) initiated a university-wide survey on student mobile learning practices, which showed that ownership of mobile devices was high among students, tablets were the

most popular devices for academic purposes, and mobile learning typically occurred outside the classroom with only limited guidance from instructors. These studies indicate a growing potential for the use of mobile devices to engage students in the learning process in ways they are already engaged in everyday life.

Karasavvidis (2009) cited several studies indicating teachers tend to adapt technology based upon traditional methods, such as moving from chalk and slate to pencil and paper. Laptops, tablets, and digital projectors primarily serve as high-tech equivalents of the chalkboard, but the process of presenting information has not changed. It remains independent, and often irrespective, of the delivery method used: chalkboard, PowerPoint, or Keynote on an iPad. He concluded that this limited use of technology is due in part to lack of time and training from the teacher's perspective. As a convergent device, the iPad replaces multiple pieces of technology through hardware, interactive apps, Internet connectivity, and the availability of social media such as media-sharing sites. It opens possibilities for interaction and research not previously available in a typical classroom.

In 2007, Stelios Papadakos wrote about the differences between a pre-convergent world and post-convergent world. Papadakos utilized a diagram from the United States Telecommunications Training Institute (USTTI) to illustrate his point (see Figure 5.2). In the pre-convergent world, there is a linear relationship between medium, means of transmission, and viewing platforms. In a post-convergent scenario, the medium, media, and devices are not restricted by the linear model and are therefore able to interact unilaterally. We can adapt these ideas to a teaching model in which the traditional path of presentation medium, ratio of dissemination (presenter to audience) and location becomes similarly disconnected with the implementation of convergent technologies (see Figure 5.3).
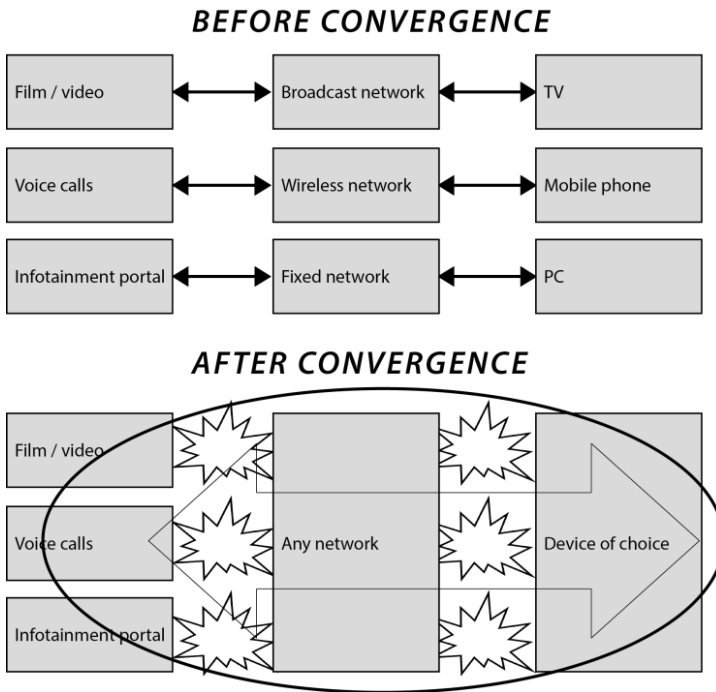
BEFORE CONVERGENCE

Film / video	↔	Broadcast network	↔	TV
Voice calls	↔	Wireless network	↔	Mobile phone
Infotainment portal	↔	Fixed network	↔	PC

AFTER CONVERGENCE

Film / video			
Voice calls	Any network	Device of choice	
Infotainment portal			

Figure 5.2. ICT industry before and after technological convergence (adapted from Papadakis, 2007).

Convergence, Innovation/Disruption, Active Engagement

In a standard demonstration format, students watch and take notes while a lecturer demonstrates a process. When the students later review these notes, they must rely on their memory to put the written words into context as they apply them to the task that was demonstrated. This process is different than when a convergent device employing audio and video is used. This type of convergent device captures both content and context and changes the way in which information is exchanged. Students have the original images and sounds to rely on as they watch the video while attempting to do the task themselves.
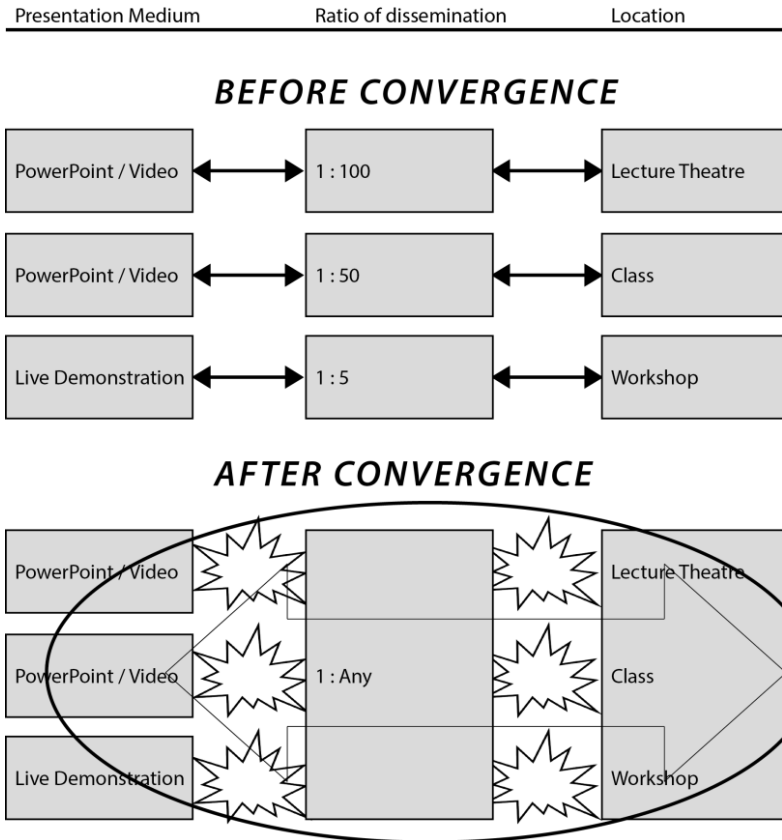
Presentation Medium	Ratio of dissemination	Location

BEFORE CONVERGENCE

PowerPoint / Video	⬌	1 : 100	⬌	Lecture Theatre
PowerPoint / Video	⬌	1 : 50	⬌	Class
Live Demonstration	⬌	1 : 5	⬌	Workshop

AFTER CONVERGENCE

PowerPoint / Video		Lecture Theatre
PowerPoint / Video	1 : Any	Class
Live Demonstration		Workshop

Figure 5.3. Adapted model of before and after the introduction of convergent technologies in teaching.

The disruptive effect of the convergent device goes deeper than a simple recording because the convergent device facilitates real-time engagement between teacher and student by capturing both content and context. This situation creates an environment where students are active and engaged in the learning process, thereby creating an active learning environment in the broadest sense (Prince, 2004). Because a record of the interaction is made, the response from the learner is embedded in real time with that of the tutor, which enables reflection and deeper learning. Information is better retained when students take steps to reinforce the materials imparted to them through either reflection or repetition

(reiteration), or a combination of these methods. According to Bonwell and Eison (1991), studies have shown that students prefer strategies that promote active engagement.

The act of demonstration is live, has the possibility for error, and forms a direct connection between the lecturer and students. The possibility of enabling students to access the demonstration session, in which they participated, so that they can review the content in context rather than relying upon notes and memory, suggested to us that a stronger link could be made between demonstration and student engagement. We wanted to explore three questions: Would the iPad, as a convergent device, help to increase student and instructor perception of the effectiveness of demonstrations? How would students and instructor perceive the effectiveness of a lecture video versus live instruction? What obstacles arise in implementation of the iPad as a convergent device in the demonstration session?

Methodology

In this qualitative case study we observed four instructors using the iPad as a projection device in demonstration sessions. This paper focuses on only one of those instructors because we were able to observe the use of the iPad as a convergent device over two three-hour sessions rather than only one one-hour session as with the others. Prior to the sessions, the instructor was concerned that students would not be able to adequately see the details of the demonstration and wanted to use technology to enhance the students' viewing capabilities. This seemed like a perfect opportunity for us to test our thoughts about the iPad as a convergent device. The subject of the demonstrations was a loom set-up for a weaving project as part of 'Introduction to Contemporary Mixed Media Textiles,' a course in which undergraduate students are introduced to several disciplines. The introduction to each discipline begins with the development of basic technical skills for the medium. Weaving is taught weekly, with instructional material made available to students through Blackboard. The workshop space is an open studio about 15m x 15m with a 4m-high ceiling used for a range of art practices. There are tables scattered throughout the space, and the walls are lined with shelves full of supplies and tools from the subjects taught at this site. Two of the tables have looms on them. The studio is equipped with Wi-Fi and limited fixed network ports but contains no built-in projection devices. We set up a mobile network with a small projector and provided the instructor with an iPad in order to project the live-stream onto the wall while simultaneously recording the demonstration.

We wanted to observe two primary behaviours: In a demonstration, how would the instructor manipulate the iPad device? Further, how would the students react to, or interact with, the way the device was being used? We also wanted to know how the instructor would handle the recordings afterwards; specifically, would she edit them or post them 'as is'? During each session we had several opportunities to discuss the activities with both the instructor and students, making adjustments in course. Eight students were involved in the sessions, outside of the sessions, or both. We interviewed three of those eight. Although this is a limited data set, our observations and interviews provided us with a wealth of data which points to the effectiveness of the iPad's convergent technologies to innovate in the classroom.

Data Collection

Prior to the first class, we had a preparatory session in the space to establish how to set up the equipment and determine positioning of the data projector. Data collection included live observation, comments from both instructor and students as the demonstration was in progress, post session and project interviews, and the edited videos by the instructor. The two class sessions were recorded simultaneously with an iPad and a Canon DSLR. The combination of recordings from the iPad being used as a convergent device and the DSLR being used as an observation device enabled us to better understand how the participants were responding to the use of the iPad. We then coded and catalogued student and instructor comments and their physical actions from the 30GB of video. We analysed the data by mapping the video from the iPad to that of the DSLR and then catalogued the dialogue and actions. The data were catalogued in a separate document.

Figure 5.4. The teacher testing the initial setup of the iPad fixed on mic stand.

Findings

Effectiveness

The students' ability to immediately access the demonstration material via a digital projector, screen, or through their own device allowed them to review exactly what they had seen earlier and reinforce the materials being delivered. It might be stating the obvious, but another related convergent device in this scenario is the mobile phone. When a student pulled out her mobile phone and accessed the video from the previous class, we realised that the phone was also a convergent device. Students watching the videos out of the classroom, however, did not get the same experience as the students who were present for the sessions.

Staff concerns that students would not attend sessions because they could watch the videos later were allayed when feedback from those who missed the first session and were required to complete the assignment from the video, declared the video from the first session to be 'unclear,' 'too long' and 'boring.' However, students who were in attendance at both sessions found that they were more connected to the videos because they could recall the context in which the recordings were made.

> "You just want the experience to be a little bit more personalized, you know you've done that video with someone and you've got it to refer back to." (Student 1)

"You feel a bit more part of it, you've got that connection with it." (Student 2)

Asked if using the iPad to make videos available immediately on completion of the demonstration was helpful, Student 1 said, "If this is something you're going to do, you want the instance of it right there in front of you without having to go onto a computer onto YouTube". Student 2 said, "It can be a bit scary going in to work on the equipment that first time when the tutor's not around. When she's there it's like 'oh yeah, I know what to do' and when she's not here it's like, 'Argh'. So it's (the immediate video) like her being around." Student 1 added, "There is such an emphasis on independent learning and sometimes you can't do that. If it's the first time you've done that, having that (video) to refer to would just give me that little bit of extra confidence to say OK…"

Obstacles

Initially, the instructor considered the iPad as a camera, albeit one that could live stream to a data projector. In this role, the device functioned as a passive observer. The instructor soon realized, however, that using the iPad to provide a general overview was insufficient and also that some key instruction had been blocked by her body or hands as she moved around, "so you can't see the cross at all there, which is rubbish!" She then removed the iPad from the stand in order to provide more detail of how to tie a knot. In her view, by doing this, the iPad obtained identity as another student, "so it's like treating the camera like a person."

Figure 5.5. The instructor uses the iPad as a hand-held device after removing it from the stand.

Once the instructor had completed a short demonstration she would then ask a student to attempt the same technique. She realized that she could record the student and offer commentary at the same time she was holding the iPad, but this proved to be awkward: "I can't see 3D as well, looking at the flat screen, but then if I look over, I'm not videoing the right bit." She put the iPad down saying, "That's the temptation when you're holding it, actually to give up… I think you need the tripod, I'll put it back on the tripod."

Some discussion regarding hand-holding versus fixed led us to recognize that hand-holding offered an opportunity to follow the demonstration more closely, so the instructor tried again. She still found that watching the student while holding the iPad was too difficult: "I think it's much easier if there is a third person doing it to be honest. I'm trying to concentrate on two things at once." We asked, "How do you think it would work if you are having a student do it, would that be distracting for the student?" The instructor responded that we should have a student try holding the iPad.

Figure 5.6. The student view of the demonstration while hand-holding the iPad.

Student 3 filmed with the iPad for two minutes, and then began moving around in order to adjust the viewing position of the iPad. Asked how she found filming with the device, she replied, "Yeah, I just watched it through the film." When asked if she felt like she was filming the process or actually watching the demonstration, she said, "I felt like I was watching it because that (the iPad) is obviously blocking it so I was watching it through there, like what she was doing, and if I couldn't see

something I just moved it." Review of the footage showed that the student had also glanced over the top of the iPad and at one point looked full on at the instructor so that in reality, she was looking at both the screen and the physical action.

Other Matters

Students are familiar with the culture of video sharing through social media, but the motivations for this activity in that context do not transfer to its application in an academic environment. Dressed in jeans and sloppy shirts, students were concerned that their appearance was not up to a standard that would be acceptable to be shared online. Student 1 was asked, "What do you think about being able to look up at yourself on the screen?" and she replied, "It's so awkward it's unbelievable." This student was very positive later on, however, when she realized the video would not be shared with anyone outside of her cohort. When we made it clear to the class that the videos would only be shared via the institution's virtual learning environment (VLE), therefore restricted to only people within their class, the students became more animated and excited by the process. The interviewees said that having the videos as reference improved their confidence when working independently:

> "It's a solid foundation that allows us to work a bit more on our own, confidently." (Student 3)

> "There's such an emphasis on independent learning and sometimes you can't do that. . . . Having that (video) to refer to would just give me that little bit more confidence." (Student 1)

We were surprised by the student's responses when asked their perceptions of the videos: Were they sufficiently edited? Did they lack an authoritative professional feel? The students were adamant that a polished, professional video in this situation would not provide such a satisfactory experience. As one student said, "I don't think they should be (polished, professional). That's the beauty of it, that it's literally students in a classroom with a lecturer, doing the process." (Student 2)

Discussion

The convergent nature of the iPad allows live streaming of audio and video to a projector, capture of the stream and immediate replay, and

editing and uploading to cloud-based storage such as YouTube and the institutional VLE environment. These capabilities are inherent in the hardware but are facilitated through a range of apps that give more presentation options to academics. Clearly, the iPad's convergent capabilities allowed for a different level of student engagement within this setting. In the other three settings that we observed, the iPad was used simply as a unique projection device and its use required relatively little input from the lecturers. In those settings, the uniqueness of the iPad's ability to be placed in unusual positions in order to project onto a large screen did indeed break down barriers to learning, but in no way did the iPad help to create the personal learning experience and engagement that occurred in the textiles setting.

The students' comments indicated that the application of the iPad in the textiles demonstration/workshop was successful on the whole. The successful aspects were: immediate availability of the video in a workshop situation, a third party or student filming the process, the projection during the demonstration, and the time shifting of the video for those who were at the initial session. We also learned the need for proper prior communication concerning the use of the video—where and to whom it would be made available—in order to make students feel at ease with the process. Perhaps of most interest was the negative reaction to the videos from the student who was not at the first session. Because she had no context, the informality of the video made it difficult for her to grasp the progression of the tasks. This stands in sharp contrast to the positive responses of the students present at the first session who appreciated the uniqueness associated with their experience through the videos.

The iPad's capabilities to undertake basic edits, crop extraneous material, stitch short sequences together, and split long sessions into shorter sections without transferring to another platform allowed the material to be quickly packaged and shared with the students. However, it is important to note that the instructor had the time, ability, and willingness to take on the task of editing. Karasavvidis (2009) raised the lack of these same traits as potential barriers to teacher engagement with new technologies. Lack of training and expertise might prohibit another lecturer from attempting to use the iPad in any way other than as a glorified projection device. Throughout the entire process, it was the flexibility and willingness of the instructor to engage with the device and allow experimentation to take place within her classroom that allowed us to achieve successful methods for implementation.

Conclusion

This case study consciously focused on one class and instructor over two extended workshop sessions. Being a single case, the conclusions are limited to the conditions mentioned in the discussion above. However, through our observations, discussions and interviews, we were able to see the potential impact of the iPad as a transformative device that is both innovative and convergent and that increases the interactivity of lecture material, instructor, and students in non-traditional ways, rather than serving as merely a glorified chalkboard.

References

Baca, M. E. (2012/11/20). iPads improve special education at Coon Rapids school. Technology has improved achievement and engagement for students with significant disabilities. Retrieved from http://www.startribune.com/ipads-improve-special-education-at-coon-rapids-school/179835811/?refer=y

Bonwell, C. & Eison, J. (1991). Active Learning: Creating excitement in the classroom. *1991 ASHE-ERIC Higher Education Reports*.

Chen, B. & Denoyelles, A. (2013). Exploring students' mobile learning practices in higher education. *EDUCAUSE Review, Oct 7, 2013*. Retrieved from http://www.educause.edu

Christensen, C. M. (1997) The innovator's dilemma: When new technologies cause great firms to fail. Harvard Business School, Boston, MA.

Christensen, C. M., Horn, M. B. & Johnson, C. W. (2011) *Disrupting class: How disruptive innovation will change the way the world learns*. New York: McGraw Hill.

Conole, G., de Latt, M., Dillon, T., & Darby, J. (2008) 'Disruptive technologies', 'pedagogical innovation': What's new? Findings from an in-depth study of students' use and perception of technology. *Computers and Education, 50*, 511-524.

Dahlstrom, E. (2013). *ECAR Study of undergraduate students and information technology*. EDUCAUSE Center for Applied Research. Retrieved from http://www.educause.edu

Dalrymple, J. (2012/02/17). iPad improves kindergartners literacy scores. Retrieved from http://www.loopinsight.com/2012/02/17/ipad-improves-kindergartners-literacy-scores/

Flavin, M. (2012). Disruptive technologies in higher education. Research in Learning Technology 0042 Supplement: ALT-C 2012 Conference Proceedings.

Karasavvidis, I. (2009). Activity Theory as a conceptual framework for understanding teacher approaches to Information and Communication Technologies. *Computers & Education, 53*, 436–444. Retrieved from http://www.journals.elsevier.com

Papadakis, S. (2007). Technological convergence: Opportunities and challenges. https://www.itu.int/osg/spu/youngminds/2007/essays/PapadakisStelios YM2007.pdf

Prince, M. (2004). Does active learning work? A review of the literature. *Journal of Engineering and Education*. 93(3), 223-231.

UCI's iMedEd Initiative named a 2012-13 Apple Distinguished Program. (2013). Retrieved from http://news.uci.edu/press-releases/ucis-imeded-initiative-named-a-2012-13-apple-distinguished-program/