

# **TABLET COMPUTERS IN THE UNIVERSITY CLASSROOM OF 2012: OPPORTUNITIES AND CHALLENGES**

## **Technology in Practice Strand**

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### **1. ABSTRACT**

Educational institutions at all levels and locations face constant pressures to incorporate the latest technology into their offerings for students and teachers. Many K-12 school districts in the U.S. have embraced SMART boards, tablet computers, and “bring your own device” (BYOD) implementations so that precollege students are now accustomed to technology-rich learning environments. U.S. higher education, in general, has been slower to adopt computer use as part of the in-class learning experience. Anecdotally, it appears that technology has taken hold in project-focused or problem solving-oriented small classes rather than in large lecture classes. In order to better understand the use of tablet computers in a large urban research institution, Boston University’s classes that use tablet devices were observed and the faculty members who taught the classes were interviewed. Tablet computers were used in a number of small (fewer than 60 students) engineering, medicine, business, fine arts, and hospitality classes. Faculty members reported that maintaining students’ focus on the course material was a consistent challenge. In addition, faculty members bore the costs of teaching with technology- whether it was in the time to teach themselves the technology and evaluate alternatives, the need to arrive early or stay late in order to set up and put away the technology, or the negative comments about technological failures that surface on course evaluations. The breadth of these fields and the consistency of these findings support the notion that these observations may be generalizable to other colleges and universities.

### **2. PROBLEM STATEMENT AND CONTEXT**

Today’s undergraduate students in the U.S. are likely to have had extensive exposure to pen-enabled teaching and learning prior to matriculation at a college or university. For example, SMART claims that more than 2 million SMART Board interactive whiteboards have been installed globally in “K-12 classrooms, reaching more than 40 million students and their teachers” [1]. Slate tablets are also prevalent in the K-12 setting today. For example, Apple reported in July 2012 that one million iPads had been sold to schools in the last quarter, including iPad 2s with a slightly reduced price after the launch of the iPad 3 [2]. This announcement was made prior to the launch of the iPad Mini, an even more affordable iPad option that has garnered the attention of many K-12 institutions since its launch in October 2012 [3]. Further, the Apple devices are only part of the K-12 tablet market; niche tablets such as the Kuno and Kineo use the Android platform and address the needs of students in classroom learning environments at a lower cost per device. In fact, an Android-based tablet computer, the Aakash 2 by Datawind, is now available in India for under \$50 and it should soon become available elsewhere for a comparable price [4]. These innovations and their infusion into precollege classrooms worldwide support the claim that an ever-increasing number of

undergraduate students will have experience with tablet computers before entering higher education.

While the K-12 world has embraced educational technology such as tablets quite readily, U.S. colleges and universities have been slower to do so. The 2012 Pearson Foundation Survey on Students and Tablets found that 25% of current students in an institution of higher education now own at least one tablet device and they see these devices as valuable for educational endeavors [5]. This report also indicates that more than 60% of college students believe that tablet computers help them to study more efficiently and perform better in their classes [5]. However, college faculty have not incorporated tablets into their teaching repertoires as quickly as might be expected based on the rapid uptake of these devices. Some people have postulated that typing difficulties or notetaking (inking) challenges have retarded the acceptance of these devices [6]. Others speculate that concerns about student inattention and distraction due to competition from online lures such as social media websites, email, online games, and other apps may be responsible for the reluctance to use tablets in class [7]. Adopters of tablet computers in the classroom counter these claims by arguing that effective teaching promotes student engagement and participation and tablets are a valuable tool to involve students in the learning process [7].

In order to understand the contexts in which tablets are used at a major research institution, an investigation of ongoing tablet initiatives throughout Boston University was undertaken. Boston University, with 16 schools and colleges, total enrollment of more than 33,000 students, and a full-time faculty of more than 4,000, is representative of many large urban research institutions with a full complement of undergraduate, graduate, and professional degree programs offered in traditional face-to-face, online, and hybrid settings. As such, the findings from an analysis of tablet use throughout the University should be generalizable to other institutions.

### **3. METHOD EMPLOYED**

With support from the Information Technology and Educational Media offices throughout the University, classes which used some form of tablet computer during the spring semester 2012 were identified. Emails were sent to the responsible course faculty members to request a meeting to discuss their application and to arrange an observation of a class session in which the tablets were used. Faculty granted permission for photography to document in-class activities.

### **4. RESULTS AND EVALUATION**

Since Information Technology and Educational Media are centralized services, these departments provide technical support for all on-campus computer laboratories and facilities. Staff from these offices provided a list of classes that were using tablet computer during the spring 2012 semester. The classes are diverse in terms of the subject matter covered and the level of the students. The following courses had tablet implementations during the spring 2012 semester:

**School of Hospitality Administration-** SHA HF 370 Revenue Management

**School of Management-** SMG SM 222 Modeling Business Decisions and Market Outcome

**Graduate School of Management-** Executive MBA Business Marketing Seminar

**College of Engineering-** ENG EK 301 Engineering Mechanics I

**Metropolitan College-** MET MA 123 Calculus I

**Metropolitan College-** MET MA 124 Calculus II

**School of Medicine-** GMS Health Care Emergency Management

**School of Medicine-** MED Anatomy/Histology/Radiology

**College of Fine Arts-** CFA AR 484 Graphic Design

The Graduate School of Management and School of Medicine courses were for graduate/professional students and the remaining courses are for undergraduates. All courses were offered in a traditional face-to face format that was augmented through online posting of course materials and assignments on Blackboard, an online learning management system. These classes had between 20 and 60 students per section, so they were considered to be small or medium-sized classes. Some classes had dedicated Information Technology assistance on a day-to-day basis (Graduate School of Management, School of Hospitality Administration), others had assistance from Information Technology on an as-needed basis (Metropolitan College and School of Medicine), and still others had additional faculty or teaching/computer lab assistants present at all times to ensure smooth operation of the technology (School of Management, College of Engineering). Thus, there was a variety of approaches to minimize the likelihood of technological problems during class time.

There were a number of different tablet technologies in use and their ownership also varied. For example, the Graduate School of Management gave each student in the Executive MBA program an iPad upon enrollment and students owned their devices. The School of Hospitality Administration and College of Engineering purchased iPads and made them available to faculty to give to students for use during specific classes via a mobile cart that must be wheeled into and out of the classroom each day. The School of Management used SMART boards and school-provided netbooks that were supplemented by students' own devices. The College of Fine Arts instructor used an iPad to show students how to develop materials for use on an iPad, but students used college-owned iPads in an out-of-class lab setting. One application at the School of Medicine used SMART boards, iPads, and iPods that were complemented by students' own devices. In the other School of Medicine application, the instructor used a PC with a Wacom external stylus on a tablet to annotate anatomical images. Finally, the Metropolitan College applications used a college-owned tablet PC classroom laboratory that was used only for tablet-based mathematics classes. Thus, many different tablet technologies coexist within the University.

The rationale for introducing tablet computers to the classroom learning environment also varied. Several of the implementations resulted from individual faculty members who envisioned tablets as a way to improve their ability to convey information or engage students in their material. Other implementations were driven by donations of equipment or dedicated funds to purchase tablets. Another implementation was launched at the behest of a dean who thought that putting tablets into the hands of every faculty member would encourage widespread adoption and classroom utilization. To date, this implementation has had only modest success, while the faculty-initiated uses have been more positively received by students and faculty members.

Another difference among the tablet implementations was the nature of information flow within the classroom. Most of the tablets were used by the instructor to provide information to students with annotations, so there was a unidirectional flow of information. The College of

Engineering used a non-real time, bidirectional information flow. In this application, students worked in groups to solve problems on their tablets and then uploaded their solutions to a common dropbox/google docs site so that the instructor could retrieve and display them to the class within a minute or two. The Metropolitan College tablet PC implementation used Classroom Presenter to create a real time, synchronous, bidirectional information flow. The bidirectional information flow required students to participate in class and create information that was shared with their fellow students.

While various tablet technologies were in use at Boston University in the spring semester of 2012, a few common themes emerged from conversations with the faculty members who used tablets in their classrooms. First, these faculty members were explicitly concerned about creating an exciting, engaging, and productive learning environment for all students. They saw tablets as a “hook” to pique students’ curiosity and as a way to bring real world applications into the classroom. Second, all faculty in unidirectional tablet applications, especially the BYOD implementations, noticed that students were spending significant amounts of time on non-academic activities such as surfing the web, reading email, online shopping, and posting to social media. Interestingly, the faculty who used tablets in a bidirectional mode reported little to no distraction from the temptations of the internet. Third, all faculty members commented that developing effective materials for teaching with tablets was time-consuming and an uncompensated activity. Many faculty members also commented that they needed additional time before and after class to set up and put away the tablets. Some faculty members commented the extra time was a barrier to regular use of technology in the classroom because of the demands of back-to-back room scheduling that could not accommodate the requisite extra time. Fourth, there has been little or no formal or structured assessment/evaluation of the tablet implementations to examine satisfaction and changes in learning outcomes. A number of faculty members said that students commented on the use of technology on the end of course evaluations. Fifth, there is no way to share best practices and lessons learned with faculty colleagues within the same school or University-wide. Each implementation operated in isolation and most of the faculty members were unaware of the other tablet applications that were also ongoing. Thus, faculty members saw both the opportunities and challenges of teaching with tablets.

## **5. FUTURE WORK**

One barrier to widespread adoption of tablets in higher education is cost, but this obstacle seems more tractable as new technology drives down the acquisition cost. The tablet or mobile learning platform seems to be one that is here to stay, since today’s students have embraced a model of learning that allows it to occur anywhere and anytime as long as it is on their terms. Since current and future college students will have experienced tablets throughout their precollege education, the impetus grows stronger for higher education faculty to imbue their classes with tablet or other mobile technologies.

However, faculty must consider their content and pedagogy to ensure that the use of tablet/mobile technologies is the best way to teach their students. Ongoing implementations of these technologies need to be evaluated in order to identify best practices that can be disseminated to others. In this way, we can effectively marshal limited resources to create exemplary teaching and learning environments.

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