TABLET PROCUREMENT WITHIN K12 EDUCATIONAL ENVIRONMENTS.

AN ANALYSIS OF THE POLITICAL INFLUENCES, PERCEIVED DEVICE

ADVANTAGES, AND HARDWARE PREFERENCES

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Chapter 1

Introduction

School reform has been a topic of continual discussion since the origins of the

American public education system. Today's schools are a clear reflection of the vision of

Horace Mann and his efforts to usher in the common school era. However, the tools and

resources available to today's K12 institutions are vast and often divergent from the core

curriculum of Mann's time when only writing and reading were required to be taught

(Hinsdale, 1898). The role of technology within public education has been a topic of

continuing discussion as well. Since their introduction, the promise of technological

innovations within the classroom have gone largely unfulfilled despite most communities

making their largest educational investments in state-of-the-art technology

(Oppenheimer, 2007). Educators have too often found been subject to following trends

without fully understanding the true motivations, costs, and outcomes of their efforts.

The rapid pace of ever-changing technology exaggerates this phenomenon. Often, the

emphasis on e-learning has led educators to place far too much emphasis on the "e" and

not upon the actual learning which we are attempting to foster (Imel, 2002). As

technology is adopted, it is imperative that educators have a comprehensive knowledge of

both the technology being adopted, and where it fits into the pedagogical process.

The evolution of the personal computer led to the creation of the notebook

computer and eventually, after years of searching, experimenting and tinkering, educators

have encountered a device that many feel will change the educational landscape. This

device, generically known as tablet computing devices, or tablets for short, have been

introduced by a number of manufacturers in many differing sizes and capabilities. As a result of this diverse and highly competitive marketplace, a social buzz has rapidly developed that surrounds these devices. This social interest has shed light on possible uses for these products and cause many within the technology arena to believe that they will soon dominate the technology marketplace (Korkmaz, Christian, & Jean-Hubert, 2012). Following such market trends, tablet computing devices have been widely implemented in schools across Indiana. Implementations range from use within one to one environments where every student has their own tablet to the devices simply serving as value added technology within classrooms.

The future adoption and subsequent implementation of tablet devices within the K12 public education environment is undeniable. By the year 2017, mobile data traffic generated by tablet devices alone will exceed the total amount of data transmitted in 2012 by the entire global mobile network (Index, C.V.N, 2013). Acknowledging that schools will follow suit in the rapid expansion of these devices, it is important to more fully understand the factors that are leading educational technology leaders to follow, and often lead, this trend. The purpose of this research was to gain a better understanding of the social/political influences, the individuals driving these decisions, and the technological traits that have been driving the adoption process of tablet devices within the K12 landscape of public schools located in the state of Indiana. The intent was to better pinpoint the groups and individuals who have been influencing educational technology leaders to adopt tablet devices and to better understand the scope of influence in which each of these groups actually holds during the adoption process.

Statement of the Problem

Advocates of technology integration within public education have long strived to implement new technologies into the classroom. However, few are able to fully quantify the factors that are influencing these efforts. Historically, educators have followed trends without spending adequate time and effort examining the forces motivating and powering these movements (Fullan & Miles, 1992). The drive to create one to one learning environments leveraging tablet computing devices is no exception. Simply put, educators need to completely understand the factors that are influencing these purchase decisions beyond their obvious desire to expose students to the latest and greatest technologies.

Purpose of the Study

The purpose of this study was to examine factors that may have influenced the decision to implement tablet technologies within classroom environments. These factors were grouped and limited to three distinct areas: social and political influences, perceived benefits of implementation, and influence of varying types of hardware, software and operating systems.

Significance of the Study

Public education within the state of Indiana is currently grappling with the continued effects of the constitutional amendment that places caps on property taxes (Merrick, 2010). This has served to create disproportionate pockets of well and inadequately funded school districts. Given this, it is imperative that the available funds leveraged in favor of educational technology be used in the most prudent manner possible. The current trend toward mobile computing and tablet devices is a major shift in the historical manners in which educational technology has been implemented and

leveraged within Indiana public school educational environments. Providing for a better understanding of the factors that have motivated this change can provide additional insight into the prudence of the overall movement. This study was intended to serve as an initial attempt to identify these factors to allow other researchers the opportunity to expand and evaluate the overall value of tablet devices within our public schools.

Research Design

To complete this study, a descriptive quantitative method was selected. According to Roberts (2010), the quantitative method tends to offer the ability to generalize, be explanatory in nature and often leverages large samples. Accepting that the fundamental credence of quantitative research is that we live in a coherent world that we can understand and generalize about (Gay, Mills, & Airasian, 2006), this research was intended to better understand the influences stirring the growth of tablet acquisitions within K12 environments. To acquire the necessary data, a survey instrument was created to offer technology leaders from all Indiana public school corporations the opportunity to provide input.

Research Questions

1. What are the social and political factors influencing the decision to implement tablet technologies by district level decision makers?

2. What are the perceived benefits of implementing tablet technologies that are positively influencing the purchasing decisions of district level decision makers?

3. What are the preferred hardware characteristics of district level decision makers when selecting tablet technologies?

Dependent Variable: The decision by K12 schools to implement tablet technologies.

Independent Variables: The social and political influences, perceived educational benefits, and preferred hardware characteristics motivating the decision listed by the dependent variable. All three items will be determined through the use of a survey instrument which will target educational technology decision makers serving public school corporations within the state of Indiana.

Listing of Null Hypotheses

$H_0 1$ There is no significant difference between the attributes being cited as perceived pressure sources regarding purchase of tablet technologies.

$H_0 2$ There is no significant difference between the attributes being cited as perceived pressure sources regarding purchase of tablet technologies when compared to corporation enrollment size.

$H_0 3$ There is no significant difference between the attributes listed as educational reasons being cited as benefits of tablet technologies.

$H_0 4$ There is no significant difference between the attributes listed as educational reasons being cited as the benefits of tablet technologies when compared to corporation enrollment size.

$H_0 5$ There is no significant difference between the types of preferred hardware attributes listed.

$H_0 6$ There is no significant difference between the types of preferred hardware attributes listed when compared to corporation enrollment size.

Definition of Terms

1. Android - Operating system developed by Google to power mobile devices including smartphones and tablets (Perenson, 2012).

2. App - Common term given to software that can be installed on tablet devices to enhance their functionality (Jeng, Wu, Huang, Tan, & Yang, 2010).

3. Cloud Computing - Refers to set of services that are delivered over the Internet to expand and enhance a user's and device's capabilities (Mell & Grance, 2011).

4. HTML5 - A web markup language used for structuring and presenting content for display on the Internet (Botelho, 2012).

5. IOS - Operating system developed by Apple to power mobile devices including smartphones and tablets (Moren, Caldwell, Frakes, & Friedman, 2012).

6. iPhone/iPod - A line of smartphones and intelligent music players designed and marketed by Apple Inc. Both are powered by Apple's iOS mobile operating system.(Ostashewski & Reid, 20100629)

7. LMS - Learning management systems where students and instructors use a common software application to collaborate, distribute content, discuss and collect assignments (Hall, 2004).

8. Mobile Learning - The term m-learning or "mobile learning", offers differing meanings among educators, however, they generally refer to a subset of e-learning, educational technology and distance education that focuses on learning spanning multiple contexts leveraging mobile devices (Wu et al., 2012).

9. PDA - Acronym standing for personal data assistant were a group of devices that served as a simple calendar, contact and sometimes web browsing devices. These

devices often lacked the ability to be expanded through software as is common with modern smartphones (Latamore, 2006).

10. SMS – Abbreviation for short message service which is commonly referred to as text messaging. (Ayabe, Chander, & Mizikovsky, 2000)

11. Tablet - An electronic device that offers a touchscreen interface, onscreen keyboard and has the ability to be expanded through the installation of additional software applications (Cromity, 2011).

Chapter 2-Literature Review

Vision of a 21st Century Educational Environment

It has been argued that for today's students to successfully develop and become tomorrow's workforce, they will need to be prepared to function within an ever changing world where the ability to consume and process information is the key to success. Furthermore, researchers have stated that students must develop the ability to become "expert thinkers" (Levy & Murnane, 2004, p. 1) where they must demonstrate the ability to critically interpret information from multiple sources. Advocates of 21st century learning environments have proposed that students who fail to learn these skills may find themselves falling to the bottom of the employment ladder, greatly limiting their career options and lifetime earnings. Additionally, limitations upon their career options will be a result of interconnectedness of our international economy that will demand that tomorrow's workforce possess the skills and competencies necessary to collaborate with coworkers bridging disciplines and geographic locations. Educational scholars have maintained that this will require students to have a deep understanding of their content areas, a commitment to interpersonal relationships, and the dedication necessary to tie the two together in a meaningful, productive manner (Sparks, 2012).

It is believed that to foster such learning environments, students will need unhindered access to the Internet as a research and productivity tool. It has been shown that developing the ability to validate the creditability of information, detect bias in arguments, and draw rational conclusions are primary skills to foster in such environments (Bjerede, Atkins, & Dede, 2010). Collaboration with peers has been

promoted to be a chief component of acquiring such 21st century skills. To facilitate such collaboration, instructors attempt to leverage tools like Edmodo[1] or My Big Campus[2], websites that leverage a social media design similar to that found in the popular site Facebook.[3] These web services allow educators to provide students with learning channels that permitted them a secure place to collaborate, connect, and share content with one another. Instructors who have employed such environments have been able to post grades, assignments, and offered quizzes to students. Such environments allowed students to submit their homework assignments, view their grades, and participate in polls, discussion boards, and blogs. Having leveraged such tools, students are offered the opportunity to engage in peer critiques and publicly revise peers' projects in digital environments that are representative of the types of environments students will be asked to participate when they join the workforce. In other words, educators must teach a "remix of multiple literacies that fuse with tech tools and critical thinking skills to stimulate authentic, relevant learning opportunities for all learners anywhere, anytime" (River, 2010, p. 11).

Given these environments, it has been alleged that curriculum must evolve from static forms like textbooks, worksheets, and handouts into more immersive and interactive digital formats. Assertions have been made that a live curriculum offers the advantage of being updated continually, and that these new environments will allow for the hyperlinking of broad forms of information that will allow learners to dive deep into the topics in a non-linear approach that encourages individual exploration (Bjerede et al.,

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[1] For additional information please visit http://www.edmodo.com/about/
[2] For additional information please visit http://www.mybigcampus.com/tour
[3] For additional information please visit http://www.facebook.com/facebook#!/facebook/info

2010). Proponents have maintained that these environments will require less direct student to teacher interaction as much of the basic levels of instruction will be driven by the digital curriculum. It has been asserted that instructors in such environments will be afforded the opportunity to work closely with students, despite possible geographic separation, to help foster higher-order skills that are often missed due to the time spent laying the groundwork for the base level of instruction.

Research has suggested that students often have a high level of support for the use of technology to supplement their learning. A survey of 2,000 first-year college students indicated that students were overwhelmingly supportive of the use of educational technologies (Gregor, Terry, Anna Churchward, Kathleen, & Kerri-Lee, 2008). In addition to directly stated support for technology integration, a study detailing motivation within a project based middle school science classroom revealed that students reported that their motivation levels were increased through the use of media rich curriculum and technology (Liu, Horton, Olmanson, & Toprac, 2011).

Assertions have been made that the digitalization of curriculum delivery also allows for a more personalized experience for the learner. Such personalization is thought to allow for formative assessments and learner growth that can be updated in real time providing educators with a data dashboard that accurately depicts student progress. Additionally, it has been emphasized that parents and guardians can have access to this information, strengthening the school to home ties (Bjerede et al., 2010). It is alleged that universal access to the curriculum will allow the school to extend the home environment allowing for parental involvement in the learning process. Through the use of new technologies, the extension of the school to home has been demonstrated to be a

realistic goal. Yet, without the proper curriculum and a method of delivering it to the appropriate devices, such ties have been marginally or completely ineffective (Oppenheimer, 2007). It is believed that to help prepare students for tomorrow's realities, educators must equip them with learning tools that will foster the development of tomorrow's skills while leveraging the resources available within their home environments. To accomplish this, at the most basic level it is necessary to provide students with devices that will facilitate the delivery of curriculum, enable collaborative communication, and help them develop the familiarity with technology necessary to be competitive in the workforce. Despite their relatively recent introduction to the marketplace, many educational technology decision makers have elected to introduce tablet computers to satisfy the hardware requirements necessary to facilitate 21st century learning environments. The implementation of such devices creates the necessity to examine the overarching topic of mobile learning (M-Learning) and the role tablets may possibly serve when introduced into such environments. Additionally, it is believed to be prudent to examine the underlying reasons for adopting such technologies, the key individuals who are actually involved in the decision making processes, and the selection and acquisition methods being employed to justify these purchasing and curricular decisions.

Mobile Learning

Mobile learning, or M-Learning, is a term that has been coined to describe a derivation of E-Learning that is facilitated through the use of a mobile device. As such, mobile learning has been defined as the transfer of information, knowledge, content and skills through the use of mobile devices that replace other forms of print and digital

media to facilitate the learning process. Mobile devices typically have included, but were not limited to, personal data assistants, tablet computers (Apple iPad, Google Android devices & Windows 8) and cellular phones, all running a gamut of operating systems.

Despite the diversity of manufacturers and versions of operating systems, mobile devices all share the ability to access content, either stored locally on the device or by way of a networked service. Additionally, a common attribute typically shared by these devices allow for learners to communicate and collaborate regardless of the students' physical locations. The two-way sharing of information and ideas while supporting each other within the learning environment have been thought to be a chief aspect of mobile learning environments. Research has asserted that utilizing mobile devices, M-Learning has generally been characterized as an unobtrusive and autonomous method of instruction since the mobile devices already play integral roles in the learner's everyday lives (Trifonova & Ronchetti, 2003). The area of mobile computing has been rapidly evolving due to the advancements made by the manufacturers of the mobile devices and the explosion of software, commonly referred to as "apps" which, while available on prior types of devices like the Palm Pilot and Windows CE personal data assistants, became front and center to the mobile marketplace with the introduction of the iPhone in 2007. Almost instantly, the expansion of the devices functions and the perceived value to the consumers purchasing them became intertwined with the availability of third-party software applications. To place this in perspective Trifonova and Ronchetti wrote that using a cell phone to read a book is a laughable idea. A decade later, such actions became common place with users being provided a wide selection of choices of reading materials available to view on their phones and mobile devices. Google Play and

Amazon have emerged as the two primary sources of e-books each offering a seemingly endless list of books, magazines and other publications. However, e-books alone do not allow for mobile devices to be leveraged as mobile learning devices. Historically, educators and courseware designers have lacked a comprehensive understanding of best practices that enable mobile courseware to be leveraged efficiently. Elias (2011) proposed a set of eight recommendations for universal instructional design in such mobile learning environments. These simple overarching principles include:

- Equitable use: Leveraging cloud-based storage for content delivery and resource management.
- Flexible use: Instructors must be willing to leverage unconventional assignment methodology and delivery options for learners to submit their assignments.
- Simple and intuitive: Through the use of minimalistic, user-centered open source software applications usability issues can be avoided and licensing errors will not invade the learning environment.
- Perceptible information: Ensuring that mobile learning environments offer multiple methods of reading key information due to device size limitations.
- Tolerance for error: Allowing students the freedom to post to community forums without the fear of losing credit due to spelling or typing errors commonly spawning from the input methods of mobile devices.
- Low physical and technical effort: Leveraging websites and software applications which have been authored to be easily accessed by mobile devices catering to the unique nature of these device's screens and input methods.
- Community of learners and support: Creating communities based upon a variety of factors including technical abilities and content knowledge.

Blending these areas will allow for cross support from each type of learner to others within the community.

- Instructional climate: Instructors of such hybrid learning environments must be available to learners through a number of methods. Text messaging, email, Skype, and others are prime examples of methods suited to mobile environments.

With an understanding of a few basic principles of mobile learning, it is possible to scaffold existing learning theories into the realm of this new technologically driven arena to attempt to better understand the power and potential of these learning environments.

Current Theories Applied to Mobile Learning

Regardless of the philosophy of the educator, mobile learning can be molded to fit the theoretical forces driving the educational intent. For example, behaviorist theory, which included such researchers as Ivan Pavlov, Edward Thorndike, John Watson, and B.F. Skinner, holds that learning is the acquisition of new behaviors through conditioning (Mergel, 1998). Using operant conditioning as a model, mobile learners can practice skills and acquire knowledge through electronic feedback applications, also known as mobile response systems, where students can compete against one another in a simulated game show format. When leveraging electronic response systems, students are offered the opportunity to demonstrate their knowledge and depending upon their responses, either be reinforced or, conversely, punished through the loss of points or lowered status within the simulation (Fies & Marshall, 2006, p. 102).

Cognitivist theory, whose major influence came by way of Jean Piaget (McLeod, 2009), attempted to look beyond behavior as the primary method of learning. In doing