MOBILE DEVICES IN THE ACCOUNTING CLASSROOM

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INTRODUCTION

Rapid improvements in technology have changed the role of accounting professionals. They are no longer just number crunchers. Instead, they are business professionals involved in a wide range of business services (Boyce, 1999). Spreadsheet, tax, and accounting software programs have decreased the amount of time spent on gathering, recording, and processing data and increased the amount of time available for more complex professional services such as financial planning, fraud investigation, and consulting. Technology has increased the demand for immediate access to information and will continue to change the way information is provided to and used by accounting professionals (Albrecht and Sack, 2000). Specifically, mobile technology has increased the tools available to accounting professionals and has changed the way they access and share data. With the use of mobile devices, accounting professionals are able to access and share data from any device or location at any time (Drew, 2015).

Because the role of accounting professionals has changed and requires a broader range of technical skills than in the past, accounting educators and practitioners have sought to work together to provide a curriculum that utilizes more technology and teaches students the technical skills they need to transition from the classroom to the accounting profession (Burnett, 2003; Roberts, Kelly, and Medlin, 2007; The Pathways Commission, 2012). Additionally, organizations such as the Association to Advance Collegiate Schools of Business (AACSB) and the American Institute of Certified Public Accountants (AICPA) agree that, as part of their accounting education, students should acquire the skills necessary to use technology (AICPA, 2005; AACSB, 2015; Burnett, 2003). However, integration of technology into the accounting curriculum has not kept pace with the technology-based business environment due to factors such as lack of faculty time, knowledge, and resources to implement curricular innovation (Baldwin, 2014; Roberts et al., 2007; The Pathways Commission, 2012).

Although the integration of technology into the accounting curriculum has not kept pace with the accounting profession, the increased use of computers and the widespread availability of the internet has led to an increase in e-learning (U. S. Department of Education, 2014). E-learning is all forms of electronically supported instruction that commonly rely on the Internet (Bell and Federman, 2013). More specifically, the use of mobile learning (m-learning), which is an extension of e-learning, has increased in recent years (Romrell, Kidder and Wood, 2014). M-learning is supported by mobile devices such as tablets, smartphones, and laptops that are equipped with wireless technology. Some advantages of learning with mobile devices are that mobile devices and content can be customized to the user, they are portable so learning can take place in formal and informal settings, and they can connect with information and people to form a learning community.

There is the potential to enhance higher education through the use of m-learning, but it is still not clear how best to use these tools in the classroom (Baldwin, 2014). Challenges from integrating mobile devices into the accounting classroom are diverse. Institutional guidance and technological support are issues that must be addressed in order for m-learning to succeed. Students generally have a positive attitude toward using new technology, but some may respond negatively to learning to use the new technology in addition to course work. Faculty members face the biggest challenges. They must devote a substantial amount of time to learning new
technology, instructing students how to use the new technology, and determining how to integrate technology into the teaching and evaluation process.

One framework that has been useful for educators when integrating technology into lesson preparation and presentation is the Substitution Augmentation Modification Redefinition Model (SAMR) which was developed in 2006 by Dr. Ruben Puenteledura (Puenteledura, 2006). It is a framework for evaluating how and why educators are using technology for teaching and learning purposes. It suggests that learning is first enhanced through substitution and augmentation and then it is transformed through modification and redefinition. This SAMR framework can be useful in assessing m-learning and facilitating the design of m-learning activities to transform learning (Romrell et al., 2014). The levels can be used to design higher level learning activities and to encourage student engagement. Dr. Ruben Puenteledura has also joined the SAMR model with Bloom’s Revised Taxonomy, a tool for communicating and classifying educational objectives, to present an easy to use framework for successfully integrating technology into the classroom and achieving multiple levels of learning (Bloom, 1956; Puenteledura, 2014). Using this combined framework, we present findings on how mobile devices can be integrated into the accounting classroom to enhance learning and how their effectiveness can be evaluated.

BACKGROUND

Educational organizations and professional accounting organizations as well as employers of accounting graduates have expressed the need for accounting graduates to have the ability to use current technologies in their profession. The AACSB Standard A7 states that accounting degree programs should include learning experiences that develop skills and knowledge related to the use of current technologies in business and management contexts (AACSB, 2015). Additionally, the AICPA Core Competency Framework defines a set of skills including the use of technology, needed by all students entering the accounting profession (AICPA, 2005). Specifically, students entering the profession must acquire the necessary skills to use technology tools effectively and efficiently and commit to continual learning to enhance the development and application of other competencies such as communication and critical thinking. Furthermore, surveys of employers of accounting graduates reveal there is a general satisfaction with functional competencies demonstrated by graduates, but improvement is needed in other areas including technological skills (Burnett, 2003; Jones, 2011; Sithole, 2015). As a response to the needs of these organizations and employers, accounting educators have incorporated technological skills into the accounting curriculum in different ways. A study from 2004 – 2005 investigated technologies with widespread applications among accounting educators. Technologies with frequent application included e-mail, the Internet, word processing, spreadsheets, PowerPoint and videos (Ahadiat, 2008). Although the use of technology has increased, there has been no significant, widespread change in accounting degree programs and the pace of change has not kept up with the needs of practicing accountants (Albrecht and Sack, 2000). Additionally, the gap between accounting education and practice is increasing due to the rapid changes in technology.

To close the gap between technology use in the accounting profession and in accounting education, educators must find a way to effectively and efficiently use current technologies in the accounting curriculum. Because accounting professionals are increasingly using mobile devices to access and share data from any device or location, integrating mobile devices into the
classroom is one way to improve the technological skills of accounting graduates. However, even though students are already comfortable using mobile devices in an informal setting for communicating, sharing, and watching videos, they may struggle to use them in a formal classroom setting (Kaganer, Giordano, Brion, and Tortoriello, 2013). Several studies involving business students have examined the formal incorporation of mobile devices into the learning environment (Hoover and Valencia, 2011; Kaganer et al., 2013). Overall, the results of those studies suggested that students show enthusiasm for using mobile technology in the classroom and believed it supported their learning. However, the studies did not reveal an increase in student learning outcomes. The authors of three of these studies stated there is a learning curve for both students and instructors when mobile technology is implemented with most of the burden falling on the instructor to have the necessary skills to guide the students as well as making sure there is a pedagogical purpose for the technology so learning improvements can be achieved. Additionally, a review of accounting education literature published during 2013-2014 found that more research is focusing on educational technology, but there is still a lack of research on mobile technology especially in the areas of course delivery, curriculum innovation, and learning outcomes (Apostolou, Dorminey, Hassell, and Rebele, 2015).

Because there is still a lack of research on using mobile technology in accounting curriculum, faculty should be encouraged and supported as they explore how mobile devices can be used in a more formal setting to support learning activities and improve learning outcomes (Apostolou et al., 2015; Rapetti, Picco-Schwendener, and Vannini, 2011). Educators must consider both technology and pedagogy when introducing mobile technologies into a course (Beckman, 2010; Dearnley et al., 2009; Momeni, Jamporazmey, Mehrafrouz, and Bahadori, 2013). Mobile devices can complement the existing course design and add new options for when, where, and how students learn (Beckman, 2010; Unal and Unal, 2014). Course design should allow for flexibility in the timing of assignments and provide appropriate training for students on the devices and applications (Beckman, 2010; Dearnley et al., 2009). Course content adaptation should consider how mobile devices are used for learning and how they can supplement existing course material (Hoover and Valencia, 2011; Unal and Unal, 2014). Before implementing new technology it is important to determine what m-learning activities will support the learning objective and produce the desired change in learning outcomes. Using a framework is a useful way to evaluate and balance the various technological, pedagogical, and organizational aspects of m-learning (Momeni et al., 2013; Park, 2011).

Bloom’s Taxonomy of Educational Objectives, developed in 1956, is a useful tool for communicating and classifying educational objectives (Bloom, 1956). It states three domains of learning: cognitive, affective, and psychomotor. The cognitive domain classifies thinking skills and moves from simple to more complex skills. The classification is useful to stimulate thought on educational issues and serves as a structure when developing curriculum, instructional techniques, and assessment. A revision was undertaken in 2001 to add relevance to 21st century students and teachers (Anderson and Krathwohl, 2001). It is a tool to help educators identify what they want students to learn.

One framework educators can use when beginning to incorporate educational technology into the classroom is Bloom’s Revised Taxonomy coupled with the SAMR model (Puentedura, 2014) (see Figure 1). Bloom’s Revised Taxonomy identifies six levels within the cognitive domain: remember, understand, apply, analyze, evaluate, and create (Anderson and Krathwohl,
“Remember” is the starting level. Students are expected to recall relevant facts and terms. “Understand” is the second level where students should be able to comprehend the meaning of instructions and state the problem in their own words. The third level of thinking is to “apply”. Students are expected to demonstrate what they have learned by using a concept in a new situation to solve problems. Students advance in thinking and knowledge to the fourth level, which is “analyze”. Analysis involves examining and separating information into parts in order to distinguish between facts and inferences. Next is “evaluate” which involves making judgments and decisions according to a set of criteria. The highest level is “create”. Creating can involve a new design, revisions to improve a process, or devising a solution to a problem.

The four levels of the SAMR model are substitution, augmentation, modification, and redefinition (Puentedura, 2006). The first two levels are where technology is considered to enhance education. The first level, substitution, is where technology acts as a direct tool substitute, with no functional change. For example, the Notability application could be used to take notes or complete an assignment. At the next level, augmentation, technology acts as a direct tool substitute, with some functional improvement. Notability could be used to record the lecture or record questions about the assignment. The next two levels, modification and redefinition, are higher levels where technology is considered to have the potential to transform education. The modification level is where technology allows for significant task redesign. One example of using technology at the modification level is using the Keynote presentation application to present the solution to an assignment. Redefinition, the highest level, allows for the creation of new tasks that were previously inconceivable. Using the ShowMe application to demonstrate the understanding of an assignment is an example of using technology at the redefinition level.

Figure 1: The SAMR Model and Bloom’s Revised Taxonomy

(Puentedura, 2014)
Bloom’s Revised Taxonomy combined with the SAMR model blends the three lower levels of Bloom with the two enhancement levels of SAMR and blends the three upper levels of Bloom with the two transformation levels of SAMR. The purpose of joining the two models is to provide a framework to help guide the integration of technology into the course design so that learning objectives are achieved. This guide can be used to carefully consider whether technology can or should be used to enhance and transform the course so that desirable results will be achieved.

RESULTS

Substitution

At the substitution level, new technology tools replace traditional learning tools. This level corresponds to the “remember” and “understand” levels on Bloom’s Revised Taxonomy that focus on the students’ ability to recall previously learned material and explain ideas and concepts. These teaching and learning activities can be done without the use of mobile devices, but are often more convenient with technology.

Many accounting educators and students are already using technology at this level through presentation software such as PowerPoint or Prezi. Instructors can create audio and video lectures using iTunesU software and YouTube to provide flexibility and convenience for online courses, students who miss class, and exam review (Fessler, 2012). Business Week, The Wall Street Journal, Khan Academy and other educational institutions provide existing podcasts and vodcasts on topics such as the Sarbanes-Oxley Act, financial statements, corporations, and e-commerce to supplement existing course materials (Zelin II and Baird, 2012). However, studies indicate that course delivery format does not impact student grades and similar learning outcomes are achieved in traditional and e-learning (Bell and Federman, 2013). Students who have acquired the skills necessary for high performance are able to adapt to different teaching and learning methods (Liu, Rowe, Serrett, and Shelton, 2013).

Student engagement and satisfaction along with small improvements in learning can be achieved through the use of student response systems (Carnaghan, Edmonds, Lechner, and Olds, 2011; Carty and Baker, 2014). New technology allows students to respond to instructor questions using a mobile device instead of a separate clicker device (Sheldrake and Watkin, 2013). Several interactive applications are available for use on a tablet, smartphone, or laptop. These student response system applications let instructors engage and assess understanding of the material with instant feedback. Socrative, Poll Everywhere and Wallwisher are applications with the potential to enhance learning by engaging students in brainstorming ideas, participating and contributing to conversations, and assessing their understanding of the course material.

Students can substitute traditional learning tools with new mobile learning tools to help them remember and understand course material. Using technology at the substitution level may not lead to significant increases in learning outcomes, but increased engagement often leads to the next level of technology usage and learning.
**Augmentation**

At the augmentation level new technology tools provide some functional improvement over traditional learning tools. Augmentation corresponds to Bloom’s Revised Taxonomy levels of “understand” and “apply” where students learn to use information in a new way.

Functional improvement is evident in digital textbooks offering students an interactive multimedia experience (Heider, Laverick, and Bennett, 2009). This innovative tool allows students to answer questions and get immediate personalized feedback, watch animated content, and view glossary terms while reading. Digital video technology can supplement existing course content and reinforce understanding of the material (Holtzblatt and Tschakert, 2011). Students are able to access class material anytime from multiple devices and locations. Communication and collaboration can be increased by sending group texts or emails, and by using videoconferencing tools such as Skype and Facetime (Holtzblatt and Tschakert, 2011).

Information can also be used in new ways through presentation applications such as Explain Everything (Malin, 2014). Through the use of an iPad the presentation can become more interactive. Functional improvements over traditional power points include the ability to write and record solutions to problems on the slides. Although business students appreciated the added features of this technology and believed it assisted their learning, there was no objective improvement in exam grades.

**Modification**

Technology allows part of the task to be redesigned at the modification level. This level corresponds to the higher level thinking skills of “analyze” and “evaluate” on Bloom’s Revised Taxonomy where students learn to compare, examine, and judge.

Spreadsheet applications such as Numbers into the classroom can help students learn technological skills and develop higher level thinking skills. Numbers can be used to support project-based learning, “what if” analysis, graphing, budgeting, and problem solving (Patch, 2015). The Drop Box application is a file sharing and management tool that can be synced across mobile devices (Khaddage and Lattemann, 2013). It allows users to view and change files as well as upload and share photos and videos. It provides flexibility for group collaboration and communication. Students can develop a group presentation and share it with the class using this tool.

Suggestions for helping faculty progress in using technology to transform teaching and learning include providing instructional support and training and using a theoretical model to guide the implementation of mobile learning technology into the learning environment (Aiyegbayo, 2014; Cavanaugh, Hargis, Kamali, and Soto, 2013).

**Redefinition**

Technology allows for the creation of new tasks, previously impossible. These learning activities do not exist without the technology. This corresponds to Bloom’s Revised Taxonomy higher order thinking skills of “evaluate” and “create” where students learn to develop, support, and write.
Cameras on mobile devices offer possibilities for new learning activities (Sheldrake and Watkin, 2013). Many students are familiar with using cameras to post photographs on Instagram or videos on YouTube. This technology also has relevance for the classroom. Students can create professional real world projects that can be shared online. Video technology can complement traditional tools and increase student participation (Holtzblatt and Tschakert, 2011). Tools such as iMovie or ShowMe can be used to create presentations, which can then be shared via YouTube or Vimeo. This has the potential to improve communication skills while using 21st century communication tools. Students also learn how to use technology, to collaborate with others, and develop and enhance other personal competencies. Audio blogging is another way to leverage technology to transform learning (Sheldrake and Watkin, 2013). Students can verbally record their thoughts and share them. Creative audio and video activities are possibilities at this level. Small changes in task redesign can lead to potential transformation of teaching and learning.

SUMMARY AND CONCLUSION

Technology has changed the way accounting professionals do business. As a result, accounting students require current technological skills as they transition from the classroom to the business world. Accounting educators have added e-learning and m-learning to traditional teaching tools as technology has affected the teaching and learning process. Opportunities and challenges arise as mobile devices are integrated into the classroom. Bloom’s Revised Taxonomy combined with the SAMR model is a framework that can be used to guide the integration process.

This paper presents suggestions for using mobile device technology in the accounting classroom to achieve multiple levels of learning. Accounting educators must have support, training, and guidelines in order to successfully integrate mobile device technology into the classroom in a way that enhances and transforms learning. Empirical evidence is needed to evaluate the effectiveness of mobile learning on learning outcomes.

REFERENCES


