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A Review of Mobile Application Characteristics Based on Teaching and Learning Theory for Mute and Deaf Students

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Abstract

Technology in education has been changed the culture of teaching and learning strategies. Teaching and learning theory is the primary basis for reference in carrying out teaching and learning activities. Learning using mobile apps is still new and has not been recognized by the education ministry as an effective learning aid. However, there are students using this method, but the implementation of the method is not based on a specific framework as a guide to make it a learning tool. This paper aims to identify key features of learning using mobile applications. In addition, the study aims to create a new model in Malay language teaching and learning in the context of sign language using digital technology such as mobile applications. This study analyzes the five theories used in teaching and learning based on previous studies. There are five key components required for the implementation of mobile applications in teaching and learning namely pedagogical strategies, mobile devices, learning modules, communication methods and application designs. These components are among the components needed for implementation of learning methods using mobile applications. The findings of the previous study showed mobile applications can help students and teachers in teaching and learning more effective.

Keywords: Education technology, education theory, teaching and learning, mute and deaf, mobile application.

Introduction

Technology in education is not a stranger because it has grown so widely across the world. Various technologies have been developed to assist students in education as reference materials and tools such as courseware, e-learning, web based learning, mobile application, blended learning and so on. This technology has also taken numerous innovations to add value to education and evaluate digital reference materials. Mobile application such as a Mimix app, it has been developed for deaf and mute students, but it is also used by the normal classes to learn signal languages more effectively. The Mimix application is developed by creating a database with multiple words as a reference source for daily communication. In addition, finger spelling in tutor application is developed using 3 dimensional animation to learning and spell a word. This suggests that mobile applications have become today's learning culture influenced by the development of digital devices such as mobile phones. Based on daily news reports, 29 percent of students use smart phones to surf the internet. That amount shows, access to the internet becomes common to in order to access the related information. However, these developments should go through a deeper process to ensure that their woes are deaf and mute. There are various theories significant used in education for sign language learning using mobile applications. This study identifies the components involved in teaching and learning using mobile applications that contribute to student achievement in their learning. Among the theories identified are cognitive theory of multimedia, constructivist learning theory, learner centered design, social learning theory, and e-learning theory. There are many other theories in teaching and learning but this theory is in line with the needs in education applying mobile apps.

Objective

This study presents the ideal framework for mobile applications suitable for learning by lower secondary students to fit the needs of students for information online based on the theory. The purpose of this study is to

i. Identify the characteristics of mobile apps in teaching and learning of mute and deaf students.
ii. Analyze the characteristics that fit to the student needs.
iii. Propose the mobile apps framework for teaching and learning of mute and deaf students.

Literature Review

Teaching and learning using mobile apps need to have a specific framework to help students in teaching and learning. Multimedia learning is learning based on text and images (Richard E Mayer, 2014). Teaching and learning process according to Richard E Mayer (2014), students have two separate thinking forces between pictures and texts but are not explained in terms of the design of a mobile app. According to Kangas and Kinnunen (2015) and Altay (2013) stating that one of the key components of teaching and learning using mobile applications is the design of the app. This shows that the learning process takes place based on what they see to illustrate something and what they read to explain a clearer meaning to forming their own understanding.

It is clear that teaching tool should have a systematic arrangement because basic concepts of learning using mobile applications are self-learning and active learning (Moreno & Mayer, 1999). While constructivist learning theory outlines five components in multimedia teaching and learning such as communication method, pedagogical strategies, student knowledge, teacher skills and environment. This theory explains how one obtains knowledge from what is learned but does not state the importance of the module (Aldoobie, 2015; Bada & Olusegun, 2015; Jia, 2010). However, Soloway et al. (1996) explaining the module is an important component, which is a learning package that has systematic learning activities.

Other than that, Soloway et al. (1996) also explains that there are other components in the learning design theory such as context, which refers to goals and objectives. Mobile devices are also the main components used such as phones, computers, tablets and so on which are an important component of teaching and learning and they refer to tools used in learning activities. According to Altay (2013), application development needs to have a clear goal and there are several disciplines in application design based on the use of mobile devices in terms of cost, consumer demand and time.

Based on the theory of social learning by Wood and Bandura (1989) learning applies through observing the behavior, attitudes and results of others. However, Altay (2013) did not explain the behavior but expressed the attitude that contributed to success because attitude would influence what a students did. There are four components introduced by Bandura (2002) including observation, retention, response and motivation. This means learning is based on student observation through behavior, attitude of a person. Based on observation of permanent knowledge in student memory. Learning occurs through observations and students have a response to what is seen and it contributes to student motivation to embarrass something. Including observation, retention, response and motivation. This means learning is based on student observation through behavior, attitude of a person. Based on student observations, the knowledge gained remains in the student memory. Learning will occur through observation and students have a response to what is seen and it contributes to student motivation to do something.

Whereas Moreno and Mayer (1999), outlined two principles in e-learning learning namely the principle of mobility and coherent principles. Based on the principle of E-learning design it focuses on reducing student cognitive burden. In addition Richard E. Mayer (2003) also stated that there are three elements in the learning competitiveness that apply the use of digital teaching tool such as evidence from past studies, research theory and application-based principles. Hence in the context of education using mobile applications based on the principle of modality the use of audio is more effective than text. However the audio element does not fit the needs of mute deaf students and the text is the primary basis for the conveyance of a science. The existence of graphs and video ads led to increased student cognitive burden and coherent values need to be applied to emphasize students focus.

Comparison between Theories

Based on the theory discussed above it is a theory that has been developed and has been tested for its effectiveness on student achievement (Bada & Olusegun, 2015; Fernando & Marikar, 2017; Jia, 2010; Richard E Mayer, 2014; Moreno & Mayer, 1999; Swann, 2013; Wood & Bandura, 1989; Wu & Tsai, 2010). In this study, a comparison of theories is done to establish a framework that is appropriate to the needs of deaf and mute students. Based on the selection of five theories, it is based on the basic needs of teaching and learning. As cognitive theory, the findings of the study by Moreno and Mayer (1999) expressing all oral inputs should be provided on a non-graphic or graphic basis. This means that the integration of audio elements is that the principle of learning modality is more effective in using audio versus text. However in the context of mute audio deaf students does not significantly affect the effectiveness of teaching and learning.

While constructivist learning theory focuses on several component components that explain how students gets the knowledge. According (Aldoobie, 2015) expressing good learning and actual learning does not depend on what the instructor or the student is hearing, even though the student repeats this information over and over again. This means learning can take place individually and the role of the teacher is as a reference. So the pedagogical strategy is more important to ensure the process of learning and how it interacts. The study by Altay (2013) states that there are various methods of teaching a student centered completion of a learning session. But in the context of learning using mobile apps, the app design is a component that contributes to student understanding. Based on design theory it focuses on content and software (Luchini, 2002). A software should have a good module to make sure students get something from their browsers. Digital learning methods are interconnected between modules and devices and they are the components that need to be together (Soloway et al., 1996).

E-learning theory is less appropriate as the basis of mobile app learning, however it relates to teaching and learning based on digital technology. While the social learning theory states that learning using mobile applications affects students' motivation (Wood & Bandura, 1989). This study focuses on the basic components in the teaching and learning of sign language that affects the level of communication and motivation of students. The dependent variable was selected based on the study conducted by Wood and Bandura (1989) which states that technology has a significant impact on student motivation. However it does not mention the effect of using a mobile app. In this study, there are five components that are studied based on the theory of constitutional learning and design theory. Among the components identified are pedagogical strategies, communication methods, application designs, learning modules and device types.

Theoretical Analysis

The following table is a summary of constructs that have been identified based on five theories in educational technology.

Table 1. Analysis teaching and learning theory

Theory/Model	Construct
Cognitive theory of multimedia	
The foundation of cognitive learning theory is how human thinking works in multimedia learning and how the application design can influence the students to understand the clearer concept by Richard Mayer (2014) Richard Mayer (1947)	Humans have two separate systems of images and texts. Each system has a limit in the information processor. Active learning process
Constructivism learning theory	
Constructivist learning theory explains how a person acquires knowledge (Bada & Olusegun, 2015; Jia, 2010)	Communication method Strategy pedagogy Students knowledge Teachers skill Environment
Learner centered design	
Student centered learning methods focus on content in software. (Luchini, 2002; Soloway et al., 1996)	Context: The goal, purpose, and viewer of the software Interface design: Front and / or aesthetic testing of software that the student interacts Module: What students do in the software Tool: What is required in the software to support the tasks the student will perform; this may include scaffolding
Social learning theory	
People learn through observing the behavior, attitudes and results of others (Bandura, 2002)	Attentive attention -factors Retention -remembering what is being observed Reproduction -reproduce the image Motivation - has good reason to imitate
Theory E-learning	
The e-learning design principles focusing on the reduction of extreme cognitive loads and introducing germane and intrinsic loads at the user-level level (Clark, 2002; Eunmo & Richard, 2012) (Moreno & Mayer, 1999)	The principle of modality-learning is more effective using audio versus text Coherence principle - there are many irrelevant things (e.g. video and graphic advertising)

Some variables have been identified involved in this research based on the theory. Among the variables are mobile devices, communication methods, learning strategies, modules, and designs. Each of these variables is identified to have an influence in mobile application based learning.

Past studies have explored how these five components influence students in teaching and learning, though the references are more geared towards more general technology. However, it is explained in a more contextual context where learning technologies such as web sites, game based education are significant to the impact of student achievement and student motivation. However, it is unclear how these methods affect the level of student communication.

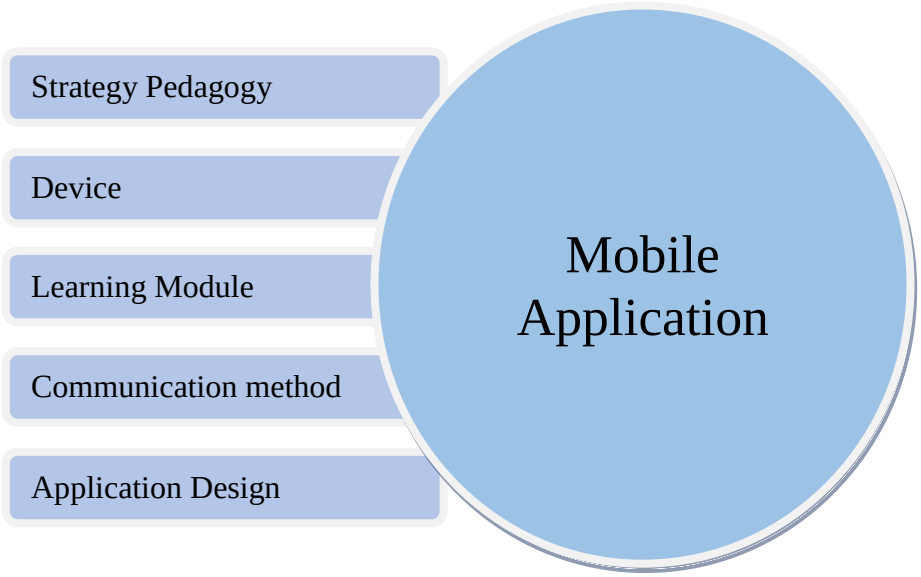

Figure 1. The characteristics of mobile application

Conclusion

As evidenced by the good impact of the use of technology in teaching and learning. However, the implementation of learning methods using mobile applications is still lacking in resources explaining how mobile apps can contribute significantly to students in the context of learning Malay language using sign language to students deaf and dumb. Therefore, this study examines the framework used in the teaching and learning of deaf and mute students using mobile applications. The results of the study will be a reference for technology integration such as mobile applications in teaching and learning. It can also support the national education policy of empowering information and communication technology (ICT) in education to produce capable, innovative and exploration of new fields to generate wealth of the nation with the involvement and cooperation of expert groups, partnerships with the private sector and community engagement students and parents.

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