JATISKOM
Jurnal Aplikasi Teknologi Informasi dan Sains Komputer
e-ISSN : 3089-8668
*https://journal.uinmataram.ac.id/index.php/jatiskom*

# LANGUAGE LEARNING MEDIA THROUGH READING SPEECH FOR THE DEAF BASED ON ANDROID

**Muhammad Hafizulloh[1], Lalu Puji Indra Kharisma[2], Nurnadiyah Syuhada[3], Qurratul Aini[4]**

[1] STMIK Syaikh Zainuddin NW; muhhafizulloh@gmail.com
[2] STMIK Syaikh Zainuddin NW; lalupuji@gmail.com
[3] Universitas Islam Negeri Mataram; nsyuhada@uinmataram.ac.id
[4] Program Studi Teknologi Informasi Universitas Islam Negeri Mataram; qurratulaini270306@gmail.com

* Korespondensi: lalupuji@gmail.com

**Abstract:** The communication system for the deaf is non-verbal (non-verbal) communication using gestures, either with hand gestures or body gestures and facial expressions. Deafness can be interpreted as a state of hearing loss. Deaf children are children who experience hearing deficiencies so that they require special services. Deaf children have difficulty in observing sounds through their hearing, therefore they must capture sounds or voices or expressions of someone through their sight. In this study, the author examines and analyzes the problem of language learning media through reading speech for the deaf based on Android. The purpose of writing is as an aid or alternative media to be able to learn how to read the opponent's lip movements in the communication process. This application uses the research and development (R&D) method and in designing this learning media application, it uses the ADDIE Model (Analysis, Design, Development, Implementation, and Evaluation). The results of this study are that the application of language learning media through reading speech for the deaf based on Android that has been created can help the learning process, especially between teachers and deaf students in learning at SLB Muhammadiyah Kelayu.

**Keywords:** Application; learning media; reading speech; deaf; android.

## 1. Introduction

Background of the Problem The role of language, speech, and hearing in the context of everyday communication is a triad of human potential that is able to bridge the communication process, because the three elements in the communication process can each be a controller of the effectiveness or otherwise of a communication. Therefore, the imbalance of one of these communication components means losing a major contributor who can help humans in going through the phases of their development tasks (Efendi, 2006).

People can understand other people's speech by reading their speech through their lip movements. However, only about 50% of speech sounds can be seen on the lips (Berger, 1972).

A person can become a good speech reader if supported by a good knowledge of the structure of the language so that he can make accurate guesses about the "hidden" sounds. Thus, deaf people who speak normal language are usually better speech readers than prelingual deaf people, and there is even evidence that non-deaf people without training can read lips better than deaf people who are forced to rely on this method (Ashman & Elkins, 1994).

A deaf person has one of their organs experiencing physical obstacles, namely the hearing organ. The hearing obstacle experienced by the person is caused by damage or dysfunction in part or all of the hearing organs, so that the person experiences obstacles in their language development (Hallahan & Kauffman 1991:266).

Learning media are of various types. Printed books are learning media used by teachers as a companion to other learning media. In fact, printed books have several shortcomings compared to other learning media.

Along with the development of information and communication technology, learning media has also developed. Now there are many media based on technology, one of which is M-learning (mobile learning). Mobile learning has developed as a result of the development of telecommunications technology, namely smartphones. Mobile learning is one alternative for developing learning media. The presence of mobile learning is intended as a complement to learning and provides opportunities for students to study material that is less mastered anywhere and anytime (Panji Wisnu Wirawan, 2012: 21-26).

Many Indonesian people already have smartphones, especially Android, including students and teachers. With the many multimedia facilities and applications on smartphones, smartphones have become multifunctional, not only used for calls 3 and sending short messages. However, most students do not use smartphones properly, only for games and social media. Meanwhile, educational applications are still rarely used by students, and mobile-based learning media are still few. Therefore, it is necessary to develop a mobile-based mobile learning media, which functions as an aid in the learning process so that deaf people can learn how to read the speech of their communication partners.

Based on the background description above, the author raised the title "Language Learning Media Through Reading Speech for the Deaf Based on Android".

In order to focus this research more, it is necessary to make limitations on the problems to be designed, namely:

a. This Android-based language learning media through reading speech for the deaf runs on the Android platform.

b. Users can only enjoy the content available on learning media.

c. Using the R&D MODEL ADDIE research method.

d. Introducing vowel letter forms through lip movements.

e. Can distinguish vowel letter forms from lip movements.

Based on the background above, the Problem Formulation can be taken How to create a Language Learning Media Application Through Reading Speech for the Deaf Based on Android?

The purpose of this study is to create a Language Learning Media Application Through Reading Speech for the Deaf Based on Android.

By carrying out this research, it is expected to provide the following benefits::

1) Theoretically

This research is expected to be one of the scientific papers that can add to the scientific treasury in the world of education and increase the author's knowledge about Language Learning Media Through Reading Speech for the Deaf Based on Android.

2) Practically

a. For Students

Students with hearing impairments can use this application as a medium for independent learning at home. As well as a medium that can facilitate students with hearing impairments to understand lessons at school.

b. For Teachers

Improve the quality of teaching to create an effective and efficient learning atmosphere.

c. For Schools

The results of this research can be used as a basis for taking policies to improve the quality of education in schools.

## 2. Materials and Methods

### 2.1. Data collection technique

In accordance with the objectives to be achieved in this research, the author collected data as report material. The collection technique used is:

a. Literature Study

The author collects literature from various books, journals and other publication sources on the internet. So that the author can find out how to use correct sign language.

b. Interview

The author conducted interviews by giving direct questions to teachers at SLB MUHAMADIYAH KELAYU. Some of the information that the author has obtained from the interview include:

- The number of teachers at SLB MUHAMADIYAH KELAYU is currently 4 teachers, and there is 1 teacher who has not mastered sign language.
- The number of students for the deaf class is currently 4 students, these 4 students can hear a few sounds. However, they have difficulty pronouncing these sounds.

### 2.2. Current System and Proposed System


Figure 2.1 Use Case of Running System

Figure 2.2.1 Above is a use case of a running system. In this use case there are two actors. The explanation is as follows:

- The teacher distributes the subject matter books that will be taught to students, either in the form of books, worksheets, or other printed media.
- Teachers teach students
- Students pay attention to the teacher.
- The teacher gives practice questions to students in class, according to the material being taught.
- Students work on practice questions.
- Then the teacher collects the students' answer sheets.
- Next, the teacher assesses the students' answer sheets.
- After that, the teacher returns the students' answer sheets so that students know which answers are correct and which answers are incorrect. So that students can learn from the mistakes they make.

The proposed system can be seen in Figure 2.2.

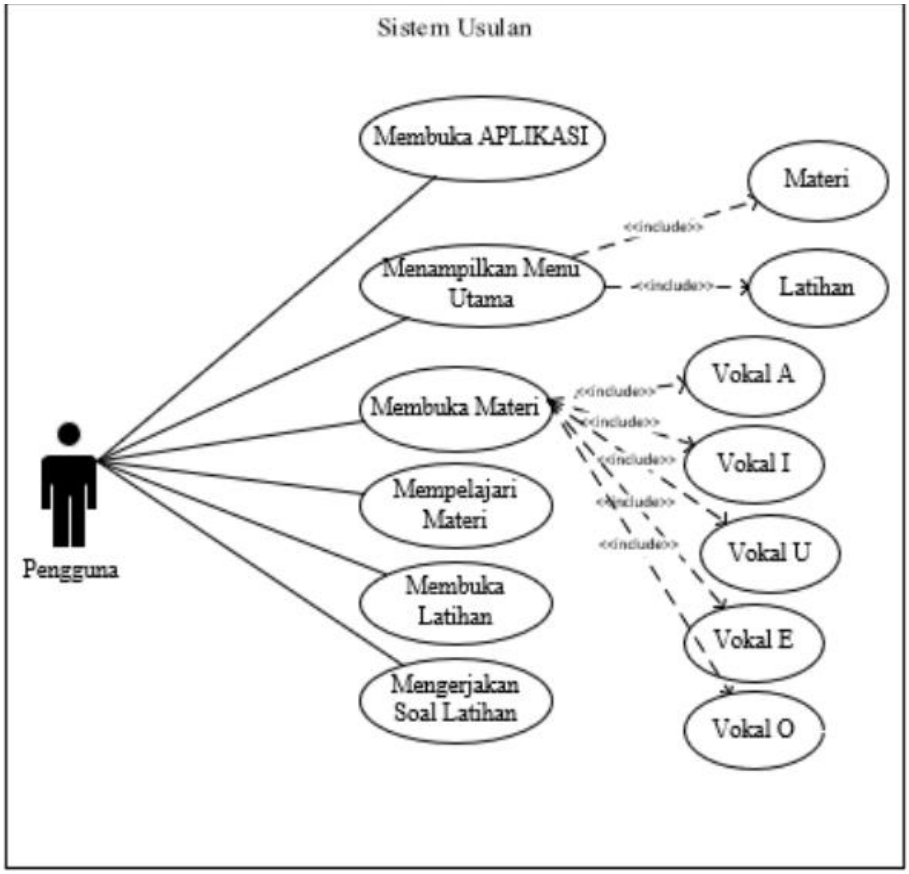



Figure 2.2 Proposed System use case

Figure 2.2 Above is the proposed system use case. In the use case there is one actor, namely the user, the user can be a teacher, student, and developer.

The explanation is as follows:

- The user opens the learning media application that the researcher has created.
- The user will see the main menu display of the application which contains materials and exercises.
- If the user opens the material menu, there will be material from the vowels A, I, U, E, and O.
- The user can immediately study the learning material.
- If the user opens the practice menu, there will be several practice questions according to what has been learned in the material menu.
- The user can work on the practice questions.

2.3. Time and Place of Research

This research was conducted at SLB MUHAMADIYAH KELAYU RT 019 Kubur Belo Ling. Aik Ampat Kelayu Jorong Sub-district, Selong District, East Lombok Regency, West Nusa Tenggara.

Profile of the Muhammadiyah Special Needs School in Kelayu:

a. School Identity

| | |
|---|---|
| School Name | : SLB MUHAMMADIYAH KELAYU |
| NPSN | : 69956626 |
| Education Level | : SLB |
| School Status | : Private |
| School Address | : Kubur Belo Ling. Aik Ampat Kelayu Jorong Sub-district |
| RT/RW | : 09 |
| Hamlet | : KUBUR BELO |
| Village Sub-district | : KELAYU JORONG |
| District | : Selong Sub-district |
| Regency | : East Lombok Regency |
| Province | : West Nusa Tenggara Province |
| Postal Code | : 83613 |
| Geographical Location | : Latitude -8 Longitude 116 |

b. School Information

| | |
|---|---|
| Accreditation | : C |
| Curriculum | : Special Education SMALB 2013 |
| Principal | : Ahmad Zahidin Akbar |
| Academic Data Operator | : Baiq Dwi Kurniati |
| School Establishment Decree | : AHU-88.AH.01.07 |
| Date of Establishment Decree | : 2010-06-23 49 |
| Operational Permit Decree | : 849/2381.b.Dikpora/2016 |
| Date of Operational Permit Decree | : 2016-11-30 |
| Special Needs Served | : A,B,C1,D,F,Q |

The time of this research is the time the research is taking place or when this research is carried out. This research will be carried out according to the schedule of activities that the author has designed, namely in May-July 2023.

2.4. Activity Diagram

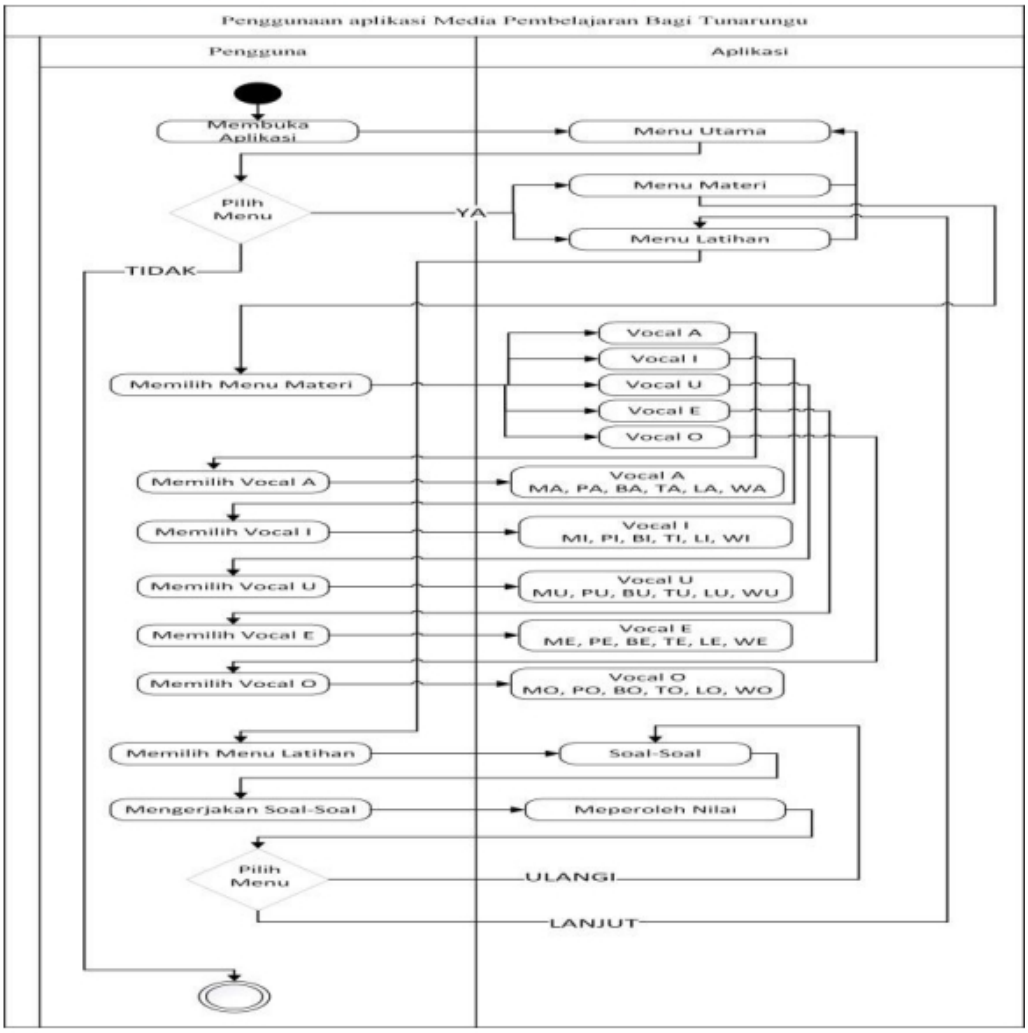



Figure 2.3 Activity Diagram

Figure 2.3 explains how the flow of the language learning media application through reading speech for the deaf. The explanation is as follows:

- The user opens the application, the application will display the main menu.
- Next, the user will select the material menu or practice menu, if the user does not select the menu, the user can immediately exit the application.
- If the user selects the material menu, the application displays the materials that can be studied, namely vowels A, I, U, E, O.
- If the user selects vowel material A, the application will display vowel material A, namely ma, pa, ba, ta, la, wa.
- If the user selects vowel material I, the application will display vowel material I, namely mi, pi, bi, ti, li, wi.
- If the user selects vowel material U, the application will display vowel material U, namely mu, pu, bu, tu, lu, wu.

- If the user selects vowel material E, the application will display vowel material E, namely me, pe, be, te, le, we.
- If the user selects the O vowel material, the application will display the O vowel material, namely mo, po, bo, to, lo, wo.
- Furthermore, if the user selects the practice menu, the application will display questions that can be solved by the user, after the user has completed the questions, the value obtained will appear.
- After that, the user can select repeat or continue, if you select repeat, you will return to the question menu, if you select continue, you will return to the practice menu.
- Then from this menu, the user can return to the main menu or exit the application.

The method used by the researcher is the research and development (R&D) method and in designing the learning media application using the ADDIE Model.

The stages in the ADDIE Model are:

1. Analysis : namely the stage where the problem is analyzed first so that a needs analysis is obtained, namely:

   a. Hardware

      To create and run this application, you will need the following hardware:

      - Smartphone with Android operating system.
      - Smartphone with minimum RAM capacity of 512 MB.
      - Smartphone has minimum storage of 2GB.
      - Acer E5 laptop.
      - AMD E2 processor.
      - 2 GB RAM.
      - 14 inch monitor.
      - 500 Gb hard disk.

   b. Software

      To create and run this application, the following software is required.**:**

      - Android operating system minimum version 4.1.4 (JellyBean).
      - Windows 10 operating system
      - Ms. Visio 2013

- Smart Apps Creator 3

c. User

The users of the Android-based Language Learning Media Application Through Reading Speech for the Deaf are Deaf Students and Teachers.

2. Design (design / planning): namely the stage where the ideas that have been obtained are designed according to the results of the needs analysis. It can be said as the Initial Design. The following is the initial design of this application, among others:

- Navigation Structure Design

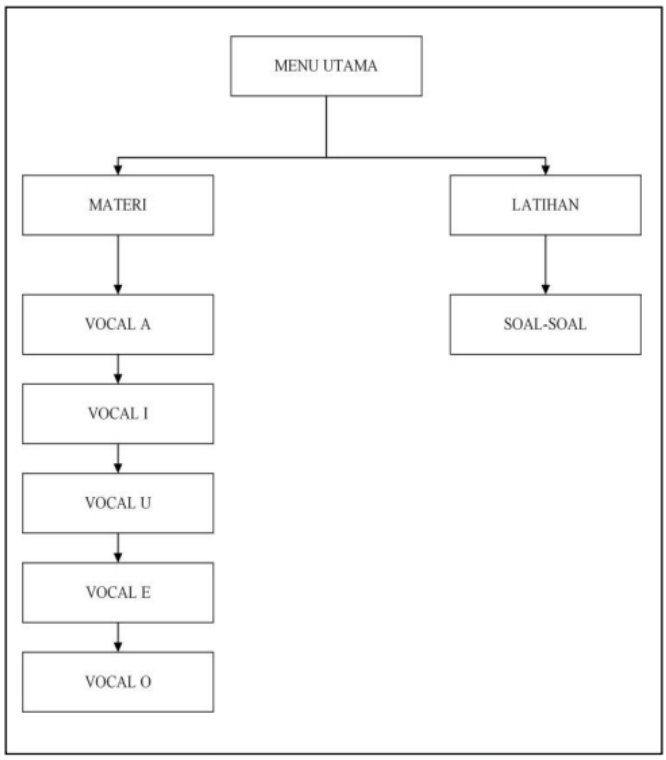



Figure 2.4 Navigation Buttons

Figure 2.4 is the navigation of the main menu of the application, which contains the material menu and the practice menu. The material menu contains the vowels a, i, u, e, o and the practice menu contains questions.

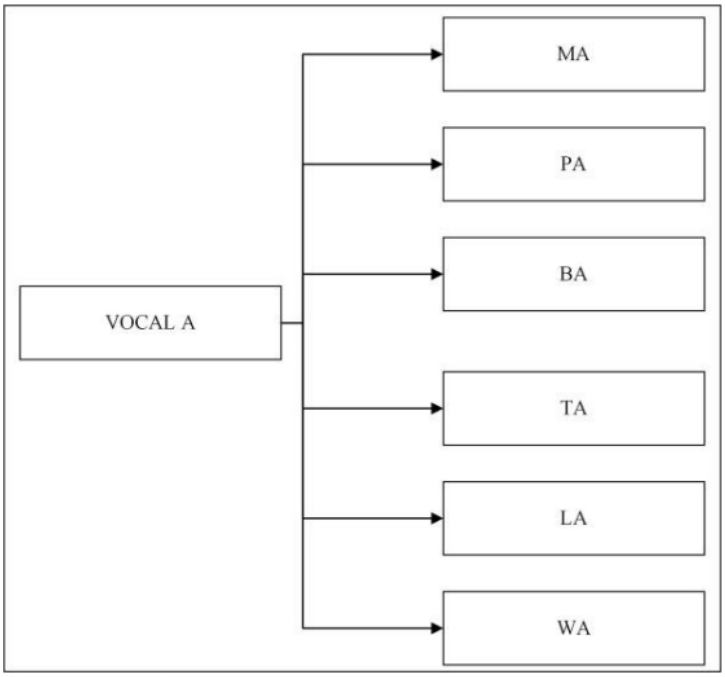



Figure 2.5 Vocal Navigation Button A

Figure 2.5 is the navigation for the vocal material menu A, containing vocal material a, ma, pa, ba, ta, la, wa**.**

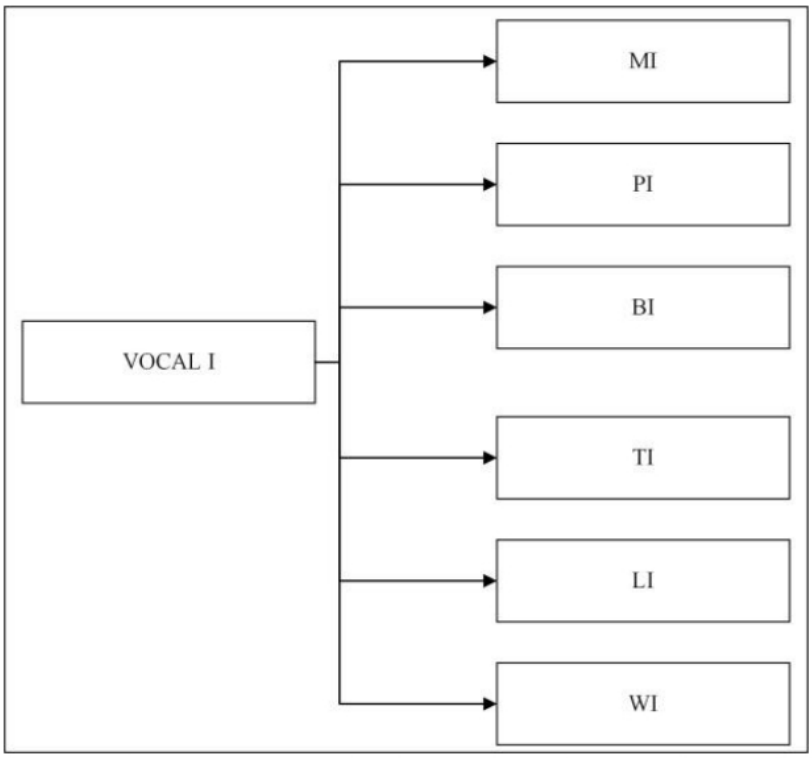



Figure 2.6 Vocal Navigation Button I

Figure 3.7 is the navigation of the vocal material menu I, containing vocal material i, mi, pi, bi, ti, li, wi**.**

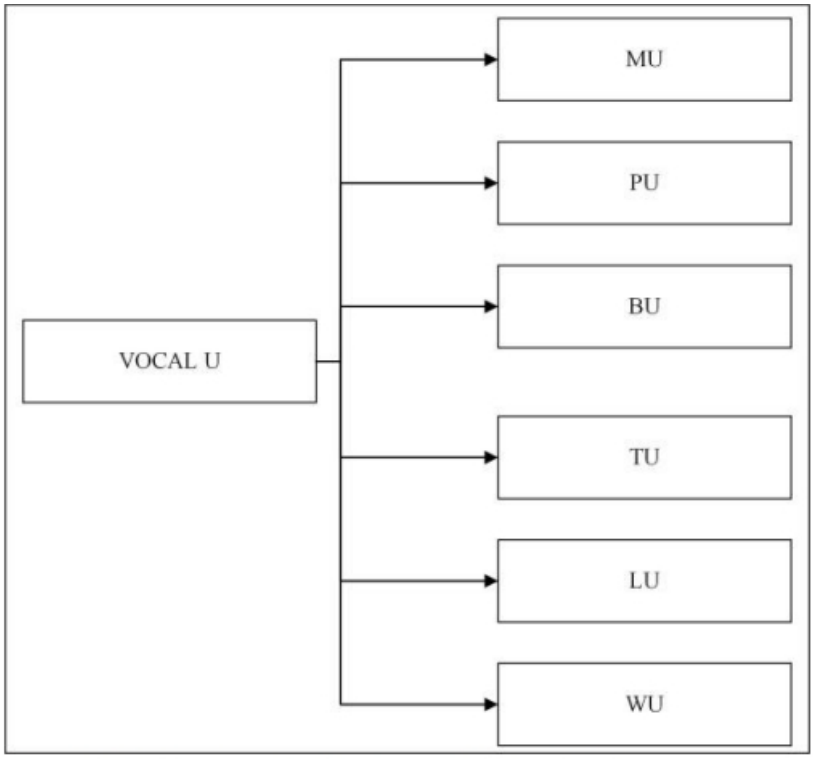



Figure 2.7 Vocal Navigation Button U

Figure 2.7 is the navigation of the vocal material menu U, containing vocal material u, mu, pu, bu, tu, lu, wu.

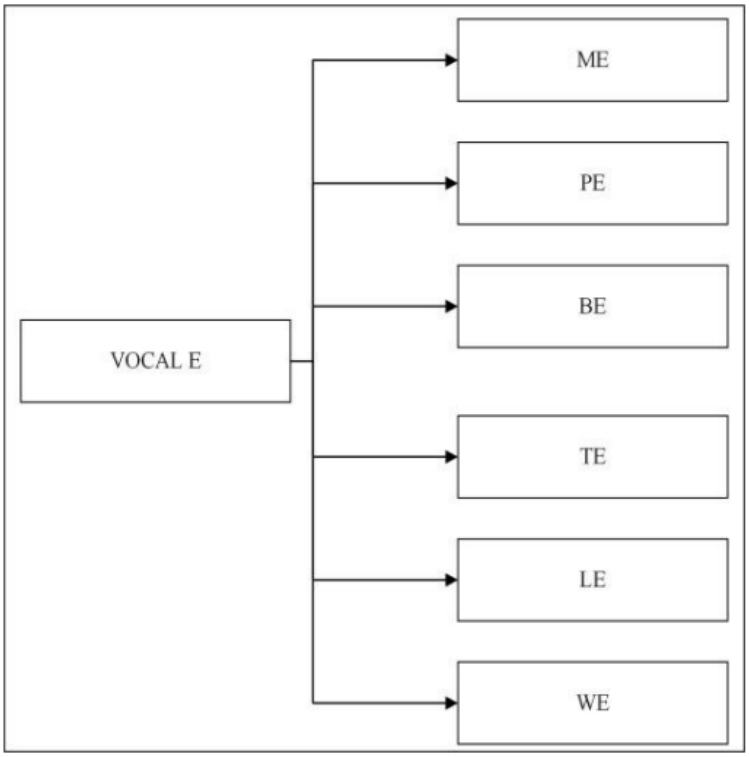



Figure 2.8 Vocal Navigation Button E

Figure 2.8 is the navigation of the vocal material menu E, containing vocal material e, me, pe, be, te, le, we.

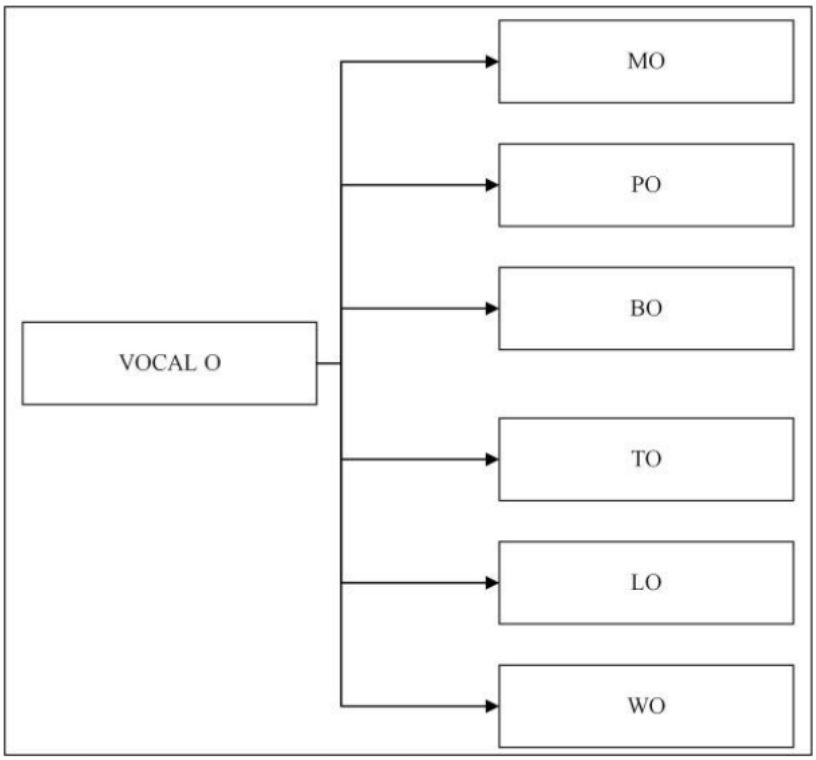


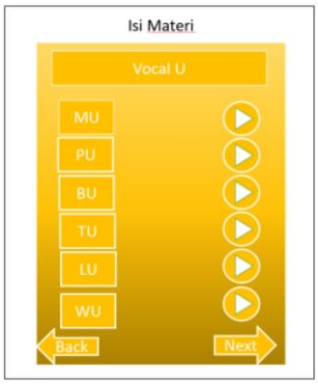

Figure 2.9 Vocal Navigation Button O

Figure 2.9 is the navigation of the vocal material menu O, containing vocal material o, mo, po, bo, to, lo, wo.

- Interface Design

Table 2.1 Interface Design

| NO | PAGE | VISUAL | INFORMATION |
|---|---|---|---|
| 1 | Main course |   | There are two buttons that will open the material menu and the Practice Menu |

| | | | |
|---|---|---|---|
| 2 | Material |  | Contains the vocal menu A, I, U, E, O from each learning material. |
| 3 | Contents of Material A |  | Contains learning materials for the vowel A, namely MA, GA, BA, TA, LA, WA |
| 4 | Contents of Material I |  | Contains learning materials for the vowel I, namely MI, GI, BI, TI, LI, WI |
| 5 | Contents of Material U |  | Contains learning materials for the vowel U, namely MU, PU, BU, TU, LU, WU. |

| | | | |
|---|---|---|---|
| 6 | Contents of Material E |  | Contains learning material for the vowels E, namely ME, PE, BE, TE, LE, WE. |
| 7 | Contents of Material O |  | Contains learning material for the vowels O, namely MO, GO, BO, TO, LO, WO |
| 8 | Exercise |  | There are several practice questions to be done. In each question you will use Multiple Choice. |

**3.** Development: namely the stage where the design that has been designed, is made using supporting software. At this stage the application is built using software such as Adobe Photoshop, Visio, and smart apps creator3.

4. Implementation: namely the stage where the application that has been created is applied to the user. At this stage the application that has been made will be used by students and teachers who teach in class.

5. Evaluation: namely the stage to find out whether the application built can be said to be successful or not. This stage is the final stage to find out to what extent teachers can understand the use of the application. In addition, this stage aims to test the application that has been made whether it is appropriate or not. The testing technique used is the Beta Testing technique. This technique itself is a trial technique by users (teachers).

6. Questionnaire Design

After the trial is conducted, each teacher will be given a questionnaire containing questions about the application that has been created. The Questionnaire Table can be seen in Table 3.2.

**Table 3.2** Questionnaire

**Name:**

| No | Question | Evaluation | | | |
|---|---|---|---|---|---|
| | | **SS** | **S** | **KS** | **TS** |
| 1 | Is this app easy to use? | | | | |
| 2 | Is the material contained in this application appropriate? | | | | |
| 3 | Is the content on this app interesting enough? | | | | |
| 4 | Is the content quality of this app good? | | | | |
| 5 | Do you agree if this program is used as an alternative form of learning media? | | | | |

**Responder**

**(……)**

## 3. Results

### *3.1. Implementation preparation*

At this stage, preparations are made before implementing the program. The stages carried out include:

- Installing Adobe Photoshop CS6 helps to create several designs for creating language learning media applications through speech reading for the deaf based on Android.
- Then install Smart Apps Creator 3 to create a language learning media application through reading speech for the deaf based on Android.

### *3.2. Program*

The following is a display of the language learning media application through reading speech for the deaf based on Android.

a. Main Page View

This view will appear when the user opens the application for the first time. On this page there are 2 menus that can be selected by the user, namely the material and exercise menus. The main page display can be seen in Figure 3.1


**Figure 3.1** Main Page

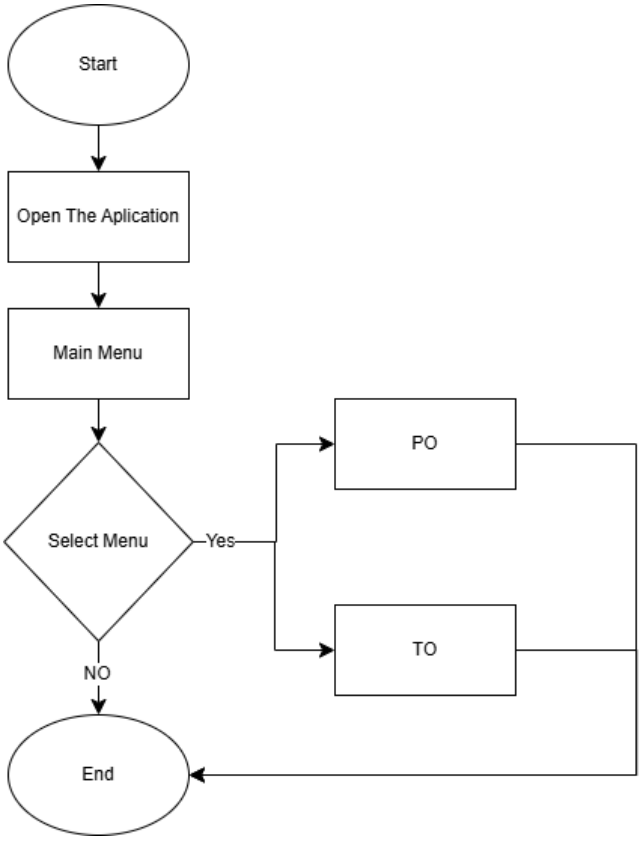



**Figure 3.2** Main Menu Flowchart

b. Material Menu Display

This display will appear when the user presses the material button on the main page. This menu contains vocal material A, I, U, E, O. The Material Menu display can be seen in Figure 3.3.


**Figure 3.3** Material Menu

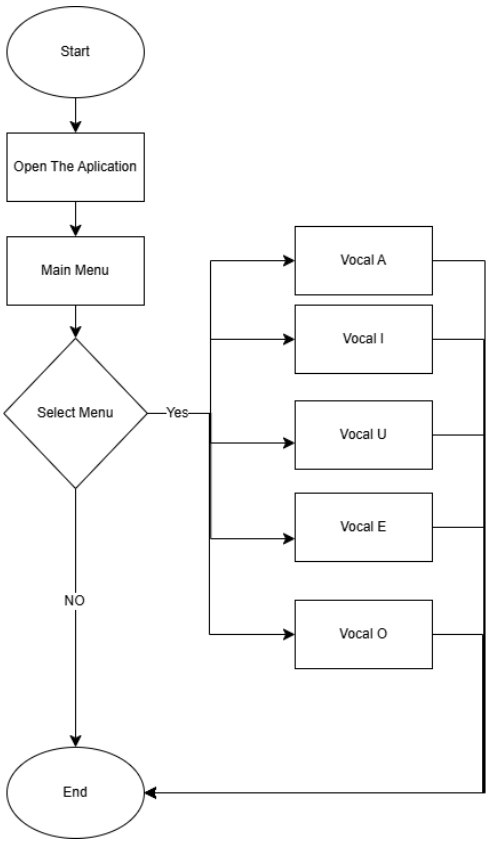



**Figure 3.4** Material Menu Flowchart

c. Display of Vocal Material A

This display will appear when the user presses the Vowel A icon on the material menu, the vowel A materials contain videos of pronouncing the letter a, followed by the words ma, pa, ba, ta, la, wa. The following is a display of the vowel A material which can be seen in Figure 3.5


**Figure 3.5** Vocal Material A

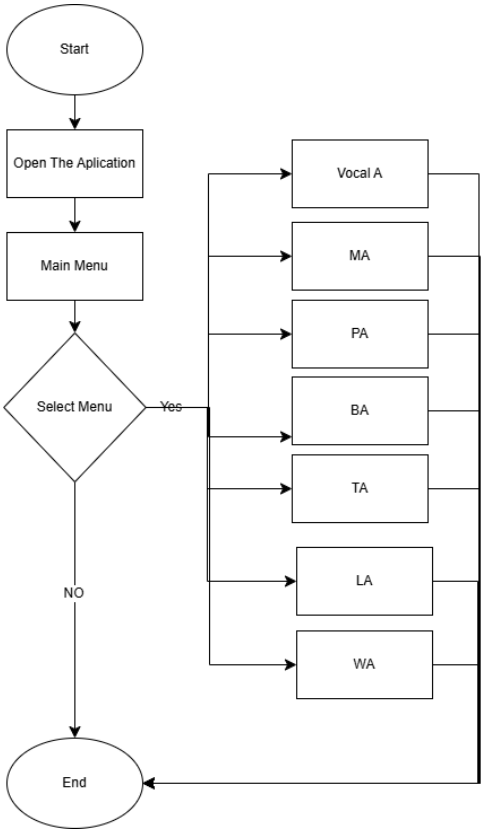



**Figure 3.6** Flowchart of vocal material A

d. Vocal Material Display I

This display will appear when the user presses the Vowel I icon on the material menu, the vowel I materials contain videos of pronouncing the letter i, followed by the words mi, pi, bi, ti, li, wi. The following is a display of the vowel I material which can be seen in Figure 4.7


**Figure 3.7** Vocal Material I

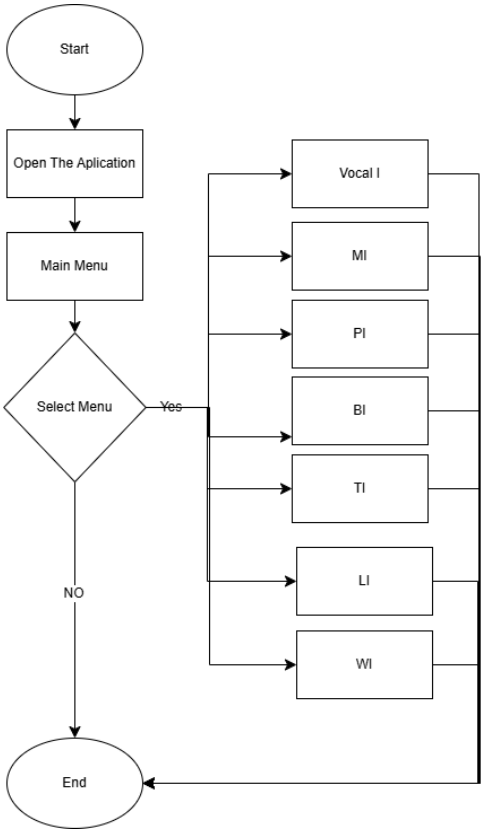



**Figure 3.8** Flowchart of Vocal Material I

e. Display of Vocal Material U

This display will appear when the user presses the U vowel icon on the material menu. The U vowel materials contain videos of pronouncing the letter u, followed by the words mu, pu, bu, tu, lu, wu. The following display of the U vowel material can be seen in Figure 3.9.


**Figure 3.9** Vocal Material U

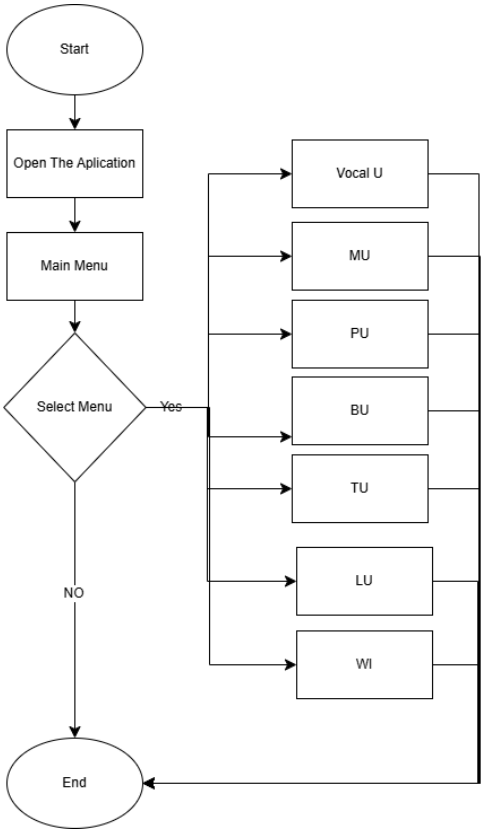



**Figure 3.10** Flowchart of Vocal U Material

f. Display of Vocal Material E

This display will appear when the user presses the Vowel E icon on the material menu, the vowel U materials contain videos of pronouncing the letter e, followed by the words me, pe, be, te, le, we. The following display of the vowel E material can be seen in Figure 3.11.


**Figure 3.11** Vocal Material E

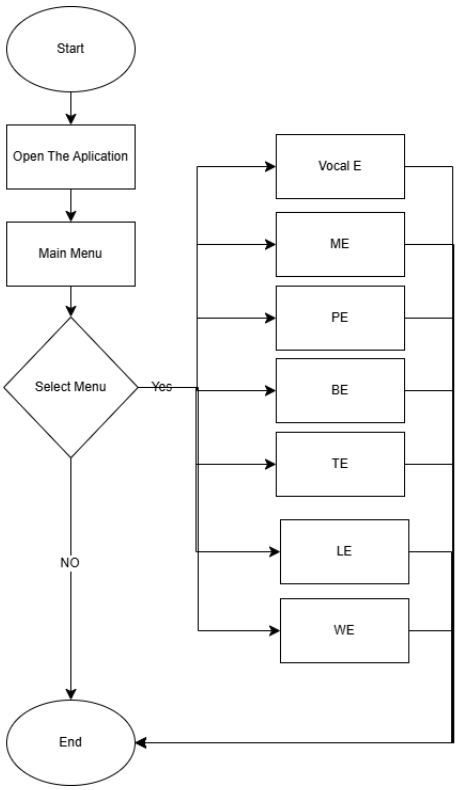



**Figure 3.12** Flowchart of Vocal E Material

g. Display of Vocal Material O

This display will appear when the user presses the O vowel icon on the material menu. The U vowel materials contain videos of pronouncing the letter O, followed by the words mo, po, bo, to, lo, wo. The following display of the O vowel material can be seen in Figure 3.13.


**Figure 3.13** Vowel Material O

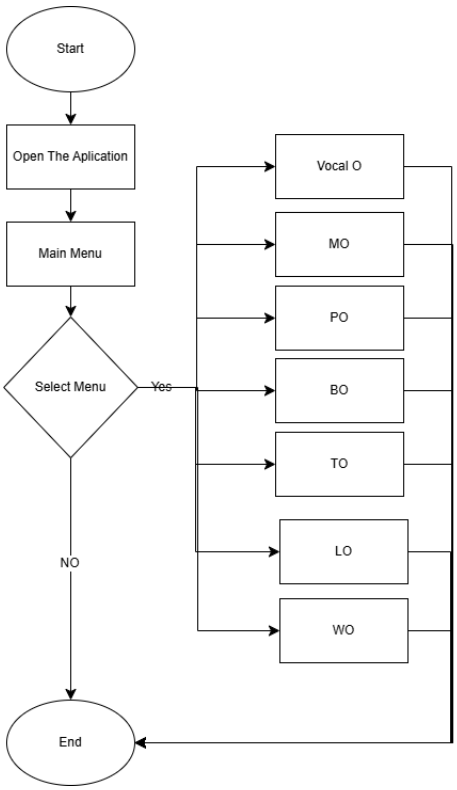



**Figure 3.14** Flowchart of Vocal O Material

h. Exercise Menu Display

This display will appear when the user presses the practice icon on the main page. The Practice Menu contains questions that must be answered to determine how far the user understands the material that has been studied in this application, and there is a number of points obtained after answering all the questions given. The questions use videos with multiple choice options as answers. The Practice Menu display can be seen in Figure 3.15


(**a**) (**b**)

**Figure 3.15** Exercise Menu: (**a**) Question (**b**) Answer

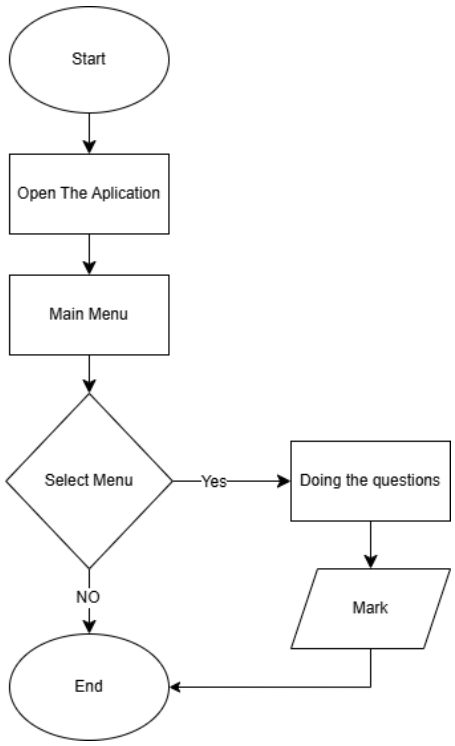



**Figure 3.16** Exercise Menu Flowchart

*3.3. Alpha Test*

In the Alpha Test, the author conducted a direct trial of the application related to several functions and the suitability of the application with previously designed features. The results of the tests carried out can be seen in table 3.1 below:

**Table 3.1** Alpha Test

| NO | TESTING | RESULTS | |
|---|---|---|---|
| | | SUCCEED | FAIL |
| 1 | Applications can open | YES | |
| 2 | The Main Menu page opens | YES | |
| 3 | The play button works | YES | |
| 4 | Material button works | YES | |
| 5 | The training button works | YES | |
| 6 | The training menu works | YES | |
| 7 | The video in the exercise can run when clicked | YES | |

Based on the testing in table 3.1 above, the application runs and is in accordance with what was tested.

*3.4 Beta Test*

Testing also involves end users, testing involves 4 people who will conduct experiments in using the application. Testing was conducted on teachers of SLB Muhamadiyah Kelayu. The questionnaire will be displayed on the attachment page. The results of the testing that the author conducted on the end users of this application can be seen in table 4.2 below:

**Table 3.2** Beta Test

| No | Question | Evaluation | | | |
|---|---|---|---|---|---|
| | | SS | S | KS | TS |
| 1 | Is this app easy to use? | 4 | 0 | 0 | 0 |
| 2 | Is the material contained in this application appropriate? | 1 | 3 | 0 | 0 |
| 3 | Is the content on this app interesting enough? | 0 | 3 | 1 | 0 |
| 4 | Is the content quality of this app good? | 1 | 3 | 0 | 0 |

| | | | | | |
|---|---|---|---|---|---|
| 5 | Do you agree if this program is used as an alternative form of learning media? | 2 | 2 | 0 | 0 |
| | **TOTAL** | 8 | 11 | 1 | 0 |

Description:

SS: Strongly Agree

S: Agree

KS: Less Agree

TS: Disagree

The calculation of the Questionnaire Results Tabulation is done using the Formula

$Y=\sum jr / (q*p) *100$

Description:

Y = Percentage Value

$\sum jr$ = Total of All Respondents' Answers

p = Number of Respondents

q = Number of Questions

The calculation results from the tabulation above are as follows:

SS $= \sum jr / (q*p) *100$

$= 8 / (5*4) * 100$

$= 8/(20)*100$

$=0.4*100$

$= 40\%$

S $= \sum jr / (q*p) * 100$

$= 10 / (5*4) * 100$

$= 10/(20)*100$

$=0.55*100$

$= 55\%$

KS $= \sum jr / (q*p) * 100$

= 1/ (5*4) * 100

= 1/(20)*100

=0.05*100

= 5%

TS = ∑ jr / (q*p) * 100

= 0 / (5*15) * 100

= 0/75*100

= 0 %

Based on the results of the questionnaire test above, consisting of 4 respondents, the details of the responses of 4 respondents regarding the questionnaire 74 user satisfaction in using the application, the number of strongly agree (SS) 40%, the number of agree (S) 55%, the number of less agree (KS) 5% and disagree (TS) 0% the largest percentage stated agree 50%. it can be concluded that the application of language learning media through reading speech for the deaf based on android can help the learning process.

## 4. Conclusions

It can be concluded that the application of language learning media through reading speech for the deaf based on Android has been successfully created using Adobe Photoshop CS6 software to design the menu and buttons on the application, and Smarts Apps Creator 3 to create this application so that it can be used on the Android platform. After the author conducted 2 trials, namely the alpha test which was directly tested by the researcher himself and the beta test stage which was tested by the teacher of SLB Muhammadiyah Kelayu. After conducting the test, the largest percentage stated that they agreed, namely 55%. It can be concluded that the application of language learning media through reading speech for the deaf based on Android can help the learning process.

**Acknowledgments:** The writing of this thesis is still not perfect and the application that was built still has several shortcomings, so the author provides suggestions to future authors to create learning media applications using better software than the software that the author used in this study, so that the material studied can be much more diverse.

## References

[1] Al Hakim, M. B. M., Tolle, H., & Kharisma, A. P. (2019). Development of language training applications for the deaf using android-based google speech. Journal of Information Technology and Computer Science Development e-ISSN, 2548, 964X

[2] Amajida, Development of Android-Based Mobile Learning Media on Class VII Student Association Material at Mts Nu Hasyim Asy 'Ari 03 Kudus. Salatiga: State Islamic Institute of Salatiga, 2020.

[3] Andleigh, P. H., & Thakrar, K. (1996). Multimedia authoring and user interface. Multimedia systems design, 433-470.

[4] Arsyad, A. (2005). Learning Media. Jakarta: Raja Grafindo.

[5] Ashman, A., & Elkins, J. (1994). Educating children with special needs.

[6] Berger, J., Cohen, B. P., & Zelditch Jr, M. (1972). Status characteristics and social interaction. American sociological review, 241-255.

[7] Bohaeri, R., (2019). Application of Language Learning Media Through Speechreading for the Deaf Based on Android at Dharma Wanita Mataram Special School, (Thesis), (Postgraduate Program S1 Computer Science Bumigora University, Mataram).

[8] D. A. M. D. J. Deriwanto, "Development of Android-Based Mobile Learning Media on the Concept of the Circulatory System in Elementary Schools," J. basicedu, vol. 3, no. 2, pp. 524–532, 2020.

[9] DePorter, B., & Hernacki, M. .شهوژپ ي م هلا ق .

[10] Efendi, M. (2006). Introduction to psychopedagogy of children with disabilities.
[11] Hallahan, D. P. & Kauffman, J. M. (1991). Exceptionality Childern Introduction to MADCOMS, 2013. Editing Video with Adobe Premiere Pro CS6. Yogyakarta: C.V Andi Offset
[12] Hendini, A. (2016). UML modeling of sales and stock monitoring information system (case study: distro zhezha pontianak). Khatulistiwa Informatika Journal, 4(2).
[13] Irawan, D. (2014). Model Development. An-Nuha, 1(November), 225-234.
[14] Kushartanti, K. (2007). Indonesian language and literature learning strategies in elementary schools: The role of teachers in responding to the curriculum at the education unit level. Wacana, Journal of the Humanities of Indonesia, 9(1), 107-117.
[15] Matthiessen, C.M.I.M. (1992). Lexicogrammatical Cartography: English System (Draft). Sydney: University of Sydney. [Matthiessen, C. (1995). Lexicogrammatical Cartography: English System. Tokyo: International Language Sciences Publishers].
[16] Munir, (2013). Multimedia, Concepts and Applications of Learning Media. Jakarta: Alfabeta
[17] Nazruddin, S. H. (2014). Programming of Android-based Smartphone and Tablet PC Applications. Bandung: Informatics
[18] Nurdina, A. (2017). Case Study on the Ability to Read Speech of Deaf Children at SLB-B Dena Upakara Won-osobo. WIDIA ORTODIDAKTIKA, 6(1), 1-11.
[19] Pribadi, B. A. (2009). Learning system design model. Jakarta: Dian Rakyat.
[20] Richards, J., Platt, J. & Weber, H. (1985). Longman Dictionary of Applied Linguistics. Harlow: Longman.
[21] Ridlo, I. A. (2017). Flowchart creation guide. Faculty of Public Health, 11(1), 1-27.
[22] Rizal, H., Adhy, S., & Wirawan, P. W. (2014). Design and Creation of Android-Based Interactive Mobile Learning Using the Personal Extreme Programming Method. Journal of Informatics and Technology, 2(3), 103-112.
[23] Rodilah, D. A. (2019). Sign Language Learning Media Application for the Deaf Based on Android (Doctoral dissertation, Panca Marga University Probolinggo).
[24] Rohaeni, S. (2020). Development of Learning Systems in the Implementation of the 2013 Curriculum Using the ADDIE Model in Early Childhood. Instructional, 1(2), 122-130.
[25] Sanjaya, W. (2014). Educational research: types, methods and procedures.
[26] Sunaryo, I. (2020). The Use of the Speech Reading Method in the Implementation of Islamic Religious Education Learning for Deaf Students at the Special Elementary School (Sd-Lb) B Negeri Pembina Palembang. (Thesis) (Doctoral dissertation, UIN Raden Fatah Palembang). 79
[27] Sutopo, H. (2008). Development of Multimedia-Based Teaching Materials. Available: http://www.topazart.info/teks_teaching/mat/flash/tutorialB ahanAjar Multimedia. Pdf. Somantri, Sutjihati, Psychology of Extraordinary Children, Bandung: Refika Aditama, (2006). Special Education (fifth ed.). New Jersey: Prentice Hall International, Inc.
[28] Vaugan, T. (2011). Multimedia: Making It works. New Yorks: Mc Graw Hill.
[29] Wirawan, P. W. (2012). Development of web-based e-learning capabilities into m-learning. Journal of Informatics Society, 2(4), 21- 26