The Impact of the Rapidly Changing Mobile Devices Market on e-Learning in Higher Education

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ABSTRACT

The market for mobile devices is evolving quickly, bringing with it both new technologies as well as increased expectations for the performance of mobile devices and content. For higher education institutions that want to enable learning on mobile devices, these changes in technology and expectations will have a significant impact on e-Learning strategies. Looking at current trends and forecasts, this paper provides an outlook on trends in the mobile device and applications market as well as perspectives on how changes in this market will impact e-Learning.

Keywords: Mobile Devices, Higher Education, E-Learning.

INTRODUCTION

The market for mobile devices – tablet computers, smart phones, e-Readers, etc. – is changing and growing rapidly, bringing with it new devices, new standards and new expectations about mobile capabilities. For higher education institutions that want to enable learning on mobile devices, these changes will continue to have a significant impact on these efforts.

Given the consumerization of mobile technology over the last decade, the generation of students now entering higher education possess high expectations toward mobile devices and mobile content. Combined with the rapidly changing mobile technology market, students' high expectations present a significant challenge for institutions in creating and deploying content which has a broad reach but meets users' conceptions of quality and functionality.

This paper examines the current forecasts and trends in mobile devices, operating systems and applications to highlight some of the challenges institutions will face with mobility and e-Learning. The final section provides perspectives on the impact of these mobile device and application trends on e-Learning at higher education institutions.

1. MOBILE DEVICE TRENDS

Tablet market

While tablets are relatively new to the mobile market, they have quickly moved from a niche product into a mainstream consumer good. According to the technology forecaster Gartner, the global purchasing of tablets jumped from 17.6 million units in 2010 to a projected 64 million in 2011. This number is expected to reach 326 million units in 2015.

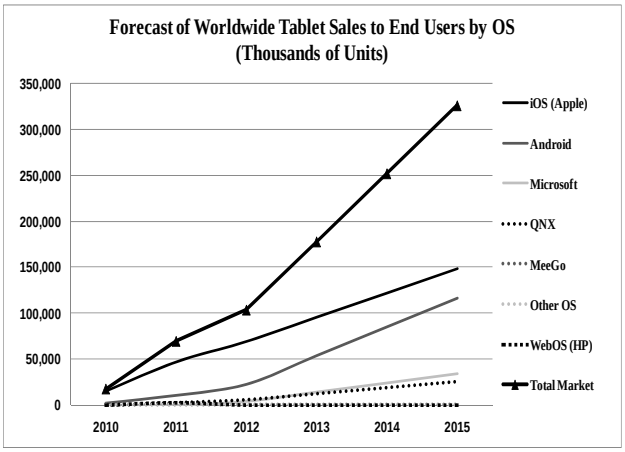
In terms of devices, Apple's iPad has been and is projected to remain the leader in tablet sales through 2014, during which time it is anticipated to hold more than 50 percent of the market share. The decline in iOS market share over the next three years will be caused by the growth of Android as well as the entry of other competitors like Microsoft.

Forecasts in spring 2011 which put Android as a growing competitor for Apple in 2011 were revised in the fall with a less optimistic outlook – a 28% decrease from original projections. The adoption rate of Android tablets, for the time being, has been slower than expected, according to an analysis by Canaccord Genuity [4]. This trend will likely be subject to change as the Android OS runs on a large variety of tablets from different manufactures.

While their market share is anticipated to remain low, with no individual competitor at more than 5 percent, other platforms have and are projected to enter the market. In fall 2011, Amazon released Kindle Fire and Sony released Tablet S, both which run on Android. Several companies including Samsung, HP, Dell, and Nokia are planning to release Windows 8 tablets during the latter half of 2012, which is slated to increase Microsoft's OS market share significantly [9,1].

Given that the tablet market is still in its infancy, the certainty of market forecasts is somewhat unclear. HP's Touch Pad, for example, was expected as a substantial market competitor but was discontinued about a month after its release. As seen in the chart below, while there is a relatively significant amount of volatility, forecasts by Gartner show that it is highly likely iOS and Android will combine to dominate the tablet OS market over the next few years. Nevertheless, given the various diversity which will continue to exist in the market, education institutions will need to be prepared for a fragmented tablet OS landscape with at least four different platforms (iOS, Android, QNX, Microsoft).

Figure 1. Forecast of worldwide tablet sales to end users by OS, 2010-2015



Source: Gartner.

Smartphone market

By 2015, the average selling price of all open OS devices (i.e. every OS with a published software development kit and application program kit) is predicted to be at USD 300 or less, establishing smartphones as the mainstream mobile phone [11]. The relative affordability of smartphones will contribute to the growth of the global installed base of smartphones, projected to top one billion units by the end of 2012.

Android devices will, according to Gartner, continue to dominate the smartphone market and grow to a share of 49 percent by 2015, up from 23 percent in 2010. Google's platform will be followed by Microsoft's Windows Phone OS, which is forecasted to increase its market share from 5 percent in 2010 to 20 percent by 2015.

Apple's iOS will account for 20 percent, and BlackBerry producer RIM's market share will stand at 17 percent. Nokia's Symbian platform is projected to drop from its 2010 market leader position with 38 percent to 0.1 percent in 2015, because Nokia decided in February 2011 to switch its OS to the Windows Phone 7. Therefore, similar to the tablet market, the smartphone OS landscape is predicted to remain fragmented with four dominant platforms (Android, Microsoft, iOS and RIM).

The Gartner forecasts might also underestimate Samsung's OS Bada, which it includes in the category "other OS". In Q3 2011, despite the success of the Samsung Galaxy, which runs on Android, Samsung's push of Bada Smartphones sold more than 2.5 million devices – in contrast to Window's phone which sold 1.7 million devices during Q1-Q3 in 2011. If Samsung prioritized the production of Bada smartphones over Android devices, Bada might become a direct rival for the Windows Phone OS, despite the introduction of Nokia's new Windows devices [3].

e-Book reader market

According to the market researcher Juniper, e-Reader shipments are projected to reach 67 million by 2016 – nearly tripling the number for 2011 (25 million in total). According to the research firm IDC, Amazon lead the e-Reader market in Q3 of 2011 with a 51.5 percent market share, with Barnes and Noble following at 21.2 percent. The e-Reader market is stratified into two segments: On the one hand, there are dedicated e-Readers, of which some are marketed by eBook vendors, such as Barnes & Noble, Amazon, or Google. On the other hand, eBooks are also read on high-performing Tablet PCs, notably with apps from Kindle, Barnes & Noble, Google, and Apple (iOS only). According to a 2011 Pew research study, 12 percent of the US population possesses an e-Reader and 8 percent a Tablet. Only 3 percent own both devices [9].

Tablets and e-Readers are likely to converge into one device over time. Apart from weight and considerable price differences, the main advantage of dedicated (black and white) e-Readers over tablets is the translucent e-ink display that does not fatigue the user's eyes and can be read even in direct sunlight. Display technology that combines both color and e-ink is already in the industry's development pipeline. Apple, for example, secured a patent for a hybrid screen for its devices, which lets the user switch between the color (LCD or OLED) display and e-ink [5].

Mobile platform standard trends: apps vs. web

According to a US study by Flurry Analytics in June 2010, users were spending 21 more minutes a day browsing the mobile web than using applications. This behavioral pattern changed with the increasing success of apps. In June 2011, users spent on average 74 minutes per day mobile browsing, and 81 minutes per day using applications [10]. Apps have become a major part of mobile user behavior which is reflected in the change in the number of apps downloaded per day from major stores like Apple – 18.4 million in Q3 2010 to 33.3 million in Q3 2011.

Despite apps' success for individual users who are free to select from apps which are designed for their specific device, institutions that want to accommodate learners on their own devices face a number of issues. Programming, customizing and updating apps for multiple devices and OS according to the different screen-sizes, resolutions, orientation (landscape or portrait), color graphics and video/audio formats is time consuming, not cost-effective, and subject to different security and reliability issues.

As a consequence, education institutions are increasingly shifting their attention from apps to browser-based platforms that can be accessed on any type of handheld device. New development platforms such as the UCLA Mobile Web Framework and the Kuali Foundation Mobility Enterprise are facilitating the development of mobile websites and allow for a decentralized and bottom-up development of mobile learning capacities [6].

One major problem for the development of mobile content on browser-based platforms has been the contentious issue of Adobe Flash for mobile, which has not been supported on iOS. In November 2011, however, Adobe announced that it would cease the development of its Flash mobile browser plug-in. The new browser programming language HTML5 will likely begin to fill the gap left from Adobe Flash while helping to overcome the OS fragmentation in the mobile devices market in near the future.

HTML5 supports non-proprietary audio and video standards, and allows for the creation of engaging, multimedia-rich content that can be fully integrated with mobile devices. One of the largest problems with moving to web-based platforms is users' high expectations derived from experiences with native apps – those apps built for a specific platform. Key technologies like JavaScript and Node.js, however, are helping to enable a more natural look and feel, like that of native apps.

The maturation of HTML5 over the next few years will push to establish the web as a viable cross-device alternative to apps, likely shifting current usage patterns. This means that education institutions will be able to provide mobile learning programs which do not require students to have a certain OS and mobile device as students will be able to directly access any learning content with their device of choice (mobile or non-mobile), without the need to pre-install apps.

2. OUTLOOK ON MOBILE DEVICES AND APPLICATIONS

While forecasts can change dramatically year to year, they do provide an idea of where the market is heading and thus can help institutions prepare for what will be seen on campus. While some convergence is expected, fragmentation – device, manufacturer, operating system, etc – will continue to be a key characteristic of the mobile market.

The end of Adobe Flash and the movement toward HTML5, particularly with Adobe's new focus on creating developer tools for HTML5, will be positive for institutional mobility as it can provide a device-neutral solution. However, despite this movement, the question of whether to focus on mobile web applications or native applications will remain salient as positives and negatives remain for both.

3. IMPACT OF MOBILE TRENDS ON E-LEARNING

While trends in the mobile device market continue to change and evolve, the overall shift towards mobile is clear, resulting in an ever greater impact on e-Learning. Unfortunately, when it comes to institutional support for learning on mobile devices, there is not, and likely will not be a device or platform panacea. The fragmentation of both devices and operating systems will ultimately force higher education institutions to make certain choices about mobility: Institutions that choose to focus too narrowly on any one device or platform may miss opportunities to reach a broad audience, provide learners with the best possible e-Learning experiences, or find themselves flat-footed when the market presents a new opportunity.

Secondly, mobile devices are, by definition, a significantly different user experience than traditional desktop and laptop computers. Thus learning on mobile devices is a significantly different user experience, particularly with regards to the amount of information that can be absorbed from the mobile device at any one time. The porting over of content from existing classroom- and desktop/laptop-based, e-Learning materials can cause significant alignment issues not only in terms of resolution and readability, but also in terms of the effectiveness of content transmission.

Despite these limitations, however, mobile devices present unparalleled learning opportunities through not only the capabilities they offer – mainstream features such as cameras, microphones, recording devices and up-and-coming technologies like Near Field Communication (NFC), Augmented Reality (AR), etc. – but also through their ability to tap into learning streams anywhere and anytime through Wi-Fi and data connectivity. As these capabilities continue to grow in both reach and scope, the possibilities for e-Learning from both the institution and student will continue to broaden.

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