Mobile Device Selection in Higher Education: iPhone versus iPod Touch

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ABSTRACT

Mobile devices are rapidly becoming the most common interface for accessing network resources (Hall 2008). By 2015 the average 18-year old will spend the majority of their computing time on mobile devices (Basso 2009). These trends directly affect institutions of higher learning. Many universities are offering learning initiatives and m-services designed to distribute content and services to mobile devices. In this chapter, we report findings from an exploratory, longitudinal study at iUniversity, where incoming freshmen received their choice of an Apple iPhone or iPod touch. Our findings indicate that users' device selections were affected by their perceptions of the costs of the devices, the devices' relative characteristics, and the social influence of parents. We also found that users' attitude, satisfaction, and confidence about their device selection varied across devices, with iPhone users having more favorable perceptions. The chapter concludes with recommendations for mobile learning initiatives and directions for future research.

INTRODUCTION

Higher education institutions have long been interested in tools and behaviors that promote positive learning outcomes for students. Increasingly, educational technology initiatives are employing mobile devices as platforms for content delivery and collaboration. Universities must choose between dedicated devices and programs (e.g., clickers or Blackboard course management software) and more open platforms, such as mobile phones, that may offer a broader range of uses. While dedicated devices afford increased control and simplicity for universities, these devices have limited utility outside of the learning environment. Open platforms that leverage existing devices (e.g., mobile phones), however, allow learners to use a common device for academic and social purposes, at the risk of limited control and increased complexity for the university. In response to these choices, several universities are providing mobile devices to incoming students along with a comprehensive suite of mobile services (m-services) built for that device (Argetsinger 2004).

This chapter reports exploratory findings from surveys of new student users at iUniversity, a pseudonym for a private university in the southwestern United States. iUniversity offered incoming freshmen a choice of either a free iPod touch or an iPhone (calling plan not included) in conjunction with a suite of custom-built m-services for mobile learning, collaboration, and communications. This chapter examines a) what factors influenced students to choose the iPhone or iPod touch and b) what consequences this choice had on various student outcomes.

BACKGROUND

With over three-billion mobile phones in use, mobile devices are quickly becoming the most common interface for accessing network resources (Hall 2008). This trend is especially evident in higher education. According to a recent survey of university leaders, over 80% of respondents anticipate an

"increase" or "great increase" in demand for mobile communication services over the next three years. The same study found that 65% of respondents agreed that handheld, web-enabled devices would be an essential tool in higher education within three years (Pirani and Sheehan 2009).

As mobile devices become more affordable and ubiquitous, they are increasingly attractive as learning tools because they combine portability with multiple functions that can be used inside and outside of the classroom. In higher education, these functions focus on communication media (e.g., phone, email, chat, audio/video content, web browsing, etc.) that enable behaviors that serve academic, social, or entertainment purposes. Of course, not all of these functions are expected to have an equal, or necessarily positive impact on student outcomes. Therefore, educators need to carefully choose mobile devices that are well-designed to accomplish desired outcomes.

Additionally, educators need to consider possible interventions that might influence users towards preferred devices (Venkatesh and Bala 2008). In considering possible interventions, educators should evaluate possible pre- and post-implementation interventions (Cooper and Zmud 1990). Pre-implementation interventions are those that precede the system roll-out, such as those that promote specific devices to incoming students and subsidize device or contract costs. Post-implementation interventions are designed to promote effective use. Possible post-implementation interventions include ongoing training, consistent use of eLearning best-practices across the curriculum, and on-going development of m-services that meet the needs of learners.

In the remainder of the background section, we introduce the conceptual model that guides our exploration of the mobile learning initiative at iUniversity. First, we introduce key factors that we expect to influence the users' choice between the iPhone and iPod touch. Then, we consider the potential impact of this choice on student outcomes. See the model depicted in Figure 1.

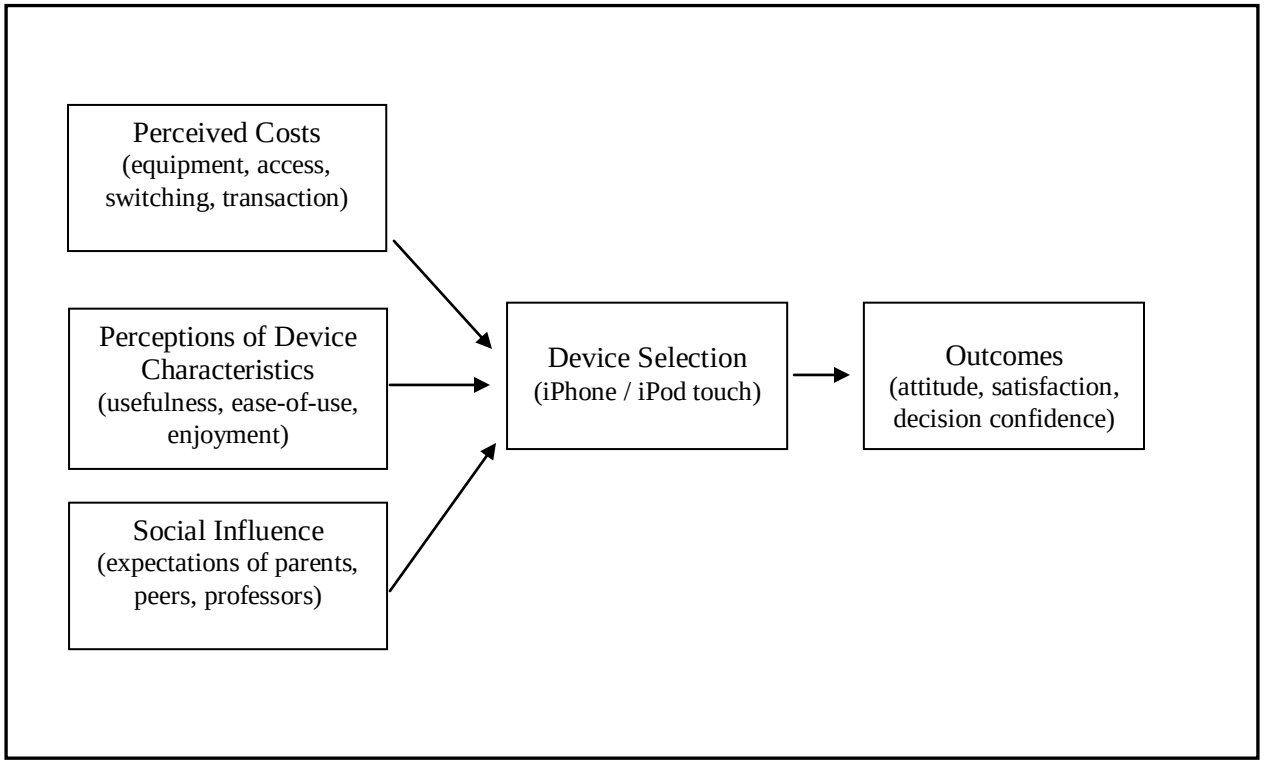

Figure 1: Research model

Factors that influence user adoption decisions

Prior research indicates that users' perceptions of a technology affect their adoption decisions. One stream of this research is the Technology Acceptance Model (TAM) (Davis, Bagozzi and Warshaw 1989). TAM argues that users' intent to use a technology is influenced by their perceptions of its usefulness and ease-of-use, among other factors (Venkatesh, Morris, Davis and Davis 2003). Perceived usefulness is a user's belief in the ability of the device to make common tasks easier. For example, users in an academic setting may perceive a mobile device as useful if it allows them to submit assignments or to check their grade from any location at any time. Perceived ease-of-use in this context implies that users believe they have the necessary knowledge and resources to effectively use the device. Even if a mobile device is perceived as highly useful, users are rarely motivated to devote extensive cognitive energy to learn how to use it, even if doing so would improve their performance (Todd and Benbasat 1999). More recent research has observed that perceptions of enjoyment can also shape adoption decisions, particularly when there is a significant hedonic or pleasure element to technology usage (van der Heijden 2004). Perceived enjoyment is derived from a user's perceptions of a device being "enjoyable" in its own right apart from any consequence of system usage (Venkatesh 2000). Therefore, we expect that users' perceptions of the relative usefulness, ease of use, and enjoyment between the iPhone and iPod touch will influence their choices between these devices.

In addition to device perceptions, users' device selection decisions are influenced by their perceptions of the comparative costs of using these devices. There are numerous costs associated with mobile learning platforms. Prior research on Internet shopping demonstrates that users are discouraged from using online shopping by high perceived costs (Limayem, Khalifa and Frini 2000). These costs include the costs of equipment (e.g., the handheld), access (e.g., carrier contracts), and transaction costs (e.g., "convenience" fees associated with online transactions). Given the pricing practices and extended contracts used by U.S. wireless carriers, users are often highly influenced by the cost of monthly service plans as well as the costs of switching between carriers. Therefore, we expect that high perceived costs will likely influence users to choose the iPod touch because it does not require ongoing contract costs.

Finally, numerous social influences affect a user's device selection. For instance, the expectations of near peers, opinion leaders, and one's personal network all influence the adoption decision (Rogers 1994). For instance, if a user perceives that the social norm of her peer group is to use a certain device, she is more likely to adjust her preferences accordingly. Additionally, prior research has shown compliance, identification, and internalization to be important social influences (Venkatesh and Davis 2000). In the context of student use of mobile devices for eLearning, we anticipate social influences may be exceptionally strong. University students are well-known to be prone to high social influence (Gilbert, Fiske and Lendzay 1984). Thus, we anticipate that the perceived preferences of peers and family as well as faculty will exert an influence on users' adoption decisions.

The effect of device selection on outcomes

The mobile device used to access eLearning tools will influence a student's outcomes due to both objective feature differences between devices and due to individual differences in patterns of use. Handheld mobile devices vary in important features and capabilities, and they appeal uniquely to a user's status and reputation within a social setting. Below we will examine the objective differences between the iPhone and iPod touch and then discuss the relationship between a particular device and its use.

The iPhone and iPod touch are similar, yet distinct devices. Both devices share a common operating system and interface. Both devices have relatively large touch screens for a handheld device and the ability to use WiFi for network access to the Internet and the Apple "App Store," where users can

download and install numerous applications. Available applications for the iPhone and iPod touch represent both work and play. In conjunction with its mobile learning initiative, iUniversity developed an m-suite of eLearning applications to support student learning activities. When the initiative was launched in August 2008, the two primary differences between the iPhone and iPod touch were that the iPhone supported the GSM protocol for wireless network access away from WiFi hotspots (allowing constant access to the Internet beyond its phone and text messaging features) and that it included a built-in camera.

Due in part to these objective device differences, the iPhone and iPod touch cultivate unique patterns of use. As users explore a handset's features and capabilities, they begin to cultivate effective patterns of behavior with a new device. As users becomes more comfortable with the device, they gain a better understanding of how it can be useful for them, which then reinforces more use. This creates a spiral that reinforces users' perceptions of a device's utility (Mort and Drennan 2007). This "cycle of utility" can be positive (i.e., leading to increased use) or negative (i.e., leading to decreased use). Because users are likely to form qualitatively different relationships with a device based on its feature set and perceived utility, we anticipate that there will be direct effects of users' adoption decisions on their outcomes in a learning environment.

METHODOLOGY

We conducted a longitudinal study of all student participants at iUniversity during the first year of their mobile learning initiative. As part of their phased implementation approach, iUniversity distributed to the entire 2008 freshman class a total of 957 devices, of which 36% were iPod touches and 64% were iPhones. Despite the similarities that these devices share, we believe that the significant long-term costs and contract commitment required for an iPhone make this an important and risky adoption decision for the students and an interesting context in which to explore our research model. We assessed our research model in two stages.

First, to better understand the factors that may have influenced students' device selection decisions, we administered paper-based surveys as students waited in line to choose their devices before the beginning of the academic year. Drawing on the established theories of technology acceptance and usage previously discussed, we measured each component of our research model with several indicators. Potential cost factors include the perceived affordability of an AT&T monthly contract, the need to switch to AT&T (51% did not previously have AT&T as their service provider), and the restrictiveness of prior contracts (i.e., My prior mobile phone contract made it difficult to switch to an iPhone). Questions about device perceptions asked students to directly compare the perceived usefulness, ease of use, and enjoyment of the devices (e.g., An iPhone would be more useful to me than an iPod touch). Similarly, students rated social influence based on the expectations of faculty, classmates, friends, and parents (e.g., I expect that my friends would prefer than I have an iPhone rather than an iPod touch). These 7 point Likert-scale questions combined with archival data on demographics such as sex (male=1) and age formed the basis for a quantitative analysis of the adoption decision; we used logistic regression because the dependent variable is binary (iPhone=1, iPod touch=0). In addition, we supplemented these findings with qualitative analysis of an open-ended question about "the most important factor that helped you decide" between devices.

Second, to assess the impact of the adoption decision on student outcomes, we administered web-based surveys by sending email invitations to all participants at the end of the fall and spring semesters and offering incentives for survey completion (e.g., each survey completed entered the student in a random drawing for one 32-inch flat screen television). We adapted and used Hsieh, Rai and Keil's (2008) 3-item

measure of attitude toward technology use (e.g., All things considered, I think that using this mobile device as part of my college experience is: extremely negative to extremely positive), Thong, Hong and Tam's (2006) 4-item measure of device satisfaction (e.g., How do you feel about your overall experience of using this mobile device? very dissatisfied to very satisfied), and a 2-item measure of decision confidence (i.e., I am confident that I have made the best choice about which mobile device is right for me. The mobile device I selected is the best fit for me.). In addition to the end of each semester, we also included the attitude and decision confidence questions in the first survey to provide a baseline for comparison.

Descriptive statistics for the participants and measures are reported in Table 1 below. The sample population is 46% male, averages 19 years of age, and 41% had time remaining on a contract with another service provider. The response rate of the paper-based survey is 78%, while response rates of 19% and 18% at the end of the fall and spring semesters fall in more normal ranges for survey-based research.

RESULTS

To begin our exploration of factors impacting device selection, we coded qualitative data by identifying emergent themes in participants' responses to critical decision factors between the iPhone and iPod touch. Of the students choosing the iPhone, 35% expressed the desire for a new phone (usually the iPhone, specifically), 16% only wanted to carry one device, and 8% already had an iPod. Students choosing the iPod touch said it was more affordable (35%) or that they already had another service provider (32%) or phone (17%). These themes provide initial support that perceived costs and device perceptions impact users' device selection decisions; the qualitative data did not provide evidence for the social influence portion of the model.

We also examined drivers of device selection using logistic regression (see Table 2). All indicators of perceived costs had a significant negative impact on the adoption of the iPhone, including the need to switch to AT&T from another carrier (b=-1.130), perceptions that monthly AT&T contract charges were too expensive (b=-.667) or that a prior contract made it too difficult to switch (b=-.468). Device perceptions that the iPhone is more useful (b=.744), easy to use (b=.334), and enjoyable (b=.757) than the iPod touch also had a significant positive impact on iPhone adoption. Parental influence was the only source of social influence with a significant impact on device selection (b=.471). None of the control variables were significant. Overall, these results again provide strong support for the impact of perceived costs and device perceptions on adoption decisions, with limited support for the role of social influence.

Despite the opportunity to choose the device that worked best for each student, iPhone users reported more favorable outcomes than iPod touch users (see Table 3). Student attitude toward using the device as part of the college experience is positive across both devices, but there are significant differences between devices at the end of the fall and spring semesters. Similar results were also found for device satisfaction and decision confidence, although significant differences in confidence about device selection were also found in the device pick-up survey. This suggests that some users doubted their device selection from the very beginning. These results suggest that device selection by students may have significant consequences for the ongoing success of a learning initiative.

Table 1: Descriptive statistics

Measures	Participants (n=957)	Device Selection Survey (n=744)	End of Fall Survey (n=181)	End of Spring Survey (n=177)
Background				
iPhone recipients	63%			
Sex (male)	46%			
Age	19.1 (0.48)			
Device Selection Factors				
Perceived costs				
• Monthly AT&T contract too expensive		4.41 (1.90)		
• Need to switch to AT&T from prior service provider		51%		
• Restrictiveness of prior contract		3.44 (2.12)		
Device perceptions				
• Perceived usefulness		5.49 (1.81)		
• Perceived ease of use		4.44 (1.62)		
• Perceived enjoyment		5.57 (1.64)		
Social influence				
• Professors		4.21 (1.54)		
• Classmates		4.43 (1.60)		
• Friends		4.56 (1.64)		
• Parents		4.18 (1.84)		
Outcomes				
Attitude		6.42 (0.92)	5.92 (1.07)	5.95 (1.21)
Device satisfaction			6.00 (1.18)	5.97 (1.24)
Decision confidence		6.42 (0.83)	5.96 (1.47)	6.06 (1.47)

Unless noted otherwise, descriptive statistics refer to the mean (and standard deviation) of 7 point, Likert-scale questions.

Table 2: Logistic Regression Results

Measures	Beta	s.e.
Control Variables		
• Sex (male)	-0.116 ns	.317
• Age	-0.130 ns	.262
Perceived costs		
• Monthly AT&T contract too expensive	-0.667 ***	.114
• Need to switch to AT&T from prior service provider	-1.130 **	.365
• Restrictiveness of prior contract	-0.468 ***	.094
Device perceptions		
• Perceived usefulness	0.744 ***	.136
• Perceived ease of use	0.334 *	.136
• Perceived enjoyment	0.757 ***	.157
Social influence		
• Professors	0.205 ns	.145
• Classmates	-0.356 ns	.199
• Friends	0.013 ns	.178
• Parents	0.471 ***	.117

*ns Not significant, * p<.05, **p<.01, ***p<.001; Dependent variable: iPhone=1, Touch=0; Model correctly predicts 91.6% of all observations*

Table 3: Student Outcome Mean Comparisons across Devices

Measure	Survey	iPhone	iPod Touch	Significance
Attitude	Device Selection	6.46 (0.96)	6.35 (0.86)	ns
	End of Fall	6.24 (0.88)	5.55 (1.16)	***
	End of Spring	6.34 (1.02)	5.46 (1.25)	***
Device satisfaction	Device Selection	n/a	n/a	n/a
	End of Fall	6.34 (0.90)	5.60 (1.34)	***
	End of Spring	6.34 (0.94)	5.52 (1.42)	***
Decision confidence	Device Selection	6.54 (0.69)	6.20 (0.98)	***
	End of Fall	6.53 (1.00)	5.31 (1.66)	***
	End of Spring	6.56 (1.01)	5.44 (1.70)	***

*ns Not significant, * p<.05, **p<.01, ***p<.001*

Issues, Controversies, Problems

The findings from our study indicate that users' choices of mobile devices may have a significant impact on outcomes in educational settings. While the iPod touch and iPhone offer similar features, they produced statistically significant differences in attitude, satisfaction, and decision confidence. Users' attitudes toward their devices showed no significant differences initially. However, by the end of the fall semester, iPhone users reported significantly more positive attitude towards their devices. The difference between iPhone and iPod touch users' attitudes increased further during the spring semester. Device satisfaction was not measured on the initial survey because users had not accumulated any experience with the device. After one semester, a statistically significant difference between iPhone and iPod touch users was evidenced, and it, too, increased over the spring semester. Together, these findings support the expectation that users enter a "cycle of utility" as they increase or decrease their device usage over time. iPhone users were more inclined to integrate the device into their daily activities and over time found themselves more satisfied and with a more positive attitude towards the device.

Users' confidence in their decision to acquire an iPhone or iPod touch was significantly different at all three periods. This finding indicates that iPhone users were more confident of their choice than iPod touch users, even the day they received their device. Over time, iPhone users' confidence barely changed while the confidence of iPod touch users fell precipitously over the course of the fall semester and then rose slightly over the spring semester, but never back to the initial level. One possible interpretation of this data is the iPod touch users were initially conflicted about their choice; perceptions of higher costs discouraged iPhone adoption while social influences and perceptions of the iPhone's increased utility, ease-of-use, and enjoyment favored iPhone adoption. Over time, these concerns were reinforced as iPod touch users struggled to integrate "another device" (e.g., in addition to their current mobile phone and computer) into their existing routines. Thus, they entered a negative cycle of utility that further diminished confidence in their original choice. By the end of the fall semester, the cycle had reached its nadir and the users began to adjust their expectations accordingly throughout the spring semester such that their declining decision confidence was somewhat attenuated.

Overall, these findings support the notion of a "cycle of utility" for mobile devices. That is, users find the utility of a device is amplified by its ongoing integration into existing practices. If a user perceives that a mobile device is useful and easy-to-use and enjoyable, they are more likely to use it. As their usage increases, so does their perception of its utility. The inverse is also possible such that a device can enter a cycle of decreasing perceptions of utility leading to decreasing usage and decreasing satisfaction.

These findings are interesting because of the similarities between the iPod touch and iPhone. Two possible explanations for the differences are 1) the importance of the ubiquitous network connection afforded by the GSM-enabled iPhone, and 2) the failure of the iPod touch to address a felt-need of users. The GSM-enabled iPhone can access the Internet from almost anywhere. While rural areas away from iUniversity's campus may offer limited connectivity, iPhone users can access iUniversity's m-services and mobile learning resources from all around the metropolitan area of iUniversity. Such access allowed iPhone users to cultivate a positive cycle of utility by accessing mobile learning resources from campus, home, and other locations. iPod touch users, on the other hand, were limited to network access wherever they had access to a WiFi network. While most of the iUniversity campus is covered with a pervasive WiFi connection, it is strongest in academic buildings, residence halls, and the library. Some outlying areas of campus have weaker signals. Additionally, when users are at home or about town, they have, at best, an unpredictable connection. Additionally, when the WiFi receiver on the iPod touch is activated, the device experiences rapid battery drain. Thus, users may choose to leave the WiFi receiver off and only connect it when necessary. This adds additional effort to using the iPod touch for mobile learning and discourages use, therefore promoting a negative cycle of utility.

A second possible explanation is that iPod touch users are less likely to integrate the device into their daily routines because of its status as a "third-device." According to Smith, Salaway and Caruso (2009), most incoming college students in the United States provide their own mobile phone and personal computer upon beginning their college experience. Consequently, an iPhone can simply serve as a robust replacement for a device they already use regularly. The iPod touch, however, does not replace one of these essential devices and thus requires the user to cultivate new routines to integrate the iPod touch into daily life. Given the already high number of adjustments required of incoming freshmen, it is no surprise that they might struggle to find a way to integrate a new device into their daily practices. This is especially difficult if the mobile learning initiative does not require consistent application in classes across the university.

RECOMMENDATIONS

Based on the findings from this study, we have several recommendations for learning institutions implementing mobile learning initiatives. First, our findings indicate that all devices are *not* created equal. Rather, the unique features and social influences of a particular device affect important outcomes. Educators should give serious attention to the devices used for mobile learning initiatives and build a supportive ecosystem for appropriate use of the chosen device. A supportive ecosystem includes m-services and mobile learning tools that provide meaningful value to learners, consistent use of mobile learning best-practices across the university, adequate technical support for all levels of users, and sufficient network coverage to provide pervasive access.

Second, we recommend that universities develop pre- and post-implementation interventions aimed at creating a positive cycle of utility for m-services and mobile learning initiatives (Cooper and Zmud 1990; Saga and Zmud 1994). Pre-implementation interventions include necessary organizational adjustments to create the technical and administrative infrastructure to respond to mobile initiatives. Providing m-services that support any-time, anywhere access to organizational resources requires significant process change for most universities. Pre-implementation interventions should include the difficult task of coordinating core university functions such as the bursar and registrar to accommodate mobile access. Another critical pre-implementation intervention is to facilitate faculty discussion about best-practices in mobile learning and pedagogy. Regardless of the technical attributes of a mobile device, if faculty members do not consistently utilize the mobile applications in and out of the classroom, a negative cycle of utility will emerge. Engaging in such pre-implementation interventions creates the necessary infrastructure for a positive cycle of utility. However, even with a robust and integrated set of m-services, one may find that a mobile learning initiative fails to thrive. In these cases, a post-implementation intervention is necessary. Post-implementation interventions include efforts aimed at gaining commitment from users and routinizing work systems to integrate new technologies. Examples of post-implementation interventions include on-going training, peer support, and system modifications to better address users' needs. We recommend that universities closely monitor usage data and frequently survey users to rapidly identify usage and satisfaction trends. This data can shape and inform post-implementation interventions.

Finally, we recommend that network carriers implement pricing policies that benefit educational use. Our research indicates that iPhone users are more satisfied and have a better attitude towards mobile learning initiatives than iPod touch users. Additionally, users' initial perceptions were that the iPhone provided more enjoyment and utility. So, why did so many choose the iPod touch? The most important reasons for not choosing the iPhone were both related to network costs ("AT&T contract is too expensive" and "Difficulty to switch to iPhone due to prior contract"). Universities may be able to subsidize hardware

costs or pass these costs on to students. However, monthly network costs are too complex and unpredictable to consolidate at the university-level. We recommend that network carriers take a long-term view of the potential customer-value of college students. By partially subsidizing the network costs of students at participating institutions, network carriers could develop meaningful relationships with a large and influential customer base and perhaps make inroads into their family connections. Our evidence indicates that users are satisfied with the iPhone experience and are not likely to switch carriers. Thus, if carriers subsidize the contract costs for the relatively short-term life-cycle of a full-time student's academic career, they will gain a customer for the long-term. Additionally, it is unlikely that a student would revert back to a more basic non-data contract once they have adjusted their behavior patterns to take advantage of data intensive mobile services.

FUTURE RESEARCH DIRECTIONS

In 2008, 66.1% of students entering college owned an "Internet-capable mobile phone." However, most of these students do not take advantage of the Internet capability due to high network costs, slow response rates, and low ease-of-use (Salaway and Caruso 2008). As global telecommunications carriers build out pervasive and reliable 3G networks (and their successors), the opportunities for universities, governments and telecommunications providers to collaborate in the mobile revolution will increase. Our research indicates that device features and perceptions of the device influence key outcomes. Future research should look more closely at the relationship of individual device features to both outcomes and the particular m-services being implemented. Also, future research should examine pre- and post-implementation interventions to develop a holistic set of best-practices for mobile learning initiatives.

CONCLUSION

This chapter examines the factors that influence device selection, and how device selection affects outcomes in a mobile learning environment. Through a longitudinal study of freshmen at iUniversity, we found that despite higher perceptions of social influence, utility, ease of use and enjoyment for the iPhone, a sizeable percentage of users chose the iPod touch due to the additional costs of the iPhone contract. Students who chose the iPhone were consistently more confident in their choice than iPod touch users. iPhone users were also more satisfied with, and had a more positive attitude towards their device than iPod touch users. These findings indicate that the success of a mobile learning initiative is influenced by users' perceptions of the device and its costs. To address these concerns, universities should prepare pre-implementation interventions designed to lay the groundwork for effective m-services and mobile learning. Universities should also continuously analyze usage and satisfaction data to develop post-implementation interventions to gain user commitment to the initiatives. Finally, we argue that it is in the best interests of both society and telecommunications carriers to implement pricing policies that are beneficial to educational use.

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KEY TERMS & DEFINITIONS[1]

eLearning: Any educational content or experience mediated over a network-enabled device. This is a super-set of mobile learning.

Hot spot: An area that is covered with WiFi service for Internet access.

iPhone: A 3-G capable mobile device made by Apple that combines a phone, music and video player, and Internet browser with a touch screen interface.

iPod touch: A WiFi capable mobile device that is based on the iPhone platform. In 2008 it was distinct from the iPhone in that it offered only WiFi access, not GSM or 3-G, and it did not include a camera.

Mobile device: A handheld computing device that can be used from multiple locations. Examples include basic phones, PDAs, portable media players and smartphones.

Mobile learning: Any educational content or experience mediated over a network-enabled mobile device. This is a sub-set of eLearning.

Mobile portal: An Internet gateway that allows mobile devices to connect remotely via a Web browser. Mobile portals aggregate content from many sources and present it in a format designed for the smaller screens and limited bandwidth common to mobile devices.

M-services: Any service that can be accessed via a mobile device and is between an organization and a customer.

Smartphone: A mobile phone that offers expanded features such as music, video, gaming, pictures, web browsing, and mobile TV. These mobile devices may have larger screens, more powerful processers, full qwerty keyboards, and touch screens.

[1] See Simpson et al. (2008) for additional terms about mobility and more extensive descriptions of some of the terms provided.