Effectiveness Malaysian Sign Language Mobile Application in Teaching and Learning for Deaf and Mute Students

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Abstract: Learning using Mobile Applications is a present culture now in teaching and learning used by students as reference source and practice. However, developers are more focused on primary school students. For special education students it is still less practiced because lack of such application developed for them. This shortage creates a gap between achievement differences among special education students and normal students. Researchers in this study identify the characteristics of Mobile-Based in the Malaysian Sign Language Application, construct the prototype, and evaluate the usage of Malaysian Sign Language Application. Based on five components of constructivist learning theory, such as pedagogy strategies, device, module, design, and communication method that contribute to student achievement. Using the experimental method, 19 students were involved as respondents in this study conducted in Kuala Nerus Terengganu. The findings showed that there is a significant increase student achievement towards the use of mobile applications in Malay language teaching and learning compared to conventional learning methods.

INTRODUCTION

As technology progresses, the technology in education is rapidly changing. Mobile learning or M-learning is the current trend of education, which users via smart phones or tablets able to learn across multiple contexts. This technology makes the learning process more flexible, fun, interactive and engaging. The Malaysian Sign Language Mobile Application is intended to help students with disabilities learn the sign language in the basic Malay language more easily.

Multimedia in education is not a stranger because it has been used and has been proven to be effective in improving student achievement and thus improving the quality of education of the nation. However technological development needs to be in line with the needs of education. Technology is an important component in integration of special education ie students with hearing impairments and conversations.

Multimedia is a technology-based interactive communication process that combines five elements such as text, graphics, audio, video and animation [1- 2]. Multimedia is also interpreted as a diversity of media that an intermediary tool for communication. Multimedia is also a tool that can help teachers improve their professionalism and help students to achieve their goals in education [3].

Implementation of technology in education can help students in improving the ability of students to master a subject being studied [4]. It helps teachers in teaching and learning at the . As the Mobile App in teaching and learning, it acts as a practical teaching and learning tool and is tailored to the needs of students [5]. In addition, it also facilitates teachers and students in practicing the learned knowledge. In fact, he can also reinforce a topic learned, where technology can help to provide a comprehensive overview of a topic through text, audio, video, animation and graphics. This explained in the study of the use of multimedia technology in the teaching and learning of English language by a global perspective by Pun [6]. Teaching and learning based on technology has been proven to be effective and conventional methods that need to be integrated with

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multimedia learning methods to give students more impact.

Problem statement

The previous study discussed the challenges of teachers and students in teaching and learning of sign language in context of Malay language. Some students face significant constraints in communication between teachers and other students as they are less skillful in communicating, especially nonverbal [7].

Based on observations and interviews with the supervisor of the Integrated Special Education Program (ISEP) she states that hearing and conversation problem students have short-term memory problems where they having difficulty to remember every teacher's teaching and this is also explained by [8-10].

In addition, special education students also having problems in writing [11]. In daily communication they can pronounce a sentence correctly but to translate sentences in their writing form has difficulty, as an example "I like to eat rice" in their sign language signals correctly but to translate in writing, they can't afford to write and make the words are like "rice loves to eat me ".

OBJECTIVE

1. To identify the characteristics of Mobile-Based in the Malaysian Sign Language Application.
2. To construct the prototype of the Malaysian Sign Language Application
3. To evaluate the usage of Malaysian Sign Language Application

LITERATURE REVIEW

Constructivism is derived from the English word construct which means to organize or structure [12]. The concept of constructivist learning is a process of restructuring or organizing. While the term constructivist is the philosophy of knowledge, psychology, teaching and learning theory that emphasizes existing knowledge. The process of learning interacts between new information and previous information [13].

In the context of learning using mobile applications, learning materials are organized in a systematic learning style and they go through a structured process. In addition, the learning style is more flexible, dynamic and attractive. Learning can be linked to previous experiences and constructivist learning theories to be implemented in a technology-based learning environment. However, mobile application-oriented learning methods need to be explored based on key aspects of mobile applications that can impact students. According to Ritland, Dabbagh [14] the five major components of learning applications are pedagogical strategies, mobile devices, communication methods, modules, and designs. These five components are essential to learning to be perfect as the concept of learning using mobile applications is material-centered and student-centered [15].

Student-centered or student-oriented learning encourages students to analyze their experiences and produce more responsible students [16]. The learning process takes place in an environment that involves students actively learning [13, 15, 17]. Where new knowledge and existing knowledge are combined to solve problems and understand the concept of learning. Knowledge is formed not only based on the reading but also from the experience.

Based on the concept of learning using mobile applications [18] the ability of students to build learning concepts depends on the design aspect to ensure the learning process goes well. Teaching and learning in the classroom based on conventional learning methods. Learning does not consist in consistently, meaning that the knowledge delivered by the teacher does not passively pass on to the students. However learning using mobile applications focuses on strengthening aspects of unclear knowledge and training as a method of measurement knowledge learned.
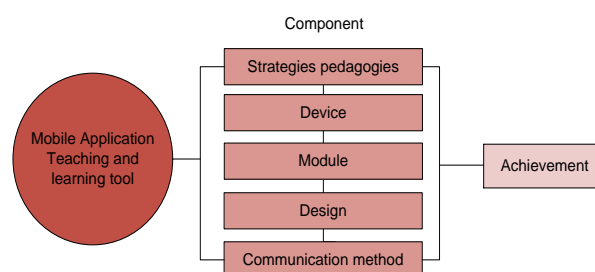

Figure 1: Mobile application component

Achievement

Today's teaching and learning mostly focus on the use of digital teaching aids as it turns out that access to online materials is easier and faster. Based on statistics released by Apple's giant companies, there are more than 25 billion mobile apps downloaded by consumers and this clearly shows that today's education is more open and students are receiving technology as a tool that can impact their achievements. Although basically they have weaknesses such as poor communication levels and their inability to listen to influence their achievements [19]. But this technology should be seen

as a tool that can deliver a good impression to the students.

Not only increases student achievement, but mobile apps also have an impact on the improvement of student communication levels effectively. Although there are some among parents and families who reject the use of technology in life and learning, because they think it has a negative impact on the students. They might think it makes the students more focused on the neglected thing. Therefore, in such situations parents and families need to pay attention and control over their use in order to be controlled.

While some of them lack the use of technology in education, it needs to be seen more widely because everything has its advantages and disadvantages. So what needs to be seen is the impact on student achievement because [19] they also said the use of mobile applications also creates logical thinking, it also contributes to good neatness and ability of students to cope with and solve various issues.

Prototype

Prototype is a system that is almost identical to the actual application, although it is not fully completed yet, its basic function is like the real system. Additionally it is also an efficient and effective way to review and optimize app design or content fixation through repeated discussion, browsing, testing and review processes. It aims to ensure the process of teaching and learning is more effective and meets the needs of students [20].
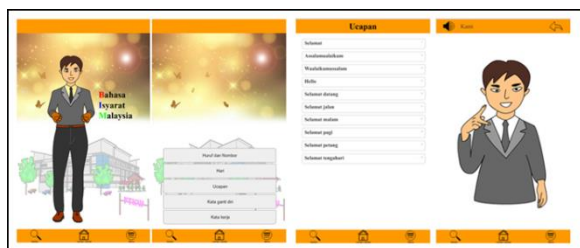

Figure 2: Prototype design

In the context of teaching and learning, some elements need to be emphasized among them teachers, teaching materials, media, and learning environments. Researchers in this study design mobile applications based on the ADDIE model. Based on the model, the design is systematic that involves several phases including analysis, design, development, implementation and evaluation. This mobile app development uses adobe flash software, and Sound Forge.

Prototype process

The process of developing an application is a complicated process and needs to be followed accordingly. Therefore there are several models of multimedia application development such as model Addie, waterfall, dick and carey, hanaffin and peck and so on. However, in this study researchers use ADDIE development model because this model is more appropriate and systematic. Addie model is one of the most commonly used models in teaching technology design to develop more effective learning applications. This model helps designers and teachers to develop more efficient learning modules and the process easier. The elements involved in the ADDIE model can also be used in a variety of learning environments whether online or offline [20].

There are five modules developed in this application including letters and numbers, days, speeches, personal pronouns, and pronouns based on text, graphics, animation and audio. This module was selected based on the needs of the study, ie, low-level students in correct and effective language learning.
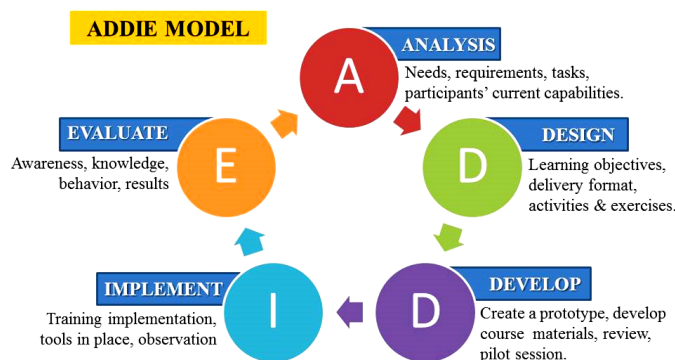

Figure 3. Addie model
[21]

There are five phases involved in the ADDIE model of analysis, design, development, implementation and evaluation. Each phase has different activities. Based on the selection of the development model it should be in line with the objectives of teaching and learning [22]. This is because in the teaching and learning of learning aids should include the need for learning and educators also need to know the appropriate teaching strategies.

METHODOLOGY

Researchers in this study used quantitative research approaches. There are several methods in quantitative research including survey studies, experimental research, causal comparison research and correlation research. In this study, researchers use experimental research methods to obtain the data. Experimental research methodology is used to determine causality

[16]. In the study of experimental investigations tested the hypothesis to determine causality in a closed and controlled system.

Experimental research consists of several types of pre-experimental design, pure experimental design, quasi-experimental design and factor design. Researchers in this study used the quasi-experimental design. According to Noraini Idris [23] this type of research is suitable for research in education. Subjects in this type of research is distributed randomly and it involves distribution in terms of treatment given to the treatment group as well as control groups and external variables neatly controlled.

Table 1: Experimental method

Treatment group	R	01	X1	02
Control group	R	01	X2	02

The design of this study involved pre test (01) and post test (02). It involves two groups of treatment groups and control groups. Each group was given pre-test (01) followed by the implementation of mobile application learning method (X1) on a group and then the conventional method (X2) was assigned to the second group. Afterwards the two groups will undergo post-test (02).
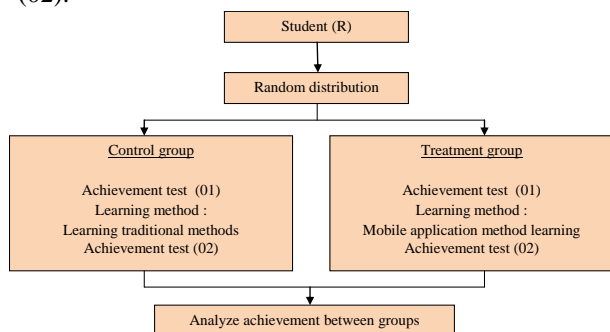

Figure 4: Experimental design
[24]

Result

Based on table below shows the respondent distribution of both teaching and learning methods. The total number of respondents consisted of 19 (100%) students and 9 (47.4%) representing the treatment group and 10 (51.6%) representing the control group. In general, it is a Malay. The gender for each group were 8 (42.1%) male and 11 (57.9%) female. Based on gender breakdown for each group of 4 people (21.1%) male students for control and treatment groups. The female for each of the plans were, 6 (31.6%) students of the control group and 5 (26.3%) of the control group.

Table 2: Respondent profile

		Variable	Number of Respondents (n=19)	Percent (%)
Control group		Race		
	1	Malay	10	51.6%
	2	Chinese	0	0%
	3	Indian	0	0%
		Gender		
	1	Male	4	20.1%
	2	Female	6	31.5%
Treatment group		Race		
	1	Malay	9	47.%
	2	Chinese	0	0%
	3	Indian	0	0%
		Gender		
	1	Male	4	20.1%
	2	Female	5	26.3%
Total			19	100%

Table below shows the actual grade by the Ministry of Education Malaysia. Based on the grade value of the control group for the pre test is 3 (30%) students obtained the average grade to the minimum level. While 7 (70%) students get average grade have not reached the minimum level. The post test showed that 1 person (10%) received a credit, 2 (20%) were satisfied, 2 (20%) had a minimum level, and 5 (50% respectively.

For the treatment group, for pre test 1 person (11.11%) students get satisfactory and reach the minimum level and 7 people (77.77%) get the average grade has not reached the minimum level. For post-test, 3 people (33.33%) students received excellent average grade score and 6 people (66.66%) received the average grade of the credits.

Table 3: The average grade of pre and post interval test groups

Grade		Frequency			
		Control group		Treatment group	
		Pre test	Post test	Pre test	Post test
85-100	Excellent	0	0	0	3
70-84	Honors	0	1	0	6
60-69	Good	0	0	0	0
50-59	Satisfactory	0	2	1	0
40-49	Reached the minimum level	3	2	1	0
0-39	Not reached the minimum level	7	5	7	0

Intervention

Previous experiments showed significant evidence that mobile apps were effective for signal language learning. However, researchers in this study conducted an intensive test on student achievement after two months of use. The purpose of the intentional test is to see how well the students are consistent with the achievement of students using learning methods using mobile applications. This test is done to the same students and

schools. The instrument is also the same, however the content varies from the point of the question. The difference was made aimed at students not relying on previous answers, and it was also intended to see how far the students were able to master the learning.

Experimental design of the intervention test is different where it does not involve pre-test. Intensity tests are conducted to the same two groups as previous experiments, respondents' responses to each group are the same, it aims to control for each group using different learning methods. Here is an Intervention test method;

Table 4: Intervention test methods

Intervention treatment group	X1	03
Intervention control group	X2	03

The design of this study also involves an intensive test (03) for both groups using conventional (X2) learning methods and mobile application learning (X1) methods.

Table 5: Intervention test results

Grade		Frequency			
		Control group		Treatment group	
		Post test	Intervention	Post test	Intervention
85-100	Excellent	0	2	3	5
70-84	Honors	1	3	6	4
60-69	Good	0	1	0	0
50-59	Satisfactory	2	2	0	0
40-49	Reached the minimum level	2	0	0	0
0-39	Not reached the minimum level	5	1	0	0

Based on the following table, test results show for the control group that there is an improvement in achievement achieving excellent grade (70%), credit (20%), and good (10%). While those who have not reached the minimum level indicate a decrease, this means that the achievement of the students is getting better, that there is an abortion of (40%) students who have not achieved the minimum grade level. The treatment group showed consistent results and improved the achievement of students who achieved excellent grade (22.22%).

Looking at the test results for both groups it shows that there are differences in the achievement of intervention tests where the treatment group applying mobile app is better than the results for the control group using conventional learning methods. Although there is an increase in achievement for both groups, mobile applications are more widely accepted by students as an app that can help them with learning.

Table 6: The difference between conventional and mobile app learning approaches

		Statistics		
	Post test CG	Intervention test CG	Post test TG	Intervention test TG
N Valid	10	10	9	9
Missing	0	0	0	0
Mean	31.6650	42.0780	31.2533	79.5722

Based on table 5.7 above shows the difference between pre test for both groups is 0.41 there is a mean difference between the two groups. However, the ratio is small, this shows that the sample group of the study is at a level of achievement that is balanced. The results of the control group showed that there were differences in achievement between pre and post test at 10.41. The results of the treatment group showed that there were differences between pre and post test at 43.32.

Based on the findings of the difference between the two tests for both groups, there was a difference in post-intervention between the control group and the treatment group of 32.91. This shows that there are significant differences in student achievement in conventional learning and mobile applications. That means this study rejects the null hypothesis and receives an alternative hypothesis.

CONCLUSION AND DISCUSSION

Theoretically it explains how constructed that has been tested gives impact to dependent variable. While it is practically explained how the prototype developed meets the needs of students in learning and makes mobile applications a new learning tool.

Education is now more open in terms of delivery and resources to obtain scientific materials that can be references to students. In the other hands students need to be wise in analyzing the material from proper and authentic sources, especially those that involve factors that can't be changed from the original fact. The role of teachers in this context in which the teacher is the source of reference to make sure that the learning materials are appropriate.

Therefore students should be able to use existing resources as support materials that can help them in learning. Access to knowledge is not merely dependent on teachers and they must be wise to use all available facilities.

REFERENCE

[1] Babiker, M.E.A., *For Effective Use Of Multimedia In Education, Teachers Must Develop Their Own Educational Multimedia Application.* The Turkish

Online Journal Of Educational Technology, 2015. **Volume14**(Issue 4).

[2] Nur Nazihah Rahim, et al. *An Assessment of Quality on Animated Infographics in an Islamic Context*. in *International Conference on Teaching and Learning in Education*. 2016.

[3] Andresen, B.B. and K.V.D. Brink, *Multimedia in Education* 2013, Russian Federation: UNESCO Institut for Information in Education.

[4] Siti Hajar Halili, Shukri Sulaiman, and Mohd Razha Abd. Rashid, *Keberkesanan Proses Pembelajaran Menggunakan Teknologi Sidang Video*. Jurnal Pendidikan Malaysia, 2011. **Vol 36**(No 1): p. 11.

[5] Jeng, Y.-L., et al., *The Add-on Impact of Mobile Applications in Learning Strategies: A Review Study*. Educational Technology & Society, 2010. **11**(3): p. 9.

[6] Pun, M., *The Use Of Multimedia Technology In English Language Teaching: A Global Perspective*. International Journal of Interdisciplinary Studies, 2013. **Volume 1**(Number 1): p. 10.

[7] Zainuddin Ibrahim, et al., *Pembangunan Modul Pedagogi Pembelajaran Berasaskan Padlet Untuk Pelajar Pekak Di Ipt*, in *Persidangan Kebangsaan Kurikulum Dan Teknologi Pengajaran*. 2014: University of Malaya.

[8] Abtahi, M.S., *Interactive multimedia learning object (IMLO) for dyslexic children*. Procedia - Social and Behavioral Sciences, 2012. **47**: p. 5.

[9] Kalyuga, S., *Effects of information transiency in multimedia learning*. Procedia - Social and Behavioral Sciences, 2011. **30**: p. 3.7-311.

[10] Khana, T.M., *The effects of multimedia learning on children with different special education needs*. Procedia Social and Behavioral Sciences, 2010. **2**: p. 341-3445.

[11] Akhondia, A. *The effective multimedia instruction in remedy spelling disability students specific learning in Iran at year 2009*. in *Procedia Social and Behavioral Sciences*. 2011.

[12] Sukiman, *Teori Pembelajaran Dalampandangan Konstruktivis Dan Pendidikan Islam* Kependidikan islam, 2008. **Vol 3**(No 1): p. 12.

[13] Hairiah Munip, *Aplikasi Pendekatan Konstruktivisme Dalam Reka Bentuk Pengajaran Berasaskan Komputer: Pengaruhnya Terhadap Pencapaian Berdasarkan Aras Kognitif Pelajar*. Science Education,, 2012: p. 19.

[14] Ritland, B.B., N. Dabbagh, and K. Murphy, *Learning Object Systems As Constructivist Learning Environments: Related Assumptions, Theories And Applications*. Research gate 2015.

[15] Jonassen, D., et al., *Constructivism and computer-mediated communication in distance education*. American Journal of Distance Education, 2014. **Vol 9**(No 2): p. 19.

[16] Hirumi, A., *Student-Centered, Technology-Rich Learning Environments (SCenTRLE): Operationalizing Constructivist Approaches to Teaching and Learning*. Jl. of Technology and Teacher Education, 2012. **Volume 10**(Issue 4): p. 14.

[17] Hairiah Munip, *Aplikasi Pendekatan Konstruktivisme Dalam Reka Bentuk Pengajaran Berasaskan Komputer: Pengaruhnya Terhadap Pencapaian Berdasarkan Aras Kognitif Pelajar.*, in *Persidangan Kebangsaan Pembangunan dan Pendidikan Lestari*. 2012: Institut Pendidikan Guru Kampus Tuanku Bainun.

[18] W.Weeks, K., P. Lyne, and L. Mosely, *The strive for clinical effectiveness in medication dosage calculation problemsolving skills: the role of constructivist learning theory in the design of a computer-based 'authentic world' learning environment*. Vol 5, 2011: p. 7.

[19] Reed, S., S.D. Antia, and K.H. Kreimeyer, *Academic Status of Deaf and Hard-of-Hearing Students in Public Schools: Student, Home, and Service Facilitators and Detractors*. The Journal of Deaf Studies and Deaf Education, , 2008. **Volume 13**(Issue 4).

[20] Baharuddin Aris, Rio Sumarni Shariffudin, and M. Subramaniam, *Reka Bentuk Perisian Multimedia*, ed. 1. 2002, Skudai, Jhor: Universiti Teknologi Malaysia. 149.

[21] Marzo, *Addie Instructional Model*. 2015.

[22] Ummu Nasibah Nasohah, Muhammad Izuan Bin Abd Gani, and Nazipah Binti Mat Shaid @ Md Shaid, *Model Addie Dalam Proses Reka Bentuk Modul Pengajaran: Bahasa Arab Tujuan Khas Di Universiti Sains Islam Malaysia Sebagai Contoh*. Proceedings of the International Seminar on Language Teaching, 2015: p. 8.

[23] Idris, N., *penyelidikan dalam pemdidikan*, ed. 2. 2013, Kuala Lumpur: McGraw-Hill Education.

[24] Chua Yan Piaw, *Kaedah Dan Statistik Penyelidikan*. Kaedah Penyelidikan, ed. B. 1. 2011, Malaysia: Mc Graw Hill.