

Agricultural Education Students' Acceptance and Self-Efficacy of Mobile Technology in Classrooms

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Abstract

Mobile learning is a growing segment of e-learning as more students are regularly engaged in mobile technology use. The amalgamation of learning and mobile technologies, known as mobile learning, is a relatively recent phenomenon and a thorough framework of knowledge has yet to be developed. Researchers lack data on the factors affecting college and university students' acceptance of mobile learning. The need to gather this data is paramount to our understanding of how the use of mobile technology is changing learning for students in higher education. Agricultural educators and students would benefit from a greater understanding of the mobile learning and its part in agricultural education. The population of the study was undergraduate education students at Texas A&M University (N =687). The study used quantitative research surveys to evaluate students' acceptance of mobile learning and self-efficacy. Descriptive statistics were used to provide levels of students' mobile learning acceptance and self-efficacy. Students scored highest in the areas of self-efficacy and effort expectancy. Further studies should address the relationship between mobile learning acceptance and self-efficacy. The relationships determined by future research will help increase our knowledge of students' perceived capacity to learn via mobile technology.

Introduction

Literature Review

Mobile learning is an emerging educational phenomenon coming from the integration of e-learning and mobile technologies. Hashemi et al. (2011) defined mobile learning as the use of mobile technologies to expand the reach of teaching and learning to occur at any time or place. The advent of mobile learning will continue to test the idea of a traditional classroom and create inquiry regarding its educational potential (Kukulka-Hulme et al., 2009). Mobile learning has

transitioned from a subordinate method of e-learning into its own educational field with a need for devoted research (Pollara and Broussard, 2011).

The increasing use of mobile learning systems is creating a paradigm shift for e-learning. Mobile or m-learning provides significant learning prospects for students who regularly use mobile devices like smartphones (Gedik et al., 2012). Our current educational system will be greatly affected by the advent of this technology. Rajasingham (2011) found mobile learning could constitute an innovative and attractive paradigm for higher education and researchers should address its use. The increasing use of mobile devices for learning is a key development in distance education and future educational strategies (Chong et al., 2011). The prevalence of mobile technologies among students is transforming our educational system. The continued growth of mobile learning as an educational tool is dependent on its flexibility and pervasiveness (Iqbal and Qureshi, 2012). Mobile technology can be beneficial for higher education due to its ubiquitous nature and ability to shape information processes (Schepman et al., 2012).

Mobile learning can extend learning opportunities to students due to its flexibility and mobility. Liaw et al. (2010) suggested better frameworks for understanding mobile learning need to be created to provide educators and researchers with a better idea of its educational uses. The growth of this learning technology is being fueled by the unrelenting pace of technology as well as the need for educational institutions to harness it effectively. Educators are exploring the application of mobile technologies in our instructional settings due to the increasing omnipresence and accessibility of the technology (Walls et al, 2010). Mobile device use among students is pervasive and creating unlimited potential for mobile learning in our schools (Khaddage et al., 2009).

Mobile learning technology provides a unique opportunity for learning activities at the post-secondary level. Cheon et al. (2012) identified higher education as an appropriate venue for the integration of mobile learning because of the ubiquitous nature of mobile devices on college campuses. The use of mobile learning can expand the scope of higher education and allow it to better reach students. Mobile learning can provide a more interactive and effective type of learning to meet student needs (El-Hussein and Cronje, 2010).

Educators should develop an understanding of the factors in the acceptance of mobile learning technology and its effective implementation in our colleges and universities. Keskin and Metcalf (2011) indicated the promising future of mobile learning needs researchers to understand the meanings, methods and theories related to its study. Wang et al. (2009) found research into factors, such as age and gender differences, affecting the intention to accept mobile learning has been limited. Research into mobile learning usage helps us to gain a better understanding of students' practices and attitudes toward mobile learning (Bradley and Holley, 2011). Current research on mobile learning acceptance among undergraduate students is lacking. Habboush et al. (2011) suggested issues on how to promote learners' acceptance of mobile learning seem to be largely unsolved. The analysis of issues surrounding mobile learning adoption is deficient despite the continued growth of mobile learning (Liu et al., 2010). Researchers should study the factors affecting mobile learning as it can provide increased access to education without the limits of geography and time (Wang et al., 2009). Agricultural educators need to examine the effect of innovative technologies on students and in classrooms. Rhoades et al. (2009) recommended future studies assess the usefulness of computer and communication technologies in agricultural education settings. Leggette et al. (2012) found that agricultural education faculty should be informed about new technologies and develop the ability to incorporate these technologies into their instruction in order help students engage in educational growth.

Theoretical Framework

The theoretical framework for this study builds upon the components of self-efficacy theory and the unified theory of acceptance and use of technology. Social Cognitive Theory provides a framework for understanding, predicting and changing human behavior. Bandura's (1986) theory suggests the interaction of personal factors like behavior and environment define human behavior. Self-efficacy is a part of Social Cognitive Theory and plays a large role in how individuals handle

a variety of undertakings. Bandura (1977) defined self-efficacy as how much effort an individual will put forth in facing challenging endeavors. Individuals with high self-efficacy will use great effort in attempting to master demanding situations while individuals with low self-efficacy will avoid attempting such situations (Bandura, 1993).

Davis (1989) built upon Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA) and devised the Technology Acceptance Model (TAM). The model is an information systems model indicating how users accept and use technology. Venkatesh et al. (2003) used TAM as basis for the Unified Theory of Acceptance and Use of Technology (UTAUT). The theory uses TAM as well as other theories and models such as TRA, Azjen's (1991) Theory of Planned Behavior (TPB), Bandura's (1986) Social Cognitive Theory (SCT) and Rogers's (2003) Innovation Diffusion Theory (IDT) in its framework.

Four key constructs explain user intentions and usage behavior toward an information system in UTAUT. Performance expectancy, effort expectancy, social influence and facilitating conditions determine information system use (Venkatesh et al., 2003). Performance expectancy measures user belief in the ability of the information system to improve job performance. Effort expectancy measures user belief in how easy it is to use the information system. Social influence measures how the user perceives others importance of using the information system. Facilitating conditions measures how the user believes the necessary infrastructure is in place to use an information system (Venkatesh et al., 2003).

Objectives

The research study was designed to assess undergraduate education students' performance expectancy, effort expectancy, behavioral intention and self-efficacy in relation to mobile learning. More specifically, this study sought to:

1. Describe students' performance expectancy, effort expectancy, and behavioral intention in regards to mobile learning; and
2. Describe students' self-efficacy in regards to mobile learning.

Materials and Methods

The study used quantitative research and descriptive statistics to provide solutions to the research questions. Quantitative research is used to analyze and interpret data through statistical procedures to communicate results (Ary et al., 2006). Descriptive statistics were used to analyze the constructs of performance expectancy, effort expectancy, behavioral intention and self-efficacy in the

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form of Mean Weighted Discrepancy Scales (MWDS). Descriptive statistics allow researchers to organize, summarize and describe observations (Ary et al., 2006). The study was deemed exempt by the Texas A&M University Institutional Review Board and was assigned protocol number 2011-0426.

The study use a population of undergraduate students enrolled in agricultural education courses at Texas A&M University. A stratified random sample (N = 687) was utilized to address the study's objectives. An instrument combining a Teacher Sense of Efficacy Scale (TSES) and a UTAUT scale was created to collect the data. Ex post facto calculation of internal consistency and reliability produced the following reliability coefficients: performance expectancy = .92; effort expectancy = .91; behavioral intention = .97; and self-efficacy = .95.

Survey research was conducted through the use of paper questionnaires handed out in class to collect data. Survey research is used by researchers to determine specific characteristics of a particular group and summarize the findings. Researchers can get an idea of a group's attitudes and beliefs from these findings (Fraenkel et al., 2012).

The TSES was used to create the self-efficacy part of the combined instrument. Tschannen-Moran and Hoy (2001) created the TSES using Bandura's (1993) Social Cognitive Theory. Their instrument used a nine-point summated scale for each item, with the following: anchors at 1 = nothing, 3 = very little, 5 = some influence, 7 = quite a bit and 9 = a great deal (Tschannen-Moran and Hoy, 2001). Venkatesh et al. (2003) UTAUT scale was used for the mobile technology preference section of the combined instrument. Mobile technology preference was measured on a seven-point summated scale: where 1 = strongly disagree, 2 = moderately disagree, 3 = somewhat disagree, 4 = neutral (neither disagree nor agree), 5 = somewhat agree, 6 = moderately agree and 7 = strongly agree. The instrument contained a definition of mobile learning. Students were not measured on engagement in formalized mobile learning.

The majority of participants were male (n = 196, 65.10%), classified as seniors (n = 195, 65.00 %), worked part-time (n = 146, 48.7) and carried a GPA

between 2.99 and 2.50 (n = 121, 40.30%). The findings were not generalizable to the target population. However, the results do offer insight into the areas of performance expectancy, effort expectancy, behavioral intention and self-efficacy in terms of mobile learning acceptance.

Results and Discussion

Results

Descriptive statistics were used to measure respondents' scores. Data frequencies were not provided due to the kurtosis and skewness were non-factors as the data was normally distributed. Participant demographics were not found to be significant regarding mobile learning acceptance. Self-efficacy (M = 5.24, SD = 1.37) was the highest scoring construct. Behavioral intention (M = 5.02, SD = 1.66) was the lowest scoring construct.

The first objective of the study was to describe undergraduate agricultural education students' performance expectancy in relation to mobile learning (see Table 1). The items that received the highest scores were "Using mobile learning enables me to accomplish tasks more quickly." (M = 5.29, SD = 1.52) and "I would fine mobile learning useful in school." (M = 5.24, SD = 1.60). The item with the lowest scores was "If I use mobile learning I will increase my chances of getting a good grade." (M = 4.74, SD = 1.48).

Part of the first objective of the study was to describe undergraduate agricultural education students' effort expectancy in relation to mobile learning (see Table 2). The items with the highest scores were "I would find mobile learning easy to use." (M = 5.41, SD = 1.50) and "Learning to operate mobile learning is easy for me." (M = 5.39, SD = 1.47). The lowest scoring item was "My interaction with mobile learning would be clear and understandable." (M = 4.89, SD = 1.50)

Another part of the first objective of the study was to describe undergraduate agricultural education students' behavioral intention in relation to mobile learning (see Table 3). The highest scoring item was "I predict I would use mobile learning in the next 12 months." (M = 5.14, SD = 1.40). The item with the lowest score was "I intend to use mobile learning in the next 12 months." (M = 4.94, SD = 1.57).

Table 1. Descriptive Statistics for Performance Expectancy (N = 303)

Constructs	N	M	SD
Using mobile learning enables me to accomplish tasks more quickly.	303	5.29	1.52
I would find mobile learning useful in school.	303	5.24	1.60
Using mobile learning increases my productivity.	303	4.97	1.49
If I use mobile learning I will increase my chances of getting a good grade.	303	4.74	1.48

Note. Overall M = 5.06, SD = 1.35. Scale: 7=Strongly Agree, 6=Moderately Agree, 5=Somewhat Agree, 4=Neutral (Neither Agree or Disagree), 3=Somewhat Disagree, 2=Moderately Disagree, 1=Strongly Disagree.

Table 2. Descriptive Statistics for Effort Expectancy (N = 303)

Constructs	N	M	SD
I would find mobile learning easy to use.	303	5.41	1.50
Learning to operate mobile learning is easy for me.	303	5.39	1.47
It would be easy for me to become skillful at using mobile learning.	303	5.34	1.49
My interaction with mobile learning would be clear and understandable.	303	4.89	1.50

Note. Overall M = 5.24, SD = 1.37. Scale: 7 = Strongly Agree, 6 = Moderately Agree, 5 = Somewhat Agree, 4 = Neutral (Neither Agree or Disagree), 3 = Somewhat Disagree, 2 = Moderately Disagree, 1 = Strongly Disagree.

Table 3. Descriptive Statistics for Behavioral Intention (N = 303)

Constructs	N	M	SD
I predict I would use mobile learning in the next 12 months.	303	5.14	1.40
I plan to use mobile learning in the next 12 months.	303	5.02	1.56
I intend to use mobile learning in the next 12 months.	303	4.94	1.57

Note. Overall M = 5.02, SD = 1.52. Scale: 7 = Strongly Agree, 6 = Moderately Agree, 5 = Somewhat Agree, 4 = Neutral (Neither Agree or Disagree), 3 = Somewhat Disagree, 2 = Moderately Disagree, 1 = Strongly Disagree.

The second objective of the study was to describe undergraduate agricultural education students' self-efficacy in relation to mobile learning (see Table 4). The highest scoring items were "How much can you do with mobile learning to learn effectively?" (M = 6.01, SD = 1.72) and "How much does mobile learning help you to follow course objectives?" (M = 5.84, SD = 2.00). The items with the lowest scores were "How much does mobile learning get you to believe you can do well in school?" (M = 4.98, SD = 1.90) and "How much does mobile learning help you value learning?" (M = 4.84, SD = 1.87).

Table 4. Descriptive Statistics for Self-Efficacy (N = 301)

Constructs	N	M	SD
How much can you do with mobile learning to learn effectively?	302	6.01	1.72
How much does mobile learning help you to follow course objectives?	301	5.84	2.00
How much does mobile learning help you focus on educational content?	302	5.34	2.04
How much does mobile learning help you assist your peers with educational content?	301	5.32	2.06
How much does mobile learning motivate you to learn educational content?	301	5.19	1.89
How much does mobile learning help you use evaluation strategies?	301	5.19	2.06
Does mobile learning help you evaluate your own learning?	301	5.13	1.97
How much does mobile learning get you to believe you can do well in school?	301	4.98	1.90
How much does mobile learning help you value learning?	301	4.84	1.87

Note. Overall M = 5.31, SD = 1.66. Scale: 9 = A Great Deal, 7 = Quite a Bit, 5 = Some Influence, 3 = Very Little, 1 = Nothing.

Discussion

The results of this study are limited to the population of undergraduate agricultural education students at Texas A&M University. The findings provide a description of factors in undergraduate agricultural education students' behavioral intention towards mobile learning acceptance.

The findings of this study support the application of UTAUT (Venkatesh et al., 2003) and self-efficacy as defined by Bandura (1993), as presented by the researchers. Bandura (1993) defined self-efficacy as the willingness of an individual to participate in new tasks, with high-efficacy individuals seeking new tasks and low efficacy individuals avoiding the same tasks. Venkatesh et al. (2003) UTAUT provided an explanation

for users' behavioral intentions towards an information system. The resulting scores for the areas of performance expectancy, effort expectancy, and self-efficacy were consistent with the theoretical framework.

Students' scores on the performance expectancy construct were compatible with the area of performance expectancy in UTAUT. Venkatesh et al. (2003) suggested performance expectancy measured the users' level of belief in possible gains from using an information system. Students' belief that mobile learning would lead to decreased time allotted to certain tasks supported the idea of an expected performance increase from the use of mobile learning.

The idea of effort expectancy from UTAUT aligned with students' scores on this construct. Effort expectancy is the level of ease a user perceives with the use of an information system (Venkatesh et al., 2003). The students' scores on the effort expectancy construct were congruent with lower expected effort in regards to using mobile learning.

Students' scores on the behavioral intention construct supported the concept of behavioral intention in UTAUT. Venkatesh et al. (2003) defined behavioral intention as an individual's intent to actually use an information system.

The scores from the self-efficacy construct were aligned with Social Cognitive Theory. An individual's self-efficacy is their willingness to take on a particular task (Bandura, 1993). Students' scores on the construct corresponded with students' desires to tackle the tasks of mobile learning. Higher self-efficacy scores indicate a greater level of intent towards new and challenging tasks. Students with higher self-efficacy scores felt mobile learning was a novel and stimulating challenge.

Summary

Future research should address the effect of performance expectancy, effort expectancy and self-efficacy on mobile learning acceptance. Researchers should investigate the relationship between performance expectancy, effort expectancy and self-efficacy and the behavioral intention to accept mobile learning. Studies should be designed examine if increases in performance expectancy, effort expectancy and self-efficacy lead to an increase in behavioral intention toward mobile learning acceptance. The increasing presence of mobile learning in education means instructors will need to understand the effects of performance expectancy, effort expectancy and self-efficacy on students' acceptance of the technology.

Instructors should emphasize the importance of performance expectancy, effort expectancy and self-efficacy in future instructional practice to increase student

acceptance of mobile learning. Agricultural instructors should enhance students' performance expectancy, effort expectancy, self-efficacy and behavioral intention in order to achieve mobile learning acceptance.

Instructors should highlight the mobile learning benefits for student performance in order to address performance expectancy. The performance benefit of mobile learning should be demonstrated through the flexibility mobile learning offers students to complete class related tasks. The ability of mobile learning to access information and assignments to improve educational outcomes without the restrictions of location or time should also be demonstrated to students. Instructors should demonstrate the various academic uses of mobile technology, like conducting research and turning in assignments, to students in order to raise performance expectancy for mobile learning. Instructors could use mobile learning-based assessment and evaluation tools to measure educational goals and objectives. The practical use of mobile learning should enhance student engagement and lead students to realize the benefit of using the technology to improve the achievement of their learning objectives.

The effort needed to adapt to mobile learning should be reduced to better engage effort expectancy. Instructors should present the reduced effort of mobile learning by relating mobile learning back to students' current utilization of mobile technology. An instructor can integrate students' mobile devices into classroom activities and assignments. Students may view mobile learning as a task requiring the same amount of effort as their everyday use of mobile technology. Instructors should use active training to demonstrate the minimal effort needed to use mobile learning. The technology should be incorporated into instructional design processes to decrease the effort needed for students to get involved with mobile learning.

Students' self-efficacy skills should be increased so their willingness to participate in a new and possibly challenging task like mobile learning is increased. Students' self-efficacy could be increased by reducing the degree of difficulty associated with mobile learning. Students' current usage of mobile technology should be paired with the idea mobile learning. Mobile learning should be demonstrated as an extension of students' current mobile technology use to reduce their perception of mobile learning being a difficult task. Students willing to engage in mobile learning will be more likely to appreciate the process as a positive part of their educational growth. Instructors giving attention to students' performance expectancy, effort expectancy and self-efficacy, may lead to students' greater behavioral intention to adopt mobile learning.

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