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User Readiness Evaluation of QR Codes in Mobile Learning (m-Learning)

Hafiza Abas [1],Faridah Hanim Yahya[2], Mahamsiatus Kamaruddin[4]

[1] Advanced Informatics School, Universiti Teknologi Malaysia, Kuala Lumpur
[2]Institute of Teacher Education, International Language Campus, Kuala Lumpur, Malaysia
[3]Institute of Teacher Education, Technical Educational Campus, Negeri Sembilan, Malaysia

hafiza.kl@utm.my, fhyzul@yahoo.com, siatus09@gmail.com

Abstract: Mobile devices have transformed from the only communication tools to a mobile learning (m-learning) tool. One of the m-learning environment is the incorporated Quick Response (QR) code. QR codes are only two dimensional barcodes used to encode and decode the information. The information embedded under these codes can be URL links, SMS, text and number. The main objective of this paper is to analyze the readiness of QR code usage via m-learning. A survey questionnaire is designed with a five point Likert scale.Fifty four in-service teachers from the Institute of Teacher Education in Malaysia were involved in the data collection process. Then, the data were collected using questionnaires and analyze with SPSS19. The result shows that 89.9% of the teachers are eager to get involved with m-learning. Besides that, 88.9% of them are aware that QR code can be used in their teaching and learning process.We suggest that QR codes should be embedded in our education system as a medium of mobile learning.

Keywords: mobile learning, QR Code, readiness, in-service teachers

INTRODUCTION

Mobile learningis a learning environment that occurs in the multiple location, with unlimited time frame and consisting of countless learning materialsfrom various sources via mobile gadget such as tablets or smart phones. Mobile learning gives engagement, sharing experience (Shuib et al., 2015) and performed as a platform to connect, communicate and collaborate with classmates and teachers (Gikasa & Grantb, 2013). Thus, it is one of the effective tools in learning (Supyan et al., 2012).

Previous research on mobile learning is focused on strategies, theories, design, effectiveness (Chen-Hsiun, 2013), technology integration with teaching and learning (Jamil & Shah, 2011), attitude towards using m-learning in Malaysia (Chong 2011) anduser readiness in Malaysia higher education (Ismail 2013). Since the utilization of mobile phones has multiplied exponentially (Cassanelli et al., 2013) with whenever and wherever concepts (Dani & Vanishree, 2013) and also with popularity (Schultz 2013) but, the readiness in applying QR codes usage are still doubtful in its implementation.Early research also focuses on engagement and motivation (Rogers et al., 2010) and higher achievement in mobile learning (Wyatt et al., 2010). Furthermore, most

of the research on QR code is focused on the library and museum (Schultz 2013; Vassilakaki, 2014; Law & So, 2010; Walsh, 2011). However, not many studies focus on the combination of quick response (QR) code with mobile learning and education (Law & So, 2010).Thus, this study tries to analyze the readiness in applying QR codes in mobile learning. Besides that suggests how mobile learning can be integrated with QR code, and can be utilized as educational tools.

MOBILE LEARNING AND QR CODES

Mobile learning is a personalized, situated, authentic, blended between formal and informal learning, and also encourage creativity and innovation (Kankaanranta et al., 2013) among student. It promotes collaboration (Rikala, 2012; De Pietro & Frontera, 2012)just with tips of fingers (Ismail et al., 2013). In order to make mobile learning easierto access, the QR codes areembedded as a point to allow a single touch to access all the decoded contents at the high speed. Even though the QR codes is still in its infancy (Kankaanranta et al., 2013; Supyan et al., 2012), it has the ability to allow the implementation of innovative and collaborative learning (De Pietro & Frontera, 2012); motivate and engage student and support independent learning very well (Kankaanranta et al. 2013).

A number of research studies recently conductedhave dealt with teaching and learning environment. For example, QR codes can be used as part of a listening exercise, self-assessment process (Law and So 2010); YouTube videos and QR codes for independent learning (Kankaanranta et al., 2013); video repository using QR Code *(www.camtasia2u.com)* (Faridah Hanim et al. 2014); the synergy of paper-based and online screencast video for ubiquitous Islamic studies learners using QR codes (Faridah Hanim et al., 2014); smart phone and QR code for adaptive learning activities (Lan 2013); online mapping services using a content management platform for supporting the history curriculum in high schools (Cheng & Choi, 2010) and introduced several related learning systems (Law & So, 2010).

QR codes area matrix code, black and white and in a square form as shown in figure 1. It is readable by camera phone using installed free apps from the apple store or google play. The matrix code will be translated by a camera to activate the contents or resources.

FIGURE 1. An example of QR code

The2D barcode technology is most suitable for scanning and encoding large amounts of data, such as URLs, text, or numeric characters and others (Ozcelik, 2011). Hence, the main focus should be more on the learners and pedagogy than on QR technology, as mobile technologies do not guarantee enhanced learning by themselves(Kankaanranta et al., 2013). A QR code is just a technology enabler, not the content creator or content

experts in teaching and learning. Teachers are the most important person in implementing QR code as a technology enabler in mobile learning. However, previous studies show that teachers also are a bit skeptical about the usage of QR codes in teaching and learning (Kankaanranta et al., 2013).They would not automatically integrate technology into teaching and learning, although barriers such as access, time, and technical support were removed (Ertmer, 1999). Because there are several barriers to face such as lack of confidence, lack of competence, and lack of access to resources (Bingimlas, 2009). There are also interlocking factors such as institution, resources and teacher (Mumtaz, 2000). Thus, teachers and institutions have an important role before the technology can be embedded in the education system (Ismail et al., 2013; Gaffney, 2010).

Factors influencing readiness for m-learning

One of the issues relates to technology acceptance is the awareness, motivation (Ismail et al., 2013) and readiness. Ready to use technology is defined as "people's propensity to embrace and use new technologies for accomplishing goals in home life and at work" (Parasuraman, 2000). According to Chapnick (2000) there are 8 categories of factors to access readiness which are psychological, sociological, environment, human resources, financial readiness, technological skills, equipment and content readiness. Parasuraman (2000) also proposed "Technology Readiness Index" (TRI) to identify the lead users in the context of new technology-based services. But Yun & Murad (2006) claimed only two factors that give influence to the readiness which are, psychological readiness and technical skill readiness. Then, Cheung et al. (2011) named three key factors to a successful mobile learning adoption, which are technological feasibility, students' needs and pedagogical benefits. There are also demographic factors influence users' readiness for mobile learning: educational level (Nwagwu, 2001); age(MacCallum & Jeffrey, 2009) and gender (Trifonova et al., 2006). When relates with educational level, university students are more interested in mobile learning (Amin et al., 2009) satisfied to use it, (Ismail et al., 2010), and prefer educational game apps (Hashim et al., 2007). Other factors influence m-learning usage are perceived ease of use, perceived usefulness, quality, services, and cultural factors (Chong 2011).

METHODOLOGY

Research Design

A research method for this study is a quantitative survey technique. Fifty fourin service teachers from Institute of Teacher Education, Technical Educational Campus, Negeri Sembilan, Malaysiawere involved in the data collection process using a questionnaire. The questionnaire consists of four sections based on table 1.

TABLE (1). Questionnaire details.

Part	*Measurement*	*Item*	*References*
A	*Respondent demographic*	*1to 3*	*Built by researchers*
B	*Handphone Information*	*1to 11*	*Ramsden&Jordan (2009); Supyan Hussinetal. (2012)*
C	*QR Code Readiness*	*1to 5*	*Ramsden&Jordan (2009)*
D	*Mobile Learning Readiness*	*1to21*	*SupyanHussinetal.(2012)*

Data Analysis

Data were analyzed using the Statistical Package for Social Science (SPSS) 19.0 for descriptive analysis (number - [n], percentage -%) to identify the level of readiness of trainee teachers to use QR codes in mobile learning. Explanation category scores to determine the readiness of trainees is based scoreconstructs by Supyan Hussin et al. (2012).

RESULTS

Background of Respondents

Eventually 54 respondents completely filled the questionnaire. Table 2 displays the sample demographics. The demographics demonstrate that male in services teachers is only 35.2% or 19 compared to female. 49 or 90.7% of the respondents are Malays and all of them are above 26 years old.

TABLE (2). Respondent background.

Item	*Category*	*Total[n]*	*Percentage[%]*
1.Gender	*Male*	*19*	*35.2*
	Female	*35*	*64.8*
2.Age	*26 years and above*	*54*	*100*
3.Race	*Malay*	*49*	*90.7*
	Indian	*4*	*7.4*
	Others	*1*	*1.9*

Mobile phone Information

Table 3 shows the information about respondents handphones. All of them have a mobile phone with a camera function. Items 2,3,5,6,7 (iv), 7 (v), 8, 9 and 11 show that respondents strongly agree about the function, operation and capability of their mobile phones. These items are about whether their mobile phones having 3G function (92.6%), knowing the functioning of 3G mobile phones (80.0%), has the MMS function (98.1%), has the access to the internet (94.4%), has the memory card for storing digital material(100%), the ability to open video file (94.4%), the ability to read images file (94.4%) and the ability to play audio files (96.3%), has a function to send / receive e-mail (94.4%), had the possibility to download information from the Internet (96.3%) and can access to the social sites like Facebook (98.1%).The overall findings showed that most of the respondents had used a mobile phone handset that has the latest functions and be able to run multiple applications. This finding explains most of the mobile phone owned by the user is ready to be used for access to the QR code information for learning.

TABLE (3). Total and percentage– Handphone information

Item	*Category*	*Yes*		*No*	
		[n]	*[%]*	*[n]*	*[%]*
1.	*Does your cell phone have a camera function?*	*54*	*100*	*0*	*0*
2.	*Does your cell phone have 3G?*	*50*	*92.6*	*4*	*7.4*
3.	*Does your cell phone have MMS?*	*53*	*98.1*	*1*	*1.9*
4.	*Does your cell phone have a video call?*	*47*	*87*	*7*	*13*
5.	*Do you have a cell phone to access the internet?*	*51*	*94.4*	*3*	*5.6*
6.	*Do you have a cell phone memory card for storing digital material?*	*54*	*100*	*0*	*0*
7.	*Does your cell phone can be used to read the following files:*				
i.	*Word*	*42*	*77.8*	*12*	*22.2*
ii.	*PDF*	*44*	*81.5*	*10*	*18.5*
iii.	*Ms Power Point*	*38*	*70.4*	*16*	*29.6*
iv.	*Video files*	*51*	*94.4*	*3*	*5.6*
v.	*Audio files*	*51*	*94.4*	*3*	*5.6*
vi.	*Image files*	*52*	*96.3*	*2*	*3.7*
8.	*Does your cell phone can be used to send / receive email?*	*51*	*94.4*	*3*	*5.6*
9.	*Does your cell phone can be used to download information from the internet?*	*52*	*96.3*	*2*	*3.7*
10.	*Does your cell phone can be used as hotspots for accessto the Internet for other computer devices?*	*47*	*87*	*7*	*13.0*
11.	*Does your cell phone can be used for access tosocial sites like Facebook?*	*53*	*98.1*	*1*	*1.9*

Note :[n] =number,[%] =percent

The Readiness of QR Codes

Table 4 shows the readiness of respondents to access the QR code. There are 2 items (1, 2) indicate the knowledge about the QR codes. Only 79.6% know about the QR codes and 75.9% aware that it can be installed in the mobile phones. Only 57.4% of the respondents already installed the QR codes apps on their mobile phones. From the 57.4% of the respondents who installed QR codes apps only 44.4% of them are already trying to use the QR code. The overall findings of the analysis showed, although respondents know about QR codes and QR code reader application can be installed on a cell phone, most respondents do not have a QR code reader application and no experience in using the QR code. However, most respondents were interested and willing to use the QR code in their teaching and learning purposes.

TABLE (4). Readiness to access QR code

Item	*Categories*	*Yes*		*No*	
		[n]	*[%]*	*[n]*	*[%]*
1.	*Do you know about QR Code?*	*43*	*79.6*	*11*	*20.4*
2.	*Do you know the 'QR Code reader' can be installed on your mobile phone?*	*41*	*75.9*	*13*	*24.1*
3.	*Does your mobile phone have been installed with the 'QR Code reader'?*	*31*	*57.4*	*23*	*42.6*
4.	*Have you scanned the QR Code with your mobile phone?*	*24*	*44.4*	*30*	*55.6*
5.	*Are you willing to scan the QR Code on your mobile phoneto facilitate access to information for your learning and use that information in 'mobile'?*	*48*	*88.9*	*6*	*11.1*

Note :[n] =number,[%] =percent

The Readiness for Mobile Learning

Table 5 shows the readiness of respondents to mobile learning. There are eleven items (2, 3,4,5, 7, 8,12, 14, 15, 18 and 19) shows the strongly agree level of readiness about the mobile learning. They want to engage and know more about mobile learning (96.3%), prefer mobile learning compared to conventional methods (90.7%),felt that mobile learning is better for adults who work and continue their studies (94.4%) strongly agree that mobile learning will make their life easier (94.4%) and ready for mobile learning if the campus provides the facilities (92.6%), mobile learning save their learning time(94.4%),mobile learning is an alternative learning to web base learning (98.1%) and conventional learning (92.6%)and willing to upgrade their mobile phone if mobile learning is conducted in for subjects (94.4%). In terms of knowledge, the respondents already know how to use the 3G function on mobile phones (92.6%). While there are four items (6, 11, 17 and 21) indicate the level of readiness of respondents to the agree level.The respondents are also eager to get involved with mobile learning(89.9%) and willing to pay extra money(77.8%). But they are really ready for mobile learning after 2 years (64.8%) even though some of the lecturers have integrated mobile learning into their teaching (79.6%).The overall findings of the analysis show that the respondent's willingness is at strongly agreed level and have a positive interest to use mobile learning.

TABLE (5). The Readiness for mobile learning

Item	***Category***	*Yes*		***No***	
		[n]	*[%]*	*[n]*	*[%]*
1.	*I know the meaning of mobile learning.*	*38*	*70.4*	*11*	*29.6*
2.	*I would like to know more about mobile learning.*	*52*	*96.3*	*2*	*3.7*
3.	*I want to engage with mobile learning*	*52*	*96.3*	*2*	*3.7*
4.	*I prefer mobile learning compared to conventional methods.*	*49*	*90.7*	*5*	*9.3*
5.	*I felt mobile learning is better for adults who work and continue their studies to a higher level.*	*51*	*94.4*	*3*	*5.6*
6.	*I am willing to pay extra money for mobile learning.*	*42*	*77.8*	*12*	*22.2*
7.	*Mobile learning will make my life easier*	*51*	*94.4*	*3*	*5.6*
8.	*I'm ready for mobile learning if my campus provides the facilities.*	*50*	*92.6*	*4*	*7.4*
9.	*I want my lecturers integrate mobile learning in addition to holding face to face learning in the classroom.*	*47*	*87.0*	*7*	*13.0*
10.	*I am willing to spend more money on my phone bill because mobile learning.*	*32*	*59.3*	*22*	*40.7*
11.	*I'll be ready for mobile learning after 2 years.*	*35*	*64.8*	*19*	*35.2*
12.	*I know how to use the 3G on my phone.*	*50*	*92.6*	*4*	*7.4*
13.	*I want my lecturers integrate mobile learning in the classroom in addition to providing a forum online for courses that I follow.*	*48*	*88.9*	*6*	*11.1*
14.	*Mobile learning will save my learning time.*	*51*	*94.4*	*3*	*5.6*
15.	*Mobile learning is an alternative to web-based learning.*	*53*	*98.1*	*1*	*1.9*
16.	*I need to learn how to use my phone for mobile learning.*	*51*	*94.4*	*3*	*5.6*
17.	*I can not wait to get involved with mobile learning.*	*48*	*89.9*	*6*	*11.1*
18.	*I will upgrade my phone if mobile learning conducted in my subjects.*	*51*	*94.4*	*3*	*5.6*

19.	*Mobile learning is an alternative learning to conventional learning.*	*50*	*92.6*	*4*	*7.4*
20.	*I think I'm ready for the mobile learning if it implemented on my campus*	*47*	*87.0*	*7*	*13.0*
21.	*Some of my lecturers have integrated mobile learning into their teaching.*	*43*	*79.6*	*11*	*20.4*

CONCLUSION

M-learning needs the element of quick and easy for accessing the mobile content such as QR code. QR codes can be embedded in mobile learning to give extra benefits such as direct and instant access which will save time. It's also easy to generate, free, can be printed on anything and save us from visiting a wrong website or type a long web address that could easily make errors. Since QR code brings lots of benefits for mobile learning, but the readiness and implementation of m-learning in Malaysia is still in a doubtful stage. Hence, this paper explores readiness of QR code usage via m-learning. From the survey, it shows that trainee teachers are ready to use the QR codes in their m-learning. In future, the strategy on how to implement and use the QR code in the classroom and m-learning environments will be explored.

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