Predicting the Adoption of an Android-Based Class Record Using the Unified Theory of Acceptance and Use of Technology Model

Dave E. Marcial

[1]College of Computer Studies, Silliman University, Dumaguete City, Philippines

demarcial@su.edu.ph

Abstract. Technology adoption is a process that is affected by many variables. To achieve innovative teaching and learning, mClassRecord, an Android-based class record application, was developed and tested. This paper is aimed at predicting the level of adoption of mClassRecord as experienced by the respondents using the Unified Theory of Acceptance and Use of Technology Model. Specifically, this article presents the qualitative analysis of mClassRecord adoption among the respondents in terms of performance expectancy, effort expectancy, attitudes toward using mClassRecord, social influence, facilitating conditions, self-efficacy, anxiety, and behavioral intention to use mClassRecord. The respondents of the study are the 17 teacher educators in higher education institutions in Central Visayas, Philippines. A semi-structured questionnaire was used which was adapted from the model. Results show that mClassRecord is useful in the classroom. The interaction of teachers with mClassRecord is found to be clear and understandable. The positive comments from the respondents imply that the app is a good idea for teachers. Result also reveals that there is no clear indication that there is a direct influence or support from the school administration. The result shows that the teachers acquire different skills and even different levels of the same skills. The result shows that majority of the teachers do not have fear and apprehension in using mClassRecord. The result implies that there is a positive and high degree of intention to use mClassRecord. The study concludes that adoption of mClassRecord is predicted at different stages. There is strong evidence that mClassRecord offers effective and efficient class recording and management. There is promising indication that the teaching tool offers innovative teaching among teachers.

1. Introduction

Webster defines innovation as "the act or process of introducing new ideas, devices, or methods." The proposed instructional technologies for teachers are not new in this digital world, however, these tools especially the process of integration is a new method for the faculty in the teacher education program. Because of this innovation, it is noteworthy that this study will consider Diffusion of Innovation theory. Diffusion and Innovation theory "seeks to explain how innovations are taken up in a population" (Robinson, 2009). Surry and Farquhar (1997) asserts that Innovation Theory is potentially valuable to the field of instructional technology for three reasons: 1) most instructional technologists do not understand why their products are, or are not, adopted; 2) instructional technology is inherently an innovation-based discipline; and 3) the study of diffusion theory could lead to the development of a systematic, prescriptive model of adoption and diffusion. Innovation-decision process "is the process through which an individual passes from first knowledge of innovation; to forming an attitude toward an innovation; to a decision to adopt or reject; to the implementation of the new idea; and to confirmation of this decision" (Rogers, 1983). Knowledge, persuasion and decision processes were done during Year 1 of the study.

"Technology adoption is a process – starting with the user becoming aware of the technology, and ending with the user embracing the technology and making full use of it" (Renaud & van Biljon, 2008). As a process, technology adoption "begins with awareness of the technology and progresses through a series of steps that end in appropriate and effective usage" (Bridges to Technology Corp., 2005). Technology adopters are classified according to the Rogers' bell curve. These are the innovators, early adopters, early majority, late majority, and laggards.

For Bridges to Technology Corp. (2005), technology adoption comes in five stages. These are awareness, assessment, acceptance, learning, and usage. Users in the awareness stage acquire enough knowledge about the technology and its benefits to decide whether they want to explore further. Assessment stage is where the potential users appraise the efficacy, effectiveness, usability, and the ease-of-use of adopting the technology. Users in the acceptance stage are those who decide to acquire and use the technology or choose not to adopt. In the learning stage, potential users progress the skills and knowledge required to use the technology effectively and efficiently. Finally, users in the usage stage apply and use the technology correctly and efficiently. Accordingly, users come at different degrees of adoption at these stages.

With the aim to provide innovative teaching in the higher education institutions in the Philippines, a mobile class record application, called mClassRecord, was developed. mClassRecord is a stand-alone mobile application that automates the manual process of a class information recording and management. It only runs on Android, a Linux-based operating system for mobile devices such as Smartphones and tablet computers. The best practices in higher education institutions in the Philippines are the critical inputs to functional analysis. The development employs the feature-driven approach specifically during the design and coding phases.　The mobile app went to a rigid system testing by a pool of testers before the launching and training. The app was subjected to a usability testing, and it was found to be highly usable. The development of mClassRecord is a part of a two-year project funded by the Philippine Commission on Higher Education through the Philippine Higher Education Research Network (Marcial, 2014).

This article predicts the degree of adoption of mClassRecord. Specifically, this paper presents the qualitative analysis of the acceptance of mClassrecord in terms of the seven factors in the Unified Theory of Acceptance and Use of Technology (UTAUT) of Venkatesh, Morris, Davis, and Davis (2003). These factors include performance expectancy, effort expectancy, attitude toward using technology, social influence, facilitating conditions, self-efficacy, anxiety, and behavioral intention to use the system.

2. Methods

This study is a qualitative analysis using a semi-structured questionnaire. The study was conducted in 15 higher education institutions (HEIs) offering any teacher education programs in the four provinces in Region 7, Philippines. Teacher education program refers to degree programs such as Bachelor of Science in Secondary Education and Bachelor of Science in Elementary Education offered in public and private HEIs.

The participants of the study are 17 teachers in HEIs offering teacher education programs in Central Visayas, Philippines. These respondents are selected because of their experience in using mClassRecord in the classroom. Notably, these teachers were identified as pilot users who agreed to use mClassRecord in their classroom during the second semester of the school year 2015-2016. As pilot users, they were provided a tablet – similar hardware specifications – installed with mClassRecord.

The instrument used in data gathering to accomplish the specific objectives of the study was a semi-structured questionnaire. The questions are based on the Unified Theory of Acceptance and Use

of Technology model (TAM) by Venkatesh et al. (2003).   There is at least one question in every variable found in TAM.

3. Discussion

On Performance Expectancy. The result suggests that mCLassRecord is useful in the class. It also signifies that using mClassRecord enables teachers to accomplish classroom tasks more quickly. Likewise, it indicates that the app increases classroom productivity.

On Effort Expectancy. Based on the model, the result shows that the interaction of teachers with mClassRecord is clear and understandable.   It also implies that becoming skillful with the app is easy for the teachers. It also signifies that mClassRecord is easy to use.

On Attitude toward using technology. The positive comments from the respondents imply that the app is a good idea for teachers. It shows that teachers are having fun using the app. Likewise, it indicates that teaching with the use of mClassRecord is interesting. On the other hand, the negative comments may mean that there is still a gray part of teacher's skills in using mClassRecord.

On Social Influence. The responses show that there is no clear indication that there is a direct influence or support from the administration. The responses indicate that most of the supports are related to training and use of facilities but not on the actual use and utilization of the digital tool. Moses, Abu Bakar, Mahmud, and Wong (2011) expound that technical and administrative support should be emphasized to ensure high adoption of digital tools like laptops. On the other hand, the responses show that there is a moderate technical assistance especially coming from the project team.

On Self-efficacy. The result shows that the teachers acquire dissimilar skills and even different levels of the same skills. The result implies that some of the teachers have the ability to accomplish most of the features offered in mClassRecord. Likewise, the result demonstrates that some teachers can complete the tasks in class recording successfully even if no one is around to assist them. In a similar qualitative study, although with the use of iPAD, Minshew and Anderson (2015) assert that "issues of self-efficacy with technological knowledge and pedagogical implementation of the technology were at the forefront with all of our teachers." They added that teachers have acknowledged the importance and value of technology in the teaching job, but "teachers did not always make the connection to classroom practice."

On Anxiety Level. The result shows that majority of the teachers do not have fear and apprehension in using mClassRecord. The result implies that majority of the teachers are comfortable and confident in using the app. Likewise, the result suggests that the app is not intimidating to the teachers. Thus, they are always interested in using the app in their everyday class recording activities. The result also indicates that some teachers experienced worries and nervousness in using the app. Privacy of data and information, loss of data and information, and people will get unauthorized access to data are among the fears of the teachers.

On Behavioral intention to use. The result implies that there is a positive and high degree of intention to use mClassRecord. The result means that teachers will also have high usage of mClassRecord (Venkatesh et al., 2003). The result also demonstrates that ownership and possession of the required hardware specification is a concern among teachers. Further, the result shows that teachers are getting more excited and interested in a more refined version of the tool.

4. Conclusion and Recommendation

Adoption of mClassRecord is predicted at different levels. The adoption of mClassRecord among teacher educators is grounded on technology features which can make their daily activities easier (Nyembezi & Bayaga, 2014). There is strong evidence that mClassRecord offers effective and efficient class recording and management. There is promising indication that the teaching tool offers

innovative teaching among teachers. On the contrary, there is little technologic anxiety among teachers in using mClassRecord. Control and security of data and information are the most pressing apprehensions of the teachers. Ownership of the prescribed gadget is a requirement in any technology integration.

There must be more training activities to be conducted to ensure high adoption of mClassRecord. The app must be improved to cater some specific needs of the teachers. Teachers must be convinced that mClassRecord is safe and secure with extra care of the tablet.

The study also recommends conducting further study to validate the claims. Evaluate the adoption of mClassRecord using the variables that mentioned by (Vogelsang & Steinhüser, 2013) as well as the diffusion estimation technique (Ford, Menachemi, & Thad Phillips, 2006). It further recommends conducting a study that will closely measure the personality dimensions and system specific dimensions as described by (Godoe & Johansen, 2012). Likewise, it is recommended to conduct a future research to utilize qualitative methods and examine the behavioral outcomes of mobile adoption instead of simply adoption in consumer markets (Sanakulov & Karjaluoto, 2015). Moreover, there is a recommendation to conduct a further study to test whether affordability and pedagogy is a predictor to mClassRecord Adoption.

Acknowledgements

5. References

[1] L. Robinson, "A summary of Diffusion of Innovations". Retrieved from *Enabling Change*, http://www.enablingchange.com.au/Summary_Diffusion_Theory.pdf, 2009.

[2] D. Surry & J. D. Farquhar. "Diffusion theory and instructional technology". *Journal of Instructional Science and Technology,* 2(1). Retrieved from http://www.usq.edu.au/electpub/e-jist/vol2no1/article2.htm, 1997, May.

[3] E. Rogers, E, "Diffusion of Innovations Theory", retrieved from www.indiana.edu/.../Diffusion_of_Innovations.pdf, 1997.

[4] K. Renaud & J. van Biljon, J. "Predicting Technology Acceptance and Adoption by the Elderly: A Qualitative study". *SAICSIT 2008*. Wilderness Beach Hotel, Wilderness, South Africa. Retrieved 23 2016, March, from https://pdfs.semanticscholar.org/10e6/a493e9aebecfdbe8ec64c40efa4776a71ffb.pdf, 2008.

[5] Bridges to Technology Corp. Retrieved March 24, 2016, from "What is Technology Adoption?": http://www.bridges-to-technology.com/page21.html, 2005.

[6] D. Marcial, J. B. Rendal, P. A. dela Rama, M. S. Fortich, J. O. Etcuban, D. I. Calibo. "ICT in Teacher Education in Region 7: Benchmarking, Training, Technology Development, and Evaluation towards an Innovative Teaching". *Technical Report*. Philippine Higher Education Research Network COMMISSION ON HIGHER EDUCATION Quezon City, Philippines. Retrieved from http://www.davemarcial.net/uploads/1/4/0/1/14014636/6_project_technical_report_marcial.pdf, 2014.

[7] V. Venkatesh, M. Morris, G. Davis, & F. Davis, "User Acceptance of Information Technology: Toward A Unified View", *MIS Quarterly*, 27(3), 425 - 478, 2003.

[8] P. Moses, K. Abu Bakar, R. Mahmud & S. Wong. "ICT Infrastructure, Technical and Administrative Support as Correlates of Teachers' Laptop Use". *Procedia - Social and Behavioral Sciences*, 59, 709–714. doi:10.1016/j.sbspro.2012.09.335, 2011.

[9] L. Minshew, & J. Anderson. "Teacher self-efficacy in 1:1 iPad integration in middle school science and math classrooms". *Contemporary Issues in Technology and Teacher Education*, 15(3). Retrieved April 14, 2016, from http://www.citejournal.org/vol15/iss3/science/article1.cfm, 2015.

[10] N. Nyembezi & A. Bayaga. "Performance Expectancy and Usage of Information Systems and Technology: Cloud Computing (PEUISTCC)". *International Journal of Education Science*, 7(3), 579-586. Retrieved April 13, 2016, from http://www.krepublishers.com/02-Journals/IJES/IJES-07-0-000-14-Web/IJES-07-3-000-14-ABST-PDF/IJES-7-3-579-14-427-Bayaga-T/IJES-7-3-579-14-427-Bayaga-T-Tx[18].pdf, 2014.

[11] K. Vogelsang & M. Steinhüser," A Qualitative Approach to Examine Technology Acceptance", *Thirty Fourth International Conference on Information Systems*, (pp. 1-16). Milan. Retrieved March 23, 2016, from https://pdfs.semanticscholar.org/15b4/161b13f5fad118566ab0883d9eaea143a64c.pdf, 2013

[12] E. W. Ford, N. Menachemi & M. Thad Phillips. "Predicting the Adoption of Electronic Health Records by Physicians: When Will Health Care be Paperless?" J*ournal of the American Medical Informatics Association*, 13(1), 106–112. doi:10.1197/jamia.M1913, Jan-Feb, 2016.

[13] P. Godoe & T. S. Johansen. "Understanding adoption of new technologies: Technology readiness and technology acceptance as an integrated concept". *Journal of European Psychology Students*, 3(1), 38–52. doi:http://doi.org/10.5334/jeps.aq, 2012.

[14] N. Sanakulov & H. Karjaluoto, "Consumer adoption of mobile technologies: a literature review", *International Journal of Mobile Communications*, 13(3), 244-275. doi:10.1504/IJMC.2015.069120, 2015.