EXPLORING THE ROLE OF SOCIAL MEDIA CREDENTIALS IN MOBILE LEARNING: THE ENGAGEMENT PERSPECTIVE

Norliza Katuk[1], Kang Hean Yong[2], and Nur Haryani Zakaria[3]

[1]*Universiti Utara Malaysia (UUM), Malaysia, k.norliza@uum.edu.my*
[2]*Tunku Abdul Rahman University College (TARUC), Malaysia, kanghy@acd.tarc.edu.my*
[3]*Universiti Utara Malaysia (UUM), Malaysia, haryani@uum.edu.my*

ABSTRACT. This paper presents a study on social media credentials as an authentication mechanism for accessing a mobile learning application. The aim of the study is to investigate whether the use of social network credentials would have effect on mobile learning activities particularly learners' engagement. An experimental study was conducted on forty students from a higher learning institution in Malaysia using a mobile learning application named LANGKAWI APPS and a learning engagement questionnaire. The mobile application was developed in two versions, one with the social network login facility and the other one with traditional authentication method. The results of the statistical tests demonstrate that social network credentials was rated higher by the learners in terms of attention in mobile learning compared to the traditional method. The results are discussed in terms of applicability of social network credential as an authentication mechanism for mobile learning.

Keywords: social network credentials, mobile learning, learning engagement, single-sign-on

INTRODUCTION

Smartphones are now becoming cheaper and more affordable as compared to five years ago. Many mobile phone users swiftly change their mobile devices into smartphones or computer tablets which are able to connect wirelessly to the Internet anytime and at anywhere. This has made access to information easy and more convenient. It is expected that the number of smartphones users will exceed 2 billion in 2016 (eMarketer.com, 2014) and 6.1 billion of smartphone subscriptions in 2020 (Ericsson, 2014). This will witness a trend in the next decade where smartphones would be part of human life.

A market research by Salesforce.com showed that 85% of the 470 respondents said that mobile devices (i.e., smartphones and computer tablets) are a central part of everyday life with 90% of them aged between 18 and 24 years. On average, the respondents spent 3.3 hours a day on their smartphone with 76% of the respondents used the device for searching information from the Internet (Salesforce.com, 2014). This report indicates the important role smartphones have these days.

Smartphones allow many applications to be installed in the device including social networks. In terms of social network; it plays a more important role to smartphone users by providing them a Single Sign-On (SSO) facility to access various other applications. Smartphone users use social network credentials (e.g., Facebook, Twitter, Google+, etc.) as

an authentication mechanism that simplifies the registration and signing-in processes. Users are no longer required to supply their identity information to the providers when they use a new application. The social network credential will provide the required information; hence, eliminate many steps during the registration while still be able to provide personalized information to the users (Chun & Katuk, 2014).

One of the major trends resulted from smartphones adoption is the integration of learning in daily life activities of adult learners. Educational application providers gradually consider mobile learning as an emerging technology that aligns with the evolvement of smartphones. A challenge to them is to design applications that suite the characteristics of smartphones (e.g., limited capacity of memory, and processor) and to ensure that the applications will not diminish smartphones' performance in delivering the learning objects to users. A way to solve this challenge is through the utilization of social network credentials as an authentication mechanism for the applications.

Social network credentials have been used by many web-based application developers as an authentication mechanism in various web application domains. However, the use of this authentication mechanism within mobile learning is rare. Hence, we interested to understand if the authentication mechanism has effect on learner's overall learning activities. It other words, does it help users in their learning process? Specifically, we would like to find out whether social login create better learning engagement than traditional authentication method within mobile learning environment.

The rest of the paper is organized into four sections. The next section provides brief background on engagement in mobile learning environment and social network credentials. The following section explains the methodology for carrying out the study, and then, the results are presented in the next section. The last section discusses the results and concludes the study.

ENGAGEMENT IN MOBILE LEARNING ENVIRONMENT

The evolution of mobile devices has changes the traditional way of communication, and the way how people acquire knowledge (Pereira & Rodrigues, 2013). The traditional learning method involves instructors and learners in a same classroom had evolved into e-learning in early 60s. Like the traditional e-learning that offers electronic based activities for learning, advanced learning environments such as virtual classroom, web-based learning, interactive multimedia and digital game based learning (Svetlana, 2009) also do so. After the high penetration of mobile users, mobile learning appears as another new subset of e-learning. Mobile learning allows learners to learn anytime and at anywhere by utilizing the mobile technology (O'Malley, et al., 2005).

Ozdamli and Cavus (2011) proposed ubiquitous, blended, portable, private, interactive and collaborative, and instant information as seven basic characteristics of mobile learning. Some other researchers (Gilbert, 2005; Luckin & Fraser, 2011) believed that the characteristics of mobile learning are able to provide better learning engagement in mobile environment. Numerous mobile applications are available in the market to support mobile learning and most of these applications require users to register with username and password for authentication process.

Mobile learning provides a convenient learning environment for the learners to conduct learning anytime and at anywhere regardless to location and time through mobile technology (Crompton, 2013). Smart phones, laptops, computer tablets, IPods or handheld PCs could be the hardware for mobile learning. Mobile learning software may include the college intranet, e-library, forum sites, maps, reader or any application that can be adapted for learning purpose. Multiple applications are available for the learning purpose; however, registration of

those different applications could be the problem in mobile learning environment (Florencio & Herley, 2007).

Traditional registration process could be a problem in mobile learning environment because of the lengthy time taken. Crompton (2013) emphasized that mobile learning is a self-directed and spontaneous learning. The intention of mobile learning could be triggered in an unplanned situation like checking animal information while visiting a zoo or check for word's meaning when reading newspaper. However, access to mobile learning application for the first time always requires registration and authentication. Hence, access to these applications demands for more steps and times to complete the traditional registration and login process (Florencio & Herley, 2007). Users might turn away from the mobile learning applications because of the lengthy process. It will also decrease users learning engagement towards mobile learning application if they must spend more effort on the registration rather than achieving their goals (e.g., view animal's information or check the word's meaning). Brill and Park (2008) claimed that the easy effort to goal achievement is able to improve learning engagement in long term. In another words, users of mobile learning applications need fast access to their goals of learning through mobile devices.

Mobile learners normally focus on searching information by using their mobile devices, the interaction of learners and applications might be less than five minutes. Therefore a simple navigation and ease of access is important for mobile learning applications. These two factors allow learners to perform some learning activities such as evaluation check, search just-in-time information or respond to the quick answers. The current site-centric paradigm requires users to provide their personal information many times for registration purpose and accessing the application. Managing multiple applications with different passwords and usernames will affect the ease of use (Alecu, Pocatilu, Stoica, Ciurea, & Capisizu, 2011). Hence, SSO appears as a solution to this issue.

Learning engagement was defined by Stovall (Stovall, 2003) as a willingness of a learner to spend time on task and participate himself into the learning activities. Brill and Park concluded that motivation, interest, active learning, attention and effort to goal achievement are able to improve learning engagement and contributed as a positive learning outcome. On the other hand, some researchers believe that the characteristics of mobile learning are able to promote the engagement because of the mobile learning applications on smartphones are more appealing to students (Gilbert, 2005; Luckin & Fraser, 2011). The multimedia elements in mobile learning applications also provide the learners to interact in real time and develop the engagement (Azuma, 1997).

METHODOLOGY

Method

A controlled laboratory experiment was conducted to evaluate the effect of social network credentials on learners' engagement within a mobile learning environment. A within-subject design of experiment was used in the study with learning engagement and login mechanisms (i.e., social network and the traditional) as dependent and independent variables respectively. The hypothesis for this research is *"there is a difference in terms of students' learning engagement with social login and traditional login within the mobile learning environment"*

Materials

A mobile learning application named LANGKAWI APP was developed as the learning tool. The main function of LANGKAWI APP is to allow the users to browse the story about Langkawi island's tourist spots and learn about the history. Figure 1 shows the interface of LANGKAWI APP.

Figure 1. LANGKAWI APP user interface

LANGKAWI APP was developed in two versions. The first version provides authentication through the traditional approach (i.e., users must create user name and password and reconfirm the password) and social network (i.e., login through Facebook credential). Figure 2 shows the Login interface for both versions of LANGKAWI APP.

Figure 2. Traditional (left) and social network (right) login interface in LANGKAWI APP

Traditional login UI uses a set of username and password for the purpose of authentication while the social login UI employed OAuth 2.0 provided by Facebook ADK for authentication. Both versions have same contents and layout. For the traditional login version, the user account stores authentication data in the mobile device using Android SQLite. For social login version, participants use social network account (i.e., Facebook) to access it. Table 1 shows the differences of the authentication mechanisms.

Table 1. Differences of Social Login and Traditional Login

	Social Login	Traditional Login
Registration process	No. Social network account for testing purpose has been created and active in mobile device.	Manually. Users were required to create a user account by entering user profile information.
New user name and password required	No. Users used the existing social network account username and password.	Yes. Users need to remember the new username and password created.
Login feature	Yes. Users need to click the login button provided on interface and auto login without providing username and password.	Yes. Users were required to supply user name and password each time login to the system after logout.

A learning engagement questionnaire was adapted from Park, Parsons and Ryu (2010) and (Katuk, 2013). It used a seven-point Likert scale with 1 represented strongly disagree and 7 for strongly agree. The questionnaire comprised twelve items in four dimensions of learning engagement namely control, attention, curiosity and interests.

Participants

A total of 40 students from Tunku Abdul Rahman College University (TARUC) participated in the study on a voluntary basis. They were 22 (55%) males and 18 (45%) females with the average age of the participants was 20 ranging between 19-24 years old. All participants were divided randomly into two groups equally that are Group 1 (9 males and 11 females) performed traditional login before social login. Group 2 (13 males and 7 females) performed social login before traditional login.

Procedure

One of the researchers conducted the whole experiment to maintain the consistency of the data. The experiment was held in a classroom with wireless connection to the Internet. The Internet connection was tested prior to the experiment and its' speed was smooth and constant. The same mobile device was used for all the participants. The environment was set up to avoid the unnecessary disturbance that might impact the test result. Each participant was invited into the room and given an information sheet before the experiment was started. The participants were informed about the way of conducting the experiment and the purpose of the study. A consent form was given to each participant to sign and agree to participate in this experiment. Each participant was requested to fill up the background information. After that, each participant was requested to perform the login task on two different login mechanisms (i.e., traditional login and social login). The participants were separated into two groups randomly (Group 1 and Group 2). Two different login mechanisms were presented to these two groups of participants in different orders. During the experiment, participants' activities were observed by the researcher. The time taken to complete the given tasks was recorded for both login scenarios. After each login scenario was completed by the participants, they were requested to answer the learning engagement questionnaire.

RESULTS

Due to the small sample size, non-parametric statistics was used to analyze the data. The Cronbach's alpha coefficients for the twelve items of the traditional and social network logins were 0.767 and 0.705 respectively which are considered as acceptable. A Mann-Whitney U test was performed on the data of both groups to ensure that the order of the tasks during the experiment does not confound the results. The test results suggested non-significant values, meaning that the order of the tasks on the respondents does not influence the results.

Four dimensions of learning engagement (i.e., control, attention, curiosity and interest) were evaluated during the experimental session. The results of Wilcoxon Signed Rank tests showed no statistical significant differences in three of the dimensions (i.e., control, curiosity and interest) between two different login mechanisms with range from $z=-1.509$ to $z=-2.225$, $p > 0.05$. However, attention had a statistical significant difference for the two different login mechanisms with $z=-2.255$, $p<0.05$, with large effect size ($r = 0.25$). The result also showed that all positive ranks were higher than the negative rank.

In overall, the results show statistical significant differences on the learning engagement for the two different login mechanisms with $z=-2-408$, $p<0.05$, with large effect size, $r = 0.27$. The median score for the traditional login (Md = 4.96) was slightly lower than the social login (Md = 5.00). Thus, it is suggested that social login created higher learning engagement compared to the traditional login mechanism within the mobile learning environment. Table 2 shows the results of Wilcoxon Signed Rank tests according to the individual dimensions of engagement.

Table 2. Wilcoxon Signed Rank Test result for learning engagement

	Traditional Login (n=40) Median (Md)	Social Login (n=40) Median (Md)	Social Login – Traditional Login					Statistics Significant
			Negative Rank		Positive Rank		Tie	
			N	Mean Rank	N	Mean Rank		
Control	4.67	5.00	8	18.50	21	13.67	11	z=-1.509, p>0.05. No Sig.
Attention	4.33	4.84	8	9.88	17	14.47	15	z=-2.255, p<0.05. Sig.
Curiosity	5.00	5.17	9	14.33	17	13.06	14	z=-1.188, p>0.05. No Sig.
Interest	5.00	5.00	11	14.27	15	12.93	14	z=-0.476, p>0.05. No Sig.
Overall Engage-ment	4.96	5.00	8	16.94	24	16.35	8	z=-2.408, p<0.05. Sig.

DISCUSSIONS AND CONCLUSIONS

The results of the statistical tests explained in the previous sections demonstrate that the learners who used social network credentials had reported higher level of engagement in mobile learning environment compared to the traditional login method. Engagement, specifically from the dimension of attention was improved when learners used social network credentials. In other words, the social network credentials helped the learners to keep their attention on the content of the mobile learning applications at the very early stage of their learning process. The simplified registration and signing-in procedures offered by the social network credentials allowed the learners to get faster access to the learning content. Consequently, they quickly achieved the goal of accessing the mobile learning application. Based on the results, the hypothesis mentioned earlier was accepted.

The findings of this research could help mobile learning providers in creating authentication mechanism for their applications. Social network credentials can benefit mobile learners in terms of their engagement to the learning contents. The result of this study should be used with consideration of its' learning domain and its' sample size. Other domains of learning such as mathematics and science could potentially lead to different outcomes. Hence, we aim to extend the study in these domains for our future works.

REFERENCES

Alecu, F., Pocatilu, P., Stoica, G., Ciurea, C., & Capisizu, S. (2011). OpenID, a Single Sign-On Solution for E-learning Applications. *Journal of Mobile, Embedded and Distributed Systems, 3*(3), 136-141.

Azuma, R. T. (1997). A survey of augmented reality. *Presence, 6*(4), 355-385.

Brill, J. M., & Park, Y. (2008). Facilitating Engaged Learning in the Interaction Age Taking a Pedagogically-Disciplined Approach to Innovation with Emergent Technologies. *International Journal of Teaching and Learning in Higher Education, 20*(1), 70-78.

Chun, K. L., & Katuk, N. (2014). A Usability Study of Social Media Credentials As A Single-Sign-On Mechanism: Student Access to Online Teaching Materials. *Journal of Industrial and Intelligent Information, 2*(3), 217-221.

Crompton, H. (2013). A Historical Overview of Mobile Learning: Toward Learner-Centered Education. In Z. L. Berge, & L. Y. Muilenburg, *Handbook of mobile learning* (pp. 3–14). Florence, KY: Routledge.

eMarketer.com. (2014). *Smartphone users worldwide will total 1.75 billion in 2014*. Retrieved December 1, 2014, from eMarketer.com: http://www.emarketer.com/Article/Smartphone-Users-Worldwide-Will-Total-175-Billion-2014/1010536

Ericsson. (2014). *Ericsson Mobility Report: On the Pulse of the Networked Society.*

Florencio, D., & Herley, C. (2007). A large-scale study of web password habits. *Proceedings of the 16th international conference on World Wide Web.* 657-666: ACM.

Gilbert, J. K. (2005). *Visualization in science education (Vol. 1).* New York: Springer Science & Business Media.

Katuk, N. (2013). Progressive Assessment of Student Engagement with Web-based Guided Learning. *Interactive technology and Smart Education, 10*(2), 116 – 129.

Luckin, R., & Fraser, D. S. (2011). Limitless or pointless? An evaluation of augmented reality technology in the school and home. *International Journal of Technology Enhanced Learning, 3*(5), 510-524.

O'Malley, C., Vavoula, G., Glew, J., Taylor, J., Sharples, M., Lefrere, P., . . . Waycott, J. (2005). *Guidelines for learning/teaching/tutoring in a mobile environment*. Retrieved December 1, 2014, from Mobilearn: http://www.academia.edu/5997242/WP_4_-_GUIDELINES_FOR_LEARNING_TEACHING_TUTORING_IN_A_MOBILE_ENVIRONMENT

Ozdamli, F., & Cavus, N. (2011). Basic elements and characteristics of mobile learning. *Procedia-Social and Behavioral Sciences, 28*, 937-942.

Park, J., Parsons, D., & Ryu, H. (2010). To flow and not to freeze: Applying flow experience to mobile learning. *IEEE Transactions on Learning Technologies, 3*(1), 56-67.

Pereira, O., & Rodrigues, J. (2013). Survey and analysis of current mobile learning applications and technologies. *ACM Computing Surveys (CSUR), 46*(2), 27.

Quinn, C. (2000). *mLearning: mobile, wireless, in-your-pocket learning*. Retrieved December 1, 2014, from LineZine: www.linezine.com/2.1/features/cqmmwiyp.htm

salesforce.com. (2014). *2014 Mobile Behavior Report: Combining mobile device tracking and consumer survey data.* ExactTarget.

Stovall, I. (2003). *Engagement and Online Learning*. Retrieved December 1, 2014, from UIS Community of Practice for E-Learning: http://otel.uis.edu/copel/EngagementandOnlineLearning.ppt

Svetlana, K. (2009). Adaptation e-learning contents in mobile environment. *Proceedings of the 2nd International Conference on Interaction Sciences: Information Technology, Culture and Human,* 474-479.