

The Synergy of QR Code and Online Screencast Video for Ubiquitous Basic Statistics Learners

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Abstract. This study aims to test the usage of quick response code and screencast video tutorial as a mode of teaching that supports ubiquitous learning. However, a proper medium of instruction and guideline that support this mode of learning are needed. Two dimensional barcode technology is capable to access to online screencast videos inside and outside class. The online screencast videos are produced by capturing the movements of the pointer on the screen. Therefore, these videos are used to scaffold students in learning basic statistics concepts. When scanning the code with a mobile device, the URL of the website is automatically opened in the browser and users are directed to watch only related video for the particular courses. A sample for this study is a group of 19 trainee teachers from the Institute of Teacher Education, International Language Campus in Kuala Lumpur, Malaysia. This paper includes a report of a usability test which used a five point Likert scale. A questionnaire for this usability test consists of four constructs: learnability, efficiency, attitude and flexibility. The results demonstrate that 91.8% of the trainee teachers agree that the combination of the qr code and screencast video are an efficient tool for enhancing student learning basic concepts of statistics. Hence, educators should implement this learning tool to enhance their teaching and learning process.

Keywords: qr code, u-learning, screencast video, basic statistics, usability test.

INTRODUCTION

The National Higher Education Strategic Plan (NHESP) which was launched by the Ministry of Higher Education (MOHE), Malaysia, had clearly stated its main goal to improve the capacity of knowledge and innovation and nurture first class mentality. Mobile Learning (m-learning) has been identified as one of the Critical Agenda Projects or CAPs and Key Result Area (KRA) of MOHE (MOHE, 2011). The term of m-

learning emerges due to the capabilities of handheld devices to support students' engagement with outdoor activities (Chin & Chen, 2013; Soykan & Uzunboylu, 2015).

Ubiquitous learning (u-learning) is a teaching method that in-line with mobile technologies. This delivering instruction can be adopted inside and outside the classroom setting using embedded devices (Hwang et al., 2014). A matrix barcode which is called quick response (qr) code, is capable to encode and decode data at a rapid rate by using mobile devices. The application of the qr code is essential to implement m-learning in outdoor education (Lai et al., 2013). A screencast video is a video tutorial which captures the actions taking place on the computer screen (Shafer, 2010). Students will be engaged with this video because they can visualize all the steps that had been highlighted in a process. In this study, the qr code is printed with notes that are given to students as handouts. Besides that, the online screencast videos are integrated with qr code using a teaching strategy's model which is called flipped classroom. It consists of two parts: delivering instruction online outside of the classroom and doing homework in the classroom (Roth, 2014).

Studies had proven that the combination of online digital materials and printed materials through two dimensional barcodes, had assisted students in learning history and practicing history inquiry skills (Lloyd & Robertson, 2012); improved students' language skills in listening and reading comprehension (Dappolone, 2013) and enhancing students' knowledge of vocabulary (Arikan & Ozen, 2015), but in learning basic statistics concepts and skills are still doubtful in its implementation. Hence, this study in an attempt to prove that this mode of teaching can be an effective learning tool.

This paper aims to evaluate the usage of the integration of paper-based and online screencast video through the qr code for ubiquitous basic statistics learners. The rest of the paper is organized as follows: Section 2 describes the literature review. Section 3 introduces the methodology of the study. Section 4 represents the results and analysis. Finally, some concluding remarks and future works are discussed in Section 5.

LITERATURE REVIEW

The qr code was created by Denso Wave, Inc, in 1994 as a method for managing the inventory of Toyota vehicle parts in Japan (Okazaki, Li & Hiruse, 2012). Denso chose not to exercise the trademark of the technology, which led to qr code technology being used throughout the world. Data can be stored in qr code both horizontally and vertically. It can contain an URL, telephone numbers and text. It can be scanned with a camera and a software (qr code reader) found on most mobile phone. Leahy (2013) states the reasons for using the qr codes are it is easy to be accessed through mobile devices, safety of students as it will take students directly to the web page, simplicity (no long web addresses), speed (no waiting for slow typing), ease of creation (easy to create qr code) and free to use. Hence, the term 'smart object' is used for qr code due to its capability to prompt a device to take action appropriate to that object (Walsh, 2011). In addition, qr code is also referred to 'high-tech' example of the way user used to access information (DeSilets, 2012). Studies had shown that qr code supported u-learning (Martin & Ertzberger, 2013; Hwang, Chu & Cheng, 2014).

The use of online screencast video has become a pertinent teaching strategy (Billings, Kowalski, & Smith., 2013). This video is also known as a ‘know how’ video due to its capability to record all the steps involved in a process. In this study, the screencast technique is produced by a special software such as Camtasia Studio. The screen recorder is a tool to record the screen. During editing, special visual effects (such as callouts, zoom-n-pan and title clips), recorded audio can be embedded into the video. Hence, this video tutorial is very effective and engaging (Martin & Martin, 2015).

Screencast video is also known as ‘lecture capture’, which is in-line with flip classroom model (Billings, Kowalski, & Smith, 2013). In a flipped classroom setting, students review lectures online prior to the class session and in class they spend time working on problems or exercises (Sams & Bergmann, 2013). Screencast videos can scaffold learners to comprehend lecture materials in various fields such as chemical engineering (Falconer, 2012), medicine (Razik et al., 2011), Mathematics (Guerrero, Baumgartel & Zobott, 2013) and Statistics (Dunn, McDonald & Loch, 2015).

METHODS

The study was conducted in a basic statistics course, in the Department of Cognitive Science Institute of Teacher Education, International Languages Campus (ITEILC). This course is mandatory and contains theory and practice. In the theoretic module, students have to learn basic concepts of statistics and in the practical module, students have to learn how to use Microsoft Excel and SPSS to find values of statistics.

Screencast videos which are produced by Camtasia Studio software, are uploaded to www.camtasia2u.com. Their codes (as shown in Figure 1) for the online screencast videos are automatically created by the website and can be easily downloaded by users.



FIGURE 1. QR code for screencast online video

Before coming to class, the students should watch five videos: Mean and Standard Deviation Using Microsoft Excel, Percentage Using Microsoft Excel, Countif and Auto Sum Using Microsoft Excel, Mean, Mod, Median, Standard Deviation, Quartile Using SPSS and Pearson Correlation using SPSS. In class, lecturer posed questions to test their skills in using Excel and SPSS. In class, they are given assignments by their lecturer where they have to find the values of statistics using Microsoft Excel or SPSS. They have to present their findings at the end of the class.

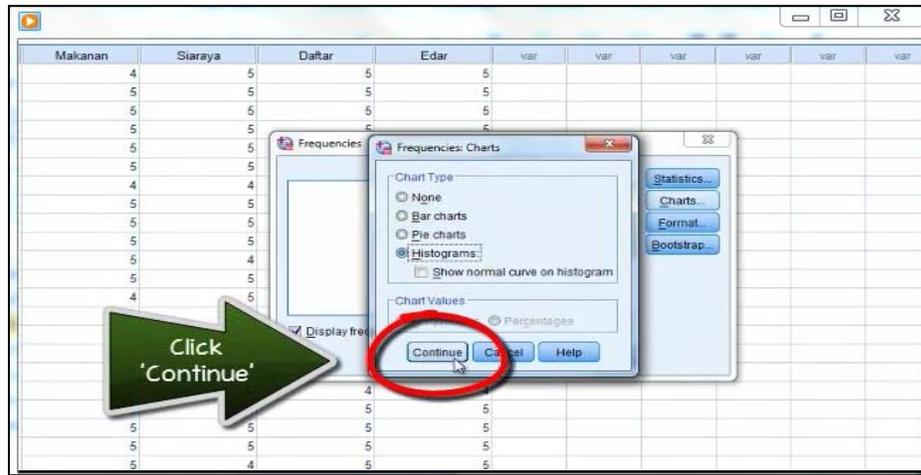


FIGURE 2. Screencast online video for finding percentage using SPSS

The questionnaire is referred to QUIS (Questionnaire for User Interface Satisfaction), developed by Chin et al. (1988). It consists of two parts: A and B. Part A is demographic while part B is a usability questionnaire which consists of four constructs: learnability, efficiency, attitude and flexibility. Learnability is the ability to learn the new knowledge or skill. (5 items). Efficiency is the ability to apply knowledge/ skill that the users have learnt (5 items). Attitude is the favorable attitude that results from using this technique of learning (5 items). Flexibility is the ability to tackle the users with different level of knowledge and skill (5 items).

A sample for this study is a group of 19 in-service teachers from ITEILC. They are majoring in TESL and compelled to take a basic statistics course during their foundation year. Table 1 displays the sample demographics.

TABLE 1. The sample demographics (n=19)

Measure	Items	Frequency	Percent
Gender	Male	7	36.8
	Female	12	63.2
Race	Malay	17	89.5
	Indian	1	5.3
	Others	1	5.3
OS for Smartphone	iOS	1	5.3
	Android	10	52.6
	Others	8	42.1

The demographics demonstrate that female trainee teachers were more than male trainee teachers. Most of the respondents were Malays. Overall, all of the respondents were using smartphones in the campus. A majority (94.7%) of the respondents used Android as an operating system (OS).

RESULTS

A five-point Likert scale was applied to all questions in the usability questionnaires: 1 denoted strongly disagreement, while 5 denoted strongly agreement. The questionnaire results were analyzed using SPSS version 20.0. Table 2 shows the mean of each construct. Overall, the mean of all constructs is above 4.0 where the highest mean of all the constructs is 4.47 that represents ‘Efficiency’.

TABLE 2.The mean of all constructs

Construct	Mean	S.D
Learnability	4.46	0.51
Efficiency	4.47	0.50
Attitude	4.41	0.54
Flexibility	4.40	0.56

Table 3 shows the items for ‘Efficiency’. The responses to item A1 indicated that most trainee teachers believed that video tutorial had met their goal after they used them (m = 4.47). Responses to item A2 (m = 4.58) indicated that the content of the video tutorial was very useful for them. The respondents also commented that they were able to know various concepts/skills after using the video tutorials (m=4. 42). The responses to item A4 indicated that most trainee teachers believed that the video tutorial could be used to complete the tasks in group work (m=0. 69). The respondents also commented that QR code facilitated access to video tutorials (m=4. 53).

TABLE3.The items for usability test

Item	Percentage	Mean	SD
Efficiency			
A1: The video tutorial meets my goal after I use it.	94.7%	4.47	0.61
A2: The content of the video tutorial is very useful for me.	94.8%	4.58	0.61
A3: I am able to know various concepts/skills after using the video tutorials	89.5%	4.37	0.68
A4: The video tutorial can be used to complete the tasks in group work.	89.4%	4.42	0.69
A5: QR code facilitates access to video tutorials.	89.5%	4.53	0.70

CONCLUSIONS

The study reveals that the integration of paper-based and online screencast video through the qrcode for basic statistics learners is an effective mode of teaching and learning to facilitates u-learning. This mode of teaching together with the flipped classroom model, should be applied in other subjects in ITEILC and other educational institutes in Malaysia. Thus, the Ministry of Education in Malaysia should review the current educational system in order to implement u-learning at all levels of education. The generalization of the present study is limited by several factors; the study used a sample of trainee teachers who are computer-literate. Secondly, the sample size of the

group is small. A larger sample size would have been more reliable. Thirdly, the findings are limited by usability test used in this study. The study would probably yield different results if the study used psychological test such as motivation. It is hoped that future researchers will contribute by using other tests. The finding of this study is important because one of the CPAs for the National Higher Education Strategic Plan (NHESP) is teaching mode using mobile devices. Hence, the integration of printed material and digital material through qr code should be addressed as a teaching instruction that supports u-learning.

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