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Abstract
Mobile applications have become an important tool in various fields especially education. However, the implementation of technology in education to students with mute and deaf disabilities is still less than normal students. This is due to the lack of digital materials that suit the needs of students. Innovation in education is needed to translate research results into life as practice. This study aims to implement a quasi-experimental research method on the technology intervention of teaching and learning materials in Education. This study reviewed articles and books that discuss the design of quasi-experimental studies. Findings showed that, the test question items for section A that were tested showed students who answered correctly at the level above average. There is one item that is below average. While for sections B and C all items tested students can answer well at a level above average. Based on these findings, the implementation of quasi-experimental methods to determine the effectiveness of an innovation technology in Education is appropriate to determine the maximum impact on the use of technology.
Keyword: Quasi-Experimental, Mobile Application, Mute and Deaf Students, Teaching and Learning Tool, Malaysian Sign Language

Introduction

Implementation of technology in education can help students to increase the level of student ability in mastering a subject studied (Halili et al., 2011). In fact, it can also help teachers in teaching and learning. As with mobile applications in learning, it acts as a practical learning tool and suits the needs of students (Jeng et al., 2010). In addition, it also facilitates teachers and students in practicing the knowledge learned. In fact, it can also provide reinforcement for a topic studied, where technology can help provide an overview of a topic through text, audio, video, animation, and graphics. This is explained in a study of the use of multimedia technology in the teaching and learning of English according to a global perspective by (Pun, 2013). Technology based teaching and learning has proven to be effective and conventional methods need to be integrated with multimedia or technology based learning methods to give a more significant impact to students (Singh & Hurley, 2017).

The research methodology provides guidance in the implementation of research (Yahaya, 2007). Starting with a study design that describes how the study was conducted, followed by the location, population and sampling that will be stated as the location of the study conducted. Important points in the research methodology will be discussed in detail in the following sections which cover the research instruments. The research instrument is used to obtain data from the respondents, the researcher will describe how the data is obtained and through that instrument how the data is obtained.

The important things also in this research is analysis. The researcher will perform the analysis of the study through the data obtained from the research instruments that have been answered. The analysis of the study is an important phase because at the end of the study the researcher will determine whether the objectives of the study can be achieved based on the objectives of the study. In the analysis section of the study the researcher will explain how the data obtained are analysed and use that method how to analyse.

Research Design

Research design is a system that includes the methods and principles used in a study. The effectiveness of a study design depends on the method of data collection, data analysis and results in the study conducted. According to Chua (2006) the results of the study are determined by the research method and the research design is determined by the purpose of the study. Therefore, it is important to determine the correct and appropriate research design so that the research finding obtained are in line with the actual purpose of the study. While according to Bryman (2008) research design is the framework used by a study to collect and analyse data. For Robson (2011) research design serves to convert research questions to projects that involve components such as purpose, theory, research questions, methods, and sampling strategies. Meanwhile, Creswell and Zhang (2009) argues, research design is a plan or proposal for conducting a study that involves the interaction between research philosophy, research strategy and research methods.

This study uses a quantitative research approach. There are several methods in quantitative research including survey research, experimental research, comparative cause research and correlation research. In this study the researchers used quasi -experimental research method. Appropriate experimental research methods are used to determine cause and effect relationships (Idris, 2013). In experimental studies researchers test hypotheses to determine cause and effect relationships in closed and controlled systems.

Experimental research consists of several types including pre-experimental design, pure experimental design, quasi-experimental design. The researchers in this study used a quasi -experimental design. According to Idris (2013) this type of research is suitable for research in statistic. Subjects in this type of research were distributed non-randomly and it involved a distribution in terms of treatments given to the treatment group as well as the control group and the external variables were tightly controlled.

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

Figure 1: The method of experiment
Source; Samsudin (2019)

The design of this study involved pre-test (01) and post-test (02). In addition, the study also involved two groups, namely the treatment group and the control group. Each group was given a pre-test (01) followed by the implementation of the mobile application learning method (X1) on one group and then the conventional method (X2) was given to the second group. After that, both groups will go through a post-test (02).

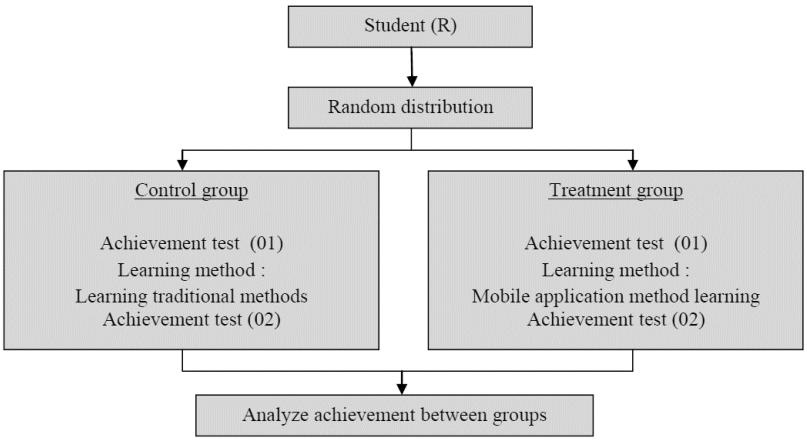

Figure 1: Experimental design
Source: Samsudin, Guan, Yusof, and Mustapha (2018)

Population and Sampling

A population is a whole group of measurements of an object or individual involved in a study. Measurement in statistics-based studies is not only focused on clusters or groups but involves the whole aspect of quality assessment, number and so on. In this study, the population refers to the group of people involved to identify appropriate learning methods.

Table 1
Method of Determining Sample Size

TABLE 1
Table for Determining Sample Size from a Given Population

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size.
S is sample size.

Source: Krejcie and Morgan (1970)

The number of samples involved in this study took into account the sampling table by (Krejcie and Morgan, 1970). The sample involved in the experimental study conducted was 20 respondents, of which 19 people were involved because one student was unable to attend school.

Development of Research Instruments

This research also uses test questions to measure the level of student achievement. Test questions were constructed by the researcher based on the needs in the study to answer the research questions. Questions were distributed to obtain data and tests were also given to students to determine student achievement.

While test questions are developed based on expert teachers in the field as a reference and the involvement of expert teachers is to help develop test questions. The involvement of such expert teachers is to ensure that the test questions are appropriate to the level of student learning.

In addition, test questions also refer to past test questions. For the topic of pronouns refer to Jalaludin (2012); Nashahrin (2012); (Curriculum Unit, 2005), the topic of verbs and speeches based on the (Terengganu State Education Department, 2017; Curriculum Unit, 2005). The type of questions involved is the arrangement of sentences or words based on the mobile application used by the students. There are three parts, namely part A is a question related to personal pronouns, the measurement method for this part is the answer choice which is used to measure the level of understanding of students. While part B is, fill in the blanks based on the answers given, the item is also to measure the level of understanding of the students. Part C, on the other hand, is sentence construction based on daily speech which aims to measure the level of sentence construction skills. To determine the suitability of the test questions and instruments of the questionnaire, a validation process was performed.

Instrument validity was performed against specific groups for purpose validity and group validity. Validity refers to the ability of an instrument to measure what should be measured accurately (Kamis et al., 2012). In this study content validity involved several expert sign language teachers who examined each content of the items tested. Selection criteria are based on educational background and a period of more than 10 years of service in special education. Based on the available expertise they are involved in reviewing each item in terms of the competency of each item to be used based on the constructs involved.

Validity of Test Questions

In determining the validity of the cognitive domain test questions Bloom's Taxonomy was proposed by (Din et al., 2009). According to Kamis et al (2012) this domain is appropriately used for individual validity of each test question item such as answers to questions on reading assessment or questionnaire perceptions, assessment of abilities, attitudes or personalities, respondent characteristics and difficulty for each item. Although the questions are made based on the Bloom's Taxonomy level for students with disabilities but must go through a validation process to ensure the questions used are appropriate to the student's level of education.

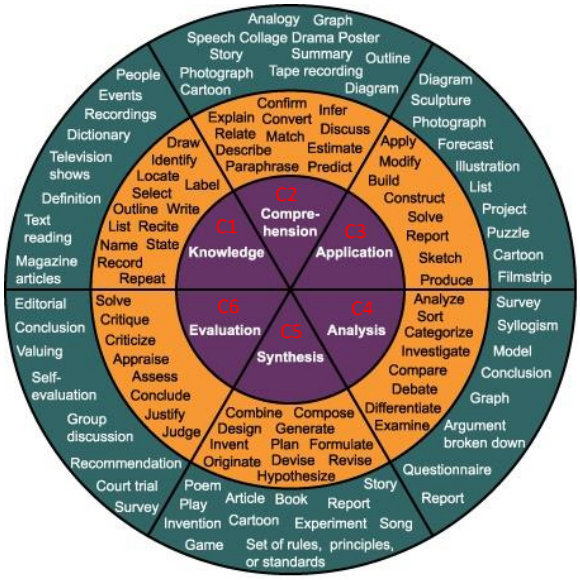

Figure 3: The cognitive domain of Bloom's Taxonomy
Source: Ferlazzo (2009)

To assess student performance, questions were arranged according to Bloom's Taxonomy levels appropriate for students with disabilities. There are six domains in teaching and learning that are taken into account namely assessment, synthesis, analysis, application, understanding, and knowledge. However, in this study the researchers used two domains namely knowledge and understanding because, according to Sadiq et al (2015); Arsad et al (2013) the two domains are more suitable for unskilled students.

Table 2
Bloom's Taxonomy Domain evaluation of test questions

Section	Question	Topic	Taksonomi Bloom (Kognitif)
Section A	10 Question	Pronoun	Knowledge (C1)
Section B	10 Question	Verb	Knowledge (C1)
Section C	5 Question	Speech	Understanding (C2)

Table 2 showed the learning topics and domains of Bloom's Taxonomy involved. Part A is a pronoun topic that requires students to answer objective questions based on the answer choices that have been provided. While part B is a verb topic that requires students to fill in the blanks based on the answers provided. Section C is a speech topic that requires students to write a complete sentence based on the speech listed.

Test Questions

Table 3
Section A Pronoun

No	Questions
1	Ahmad is a smart student **he** is studying in class 5 Bestari
2	"**I** will meet with teacher Harun later in the evening" said David to Siti.
3	"Can **you** show me the way to the National Library?" Devi asked the girl?
4	The students were fined by Ms Lim for **them** not completing schoolwork.
5	"If **you** have free time, invite her to my house," Ani told her friends.
6	" **We** want to go out to play," said Aiman and his brother to their father.
7	**Mr.** Yosouf was so hard working that he was loved by his employer.
8	**Mrs** Aminah is a secretary who is very committed in her work
9	The Prime Minister will deliver **his** speech at the event
10	I want **you** to attend the course, the manager told his employees

Table 4
Section B Verb

No	Questions
1	Umairah loves to **read** books, every day she reads story books
2	"**Give** way to solve your sister's problem," said the mother to the brother.
3	Students should **listen** to the advice given by the teacher to achieve success in lessons
4	Your health problem is getting critical, and you need to **meet** a specialist
5	I am too busy today because I have a lot of **work** to get done
6	Many times, the door has been **knocked** on, but faith still does not open the door
7	**See** what is around, everything is the creation of Allah s.w.t.
8	To maintain good health, we should **eat** nutritious foods and have a lot of protein
9	According to the advice of a human doctor should **drink** eight glasses of water a day
10	Farid needs to **meet** a counselor to get views and advice on his problems.

Table 5
Section C Speech

No	Questions
1	Secure
2	Welcome
3	Good morning
4	Goodbye
5	Assalamualikum

Data Collection Procedures

The data collection procedure used for this study was a random sampling method for the experimental study. While the experimental study, data were collected using test questions. This study involved special education students for the deaf and dumb involving students in a school in Terengganu.

To obtain data, applications are made to the Ministry of Education, State Education Department, District Education Office, and the schools involved. This study received cooperation from teachers to educate students for experimental studies, the appointment of a teacher as an instructor for teaching and learning sessions and student guided by the teachers. Before starting the teaching session, the teachers were briefed on the experiment which involved in two tests, namely pre-test and post-test for all students involved. Then after two weeks, one more test will be doing see to what extent the intervention method using mobile applications was able to have an impact holistically.

Meanwhile, for the experimental session, a booklet was given during the briefing which outlined the time of each activity carried out. Every question will be answered by the students and test question answered becomes confidential from public knowledge.

Student Achievement Analysis

Data analysis performed on eight students based on the percentage of students who answered correctly for each item tested.

Table 6
Percentage of students answering correctly

Topic	Item	Answer	Percentage %
Pronoun	1	D	50
	2	B	50
	3	B	66.7
	4	B	50
	5	D	66.7
	6	C	50
	7	B	100
	8	C	100
	9	B	83.3
	10	D	33.3
Verb	11	Read	100
	12	Give	50
	13	Listen	83.3
	14	Meet	66.7
	15	Work	100
	16	knocked	66.7
	17	See	66.7
	18	Eat	100
	19	Drink	100
	20	Meet	50
Speech	21	True	83.3
	22	True	50
	23	True	66.7
	24	True	50
	25	True	100

Table 6 shows the percentage of students who answered the question correctly. Out of the whole question, it shows that the student's achievement is satisfactory and good. However, there is one question that is less satisfactory which is item 10, because the question is quite difficult for students. This shows that the level of ability of students is in line with the level of education of students and the item is suitable for testing against the actual sample.

Researchers in this study also performed tests on experimental test instruments. This study was conducted in a school in Besut where experiments were conducted on N = 8 students. These students were divided into two groups, the control group and the treatment group. For both groups the researchers performed pre-test and post-test.

Table 7
Test Result

Control group		Treatment group	
Pre-test	Post-test	Pre-test	Post-test
26	32	30	54
33	40	25	48
30	50	32	50
28	56	26	40

Table 7 showed the results of pre -test and post-test, referring to the pre-test for both groups the results showed it was in almost the same level of achievement. However, after practicing two different learning methods on different groups and the results of the study showed the results were significant on the treatment group.

Summary

Technology has been accepted in life as well as education and it has been proven by previous studies its impact on education. However, this study explores some of the gaps available to look at the impact of technology on special education students with deaf and dumb disabilities. The results of this study outline a framework for determining appropriate methods in the teaching and learning of deaf and dumb students using mobile applications. Through the experiments conducted, the implementation of learning methods using the Malaysian Sign Language Application (ABIM) showed clear results that is more than 150% increase in post-test achievement from pre-test. The results of this study have proposed a framework that has gone through a validation process and proved it to be significant for the teaching and learning of deaf and dumb students. Overall, students gave a positive response to the Malaysian Sign Language Application (ABIM) as a learning aid. With the existence of the Malaysian Sign Language Application (ABIM), it is hoped that it can benefit students in their learning, and it can be used as a learning aid more quickly and effectively. In fact, its existence is also expected to be utilized by all communities who want to learn sign language more easily.

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