Mobile Application for G-Suite Based on Multimedia Learning Cognitive Theory

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ABSTRACT

This research is to develop a mobile application for G-Suite (Google Suite) based on Multimedia Learning Cognitive Theory and to identify teachers' perception toward the mobile application. The effect of using the mobile application to satisfaction, ability and performance of the users are also studied. Thirty-six teachers consist of ICT coordinator from a zone in Johor Bahru were involved as sample. Quantitative approach using questionnaire was implemented with 0.78 Cronbach's Alpha value from the pilot study. The instrument used is a questionnaire to measure teachers' perception toward the usage of the mobile application. The instrument was analysed using descriptive statistic on satisfaction, ability and performance. This research had successfully identified teachers' perception toward apps in G-Suite such as Google Drive, Google Docs, Google Sheet, Google Slide and Google Form. All the applications were assigned as construct and significant improvement in knowledge and understanding were reported in the construct. The samples are reported as highly satisfy with the level of satisfaction, ability and performance regarding the evaluation of the mobile application. In conclusion, mobile application of G-Suite developed based on Multimedia Learning Cognitive Theory was found as effective in ensuring an effective mobile learning (m-learning).

Keywords
Mobile application, G-Suite, Multimedia Learning Cognitive Theory

Introduction

The usage of ICT in teaching and learning and its implementation in curriculum, is now an imperative agenda for the 21st Century Education. Today's generation consist of digital native, with a strong attraction to technology. The term digital native is referring a generation attached to computer technology, the Internet, smart phone as well as video games that exist in this century, that have its own natural technological persuasive element as they are exposed to technology since childhood (Prensky, 2001). The way they think, communicate, play and work are different from the previous generation. Thus, Prensky (2001) suggested that teaching and learning method have to be update, in line with the nature of this generation. G-Suite for education was created with the goal of facilitating teachers and students to collaborate and learning innovatively together. Mobile application is among the approach that show a significant development as it is suitable with the need of digital natives. Chang et al., (2016) stated that students who exposed to mobile application able to learn collaboratively, communicate, conduct research, creative work and using it as a way to search data and information literacy and create a competitive environment. Thus, this research is conducted to develop a mobile application for G-Suite based on Multimedia Learning Cognitive Theory.

The usage of m-learning in today's education had attracted educators' interest to use mobile application as a facilitating medium in achieving learning objective. G-Suite or Google-Suite is a suite of cloud software for education, offered by Google. Previously known as Google Apps for Education. G-Suite for education consist of Google Drive, Google Docs, Google Sheet, Google Slide and Google Form which are the application to help educator and students to communicate, collaborate, and sharing assignment in doing work effectively and easily. According to OECD (2013), redesigning learning environment via pedagogical transformation and fostering the 21st century learning that effective is an imperative element toward the future. The future education needs to support paradigm shift in education and leading the transformation in teaching and learning with effective way for student's need in the 21st century. Multimedia in learning process able to manipulate the user's sense in learning. This meaning that students is focusing and involving actively through hearing, seeing and touching senses (Vaughan, 1998).

According to Park & Hopkins (1993), animation and dynamic display enhance students' achievement. Animation illustrating a movement in content help the cognitive process and reduce the need to process the information in working memory (Reiber & Kini, 1991). This research is also showing that student does not need to read lot of text or revision in understanding the students' content dynamic (Catrombone & Saey, 2002).

Google Suite is a cloud-based system that is easy to use in learning. According to research by Chang et al., (2016), in facing the development, cloud learning is much easier with the latest digital technology and now trending in many nations as one of the innovative learning environments. Mobile learning that uses by students and educators in conducting research, collaborative learning, communication and creative works are one of the methods to retrieve knowledge, information literacy and creating knowledge competition.

Theoretical Framework

This research is using Multimedia Learning Cognitive Theory as its foundation to the theoretical framework of the development process of the G-Suite for education. The application used implements verbal and visual tutorial content according to Multimedia Learning Cognitive Theory.

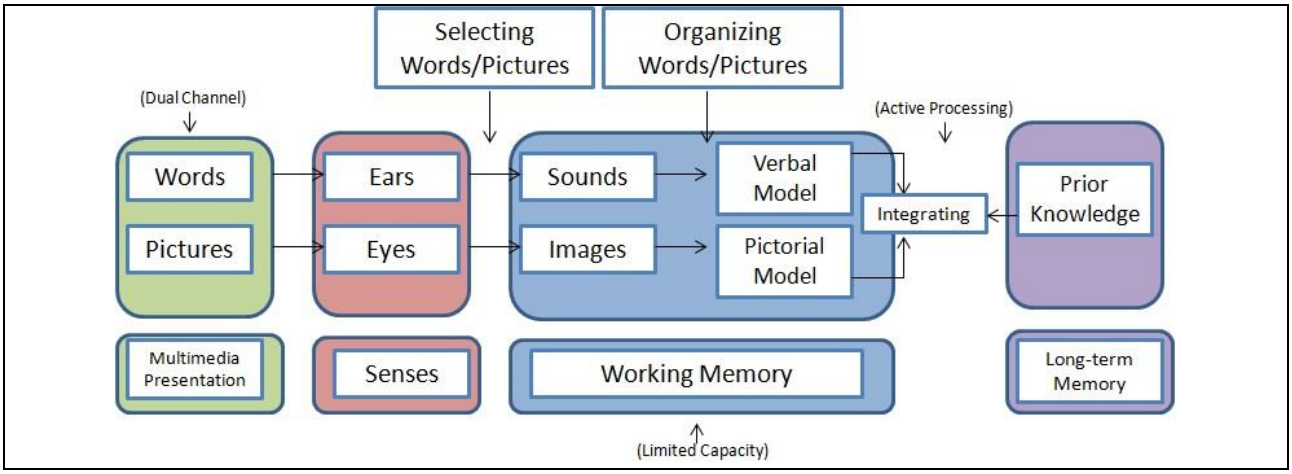

Figure 1: Research Theoretical Framework

Main Menu **G-Suite Page** **Tutorial Page**

Figure 2: Print Screen of Mobile Application that use Multimedia Learning Cognitive Theory

According to Mayer (2001), dividing information channels into two verbal and visual. Mayer's theory states that the use of multimedia will go through three cognitive processes that are important for a student to use. The first cognitive process is the selection of text or words for processing in verbal working memory and selection of images for processing in visual work memory. The second cognitive process involves organizing selected texts or words into verbal mental models and organizing selected images into mental visual models. The third cognitive process involves combining verbal and visual representations with existing knowledge. According to Cooper (1998), based on the cognitive theory, the cognitive skill is based on individual need to refer to the ability to store information and recalling information from the long-term memory. The information intended to be registered in long-term memory must be stored temporarily in sensory memory and working memory. Not all information reached the working memory will be transferred to long term memory, due limited of the ability and capacity of the working memory.

Research Objectives

The purpose of this research is:

i. To identify the effect of using the developed mobile application to
   a. Level of satisfaction when using the application
   b. Application ability
   c. Application performance

Methodology

In this research, quantitative approach was implemented using a modified questionnaire from *Questionnaire for User Interface (QUIS) version 3.0* and also used a 9 point likert scale adapted from (Chin, Diehl, & Norman, 1988). Purposive and simple random sampling was used in research. Thirty-six respondents were sampled to give their respond. To ensure the data is accurate and comprehensive, the researcher had focused to the population to teachers from schools in Johor Bahru who are teaching ICT subject. The questionnaire was administrated online, and all the respondent had previous experience with the G-Suite. The instrument used is to measure the level of satisfaction, ability and performance of the respondents as users of the developed mobile application

Research Findings

The data gathered has been processed using Statiscal Package for Social Science (SPSS) version 22. All the items were displayed in mean and median for each dimension of the question. The mean value representing the average value as a key indicator in evaluating the user' evaluation to the application while the median is representing the mid value in analysing for any extreme value. Finding of this research is as follow:

Overall Design of the Mobile Application

The mean and median for "Overall Application Perception-Reaction" as in Table 1, shows the perception-reaction of the respondents to the application as a good application and very easy to use with mean value of 8.25 and median of 9.00 if compared to the maximum scale of 9.00. The items show positive perception-reaction, which are satisfying and enjoying with the mean value of 8.19 and 8.25. The whole mean for this dimension is high at mean = 8.22.

Table 1: Overall System Perception-Reaction Analysis

Item	Mean	Median
Overall perception-reaction to the application (encouraging)	8.25	9.00
Overall perception-reaction to the application (ease of use)	8.25	9.00
Overall perception-reaction to the application (satisfying)	8.19	9.00
Overall perception-reaction to the application (entertaining)	8.19	8.50
Overall	**8.22**	**8.88**

Mobile Application Screen Analysis

In Table 2, the construct of the mobile application screen analysis was reported with mean value of high and very positive between 7.86 to 8.14. The respondents are satisfied with the overall display of the mobile application with overall mean of 8.00 and median of 8.25.

Table 2: Mobile Application Screen Analysis

Item	Mean	Median
Information arrangement in the application (very clear)	8.14	8.50
Arrangement of each screen (very clear)	8.14	8.50
The button (very helpful)	7.86	8.00
Readability of the font on the screen (easy)	7.86	8.00
Overall	**8.00**	**8.25**

Mobile Application Ability Analysis

The analysis for this dimension, show a positive respond with overall mean value of 8.02 and median of 8.17. Respondents agreed that the application have a high speed of operation with the mean at 8.25 and median at 9.00. All of the other items are having positive mean value at minimum of 7.75 and median of 8.00.

Table 3: Mobile Application Ability Analysis

Item	Mean	Median
Application speed (fast)	8.25	9.00
Application operation responsiveness (fast)	8.14	8.00
Time taken for each screen display	8.11	8.00
Comprehension using the application (clear)	7.89	8.00
Operational bug (rarely)	7.97	8.00
Reliability of the application (reliable)	7.75	8.00
Overall	**8.02**	**8.17**

Mobile Application Performance Analysis

Based on the research, the finding shows the respondents are highly agreed that the application enables the tutorial to be shared to the social media without any problem with mean as high as 8.31 and median at 9.00. The data for this construct is as in Table 4.

Table 4: Mobile Application Performance Analysis

Item	Mean	Median
Enable the sharing of tutorial to social media without problem (agree)	8.31	9.00
Enable document download without problem (agree)	8.25	9.00
Enable the display of tutorial video without problem (agree)	8.11	8.00
The application facilitate tutorial search (agree)	8.08	8.00
Overall	**8.19**	**8.50**

Discussion

For the overall respondents' reaction toward the mobile application design, the data is showing a highly positive reaction and acceptance by respondents. The application was considered as very easy to be used with mean value of 8.25 that able to attract users. According to Alqahtani and Mohammad (2015), the factor of easiness of use is very important and is considered as a construct to measure the system or application quality. It shows the relationship of the design and user-friendly application. Thus, it clearly shown that the application able to attract users.

For respondents' level of satisfaction toward the mobile application screen, in overall, this dimension is showing a positive response from all the samples with very high mean value. The layout was approved as very helpful in facilitating the task in the application such as navigation to change page. The navigation button is considered as very helpful in the application. Research did by Hoehle and Venkatesh (2015) stated that screen size control is important as an input to the user interface and must be considered in reliability of mobile application among users. This statement is in line with user's evaluation on item "level of users satisfaction toward screen application" that showing a high mean.

For the level of respondents' satisfaction toward the application, the dimension of application ability is consisting of items that measure either the application able to operate as it should be. Overall, all users give positive response and agreed that the application ability is at a high level with overall mean of 8.02. The users are agreed that the application give a good operational response and operate at high speed. The finding is supported by research by Harrison et al. (2013) that stated application effectiveness is the ability of users to complete their task with speed and precision. Precision can be measured with a number of methods, for example the time taken to solve task given, or the number of keypad hits on the gadget that is required to solve a task given. Users are also agreed that the time taken for each screen display is very fast.

For the respondents' satisfaction toward the application performance, the dimension is measuring how far the performance of each available function in the application able to function without any problems. The result shows that users are agreed with the overall performance analysis as very high with mean at 8.19. All the users are very agreed that the application enable the sharing of tutorial to social media without problem with mean of 8.31. Inukollu et al. (2014) stated that to compete in mobile device world, developing application only is not enough. Thus, the developer needs to be open minded and always innovative to maintain the performance of the application for the purpose of user's satisfaction. New technology come in every day, and the developer must be always alert to new trend, need and latest development in mobile technology.

Conclusion

In conclusion, the mobile application for G-Suite developed by the researcher based on the Multimedia Learning Cognitive Theory had fulfilled users' needs which are to transform the conventional learning method into mobile application. Hopefully, this research able to contribute to a new knowledge in Malaysian educational technology development.

As conclusion, all the items tested show that it is well accepted by the users. In short, there are a number of advantages and benefits of the developed application based on positive users' perception toward the overall performance of the application, screen, ability and performance of the application.

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