Media Literacy Based Android Application to Introduce Sumbawa Culture for Visual Disabilities

Shinta Esabella[1*], Nora Dery Sofya[1], Erwin Mardinata[2], Muhammad Hidayatullah[3], Titi Andriani[3], Gunawan[4]

[1] Department of Informatics, Faculty of System Engineering, Sumbawa University of Technology, Sumbawa, Indonesia.
[2] Department of Digital Business, Faculty of Economics and Business, Sumbawa University of Technology, Sumbawa, Indonesia.
[3] Department of Electrical Engineering, Faculty of System Engineering, Sumbawa University of Technology, Sumbawa, Indonesia.
[4] Physics Education Study Program, Faculty of Teacher Training and Education, University of Mataram, Mataram, Indonesia.

Abstract: This research aims to introduce Sumbawa culture to blind disability based android smartphone applications that can utilize feature reader screens and barcodes on objects historical. Output from application This is information in the form of audio details of cultural sites in the Inner Palace Loka, Bala Kuning Palace, Bala Puti Palace, Bala Datu Ranga, and the Sumbawa Museum. This research is quantitative method with build uses waterfall method and design with UML models with test six aspect appropriateness to application. The resulting average value for the attractiveness p ax is 1.90 and the average score for as a perspicuity peak of 1.77. Third aspect from UEQ, efficiency value with an average of 1.61 and dependability aspects with value 1.55. Whereas the stimulation aspect on the UEQ model is 1.49 and the novelty aspect with the average value is 1.39. From testing aspect perspicuity, efficiency, dependability, stimulation and novelty show quality application are excellent. Whereas the attractiveness aspect generates very good value. Application literacy culture for blind disability is something effort in preserving culture and can be accessible on google play store.

Keywords: Androids; Culture; Literacy; Sumbawa; Visual Disabilities.

Introduction

A person with a visual disability is someone who has impaired or damaged eyesight so that they cannot function normally (Rahmah, 2020). Based on the level of eye disorders, people with visual disabilities are divided into two categories: those who still have residual vision and those who are totally blind (Fauzi et al., 2020) . Indonesia is a country that has the highest rate of survivors of visual disabilities in Southeast Asia, with a prevalence rate of 1.47% (Melani et al., 2021). People with visual disabilities and their limitations demand assistance, guidance, and intensive care to be able to carry out their daily activities and meet the necessities of life (Aulia & Apsari, 2020). Social support must be provided to persons with visual disabilities in the form of social emotional support, social appreciation support,

instrumental social support, and informational social support (Rosalina & Apsari, 2020). The Law of the Republic of Indonesia Number 8 of 2016 concerning persons with disabilities regulates in more detail the rights of persons with disabilities in various fields, including cultural and tourism rights. Indonesia is a country that has diverse cultural wealth and is spread from Sabang to Merauke (Setiawan et al., 2017). Persons with disabilities have the right to actively participate in arts, culture, and tourism activities, which of course require adequate infrastructure. However, tourist and cultural destinations designed for people with blind disabilities are still very few and even rare. One of the instruments that can be used by blind people is *braille books,* which are also a rare item and hard to find in bookstores or tourist spots (Adiba et al., 2019), especially in Sumbawa Regency, West Nusa Tenggara Province.

Along with advances in technology, it encourages changes in the way people communicate and seek cultural information by utilizing *smartphones* for blind people to meet their desired information needs. The ability of blind people to utilize information technology is grouped into intellectual abilities in thinking and physical abilities in using technology independently. Services that are easily accessible for persons with disabilities include the provision of cultural and tourism information in audio, visual, and tactile forms. Sumbawa Regency, West Nusa Tenggara Province, provides very minimal cultural information for blind people with disabilities. Cultural information that can be obtained in Sumbawa Regency is found in five locations: the Dalam Loka Palace, Bala Kuning Palace, Bala Puti Palace, Bala Datu Ranga, and the Sumbawa Museum. Culture has a major function for society, which is also influenced by technological developments and the awareness and sensitivity to critically understand culture in an area (Bahar & Teng, 2017). The diversity of local cultures is faced with problems that are starting to be difficult to find information about and modernization on the other hand, especially in (Budi Setyaningrum, 2018) Sumbawa Regency, West Nusa Tenggara Province. Every historical object that is part of cultural heritage is given a description on a piece of paper. The cultural information presented is then affixed to the walls of the building. Information on paper is less effective, so it needs to be converted to digital form, which is then stored in a database (Maslahah & Rahmawati, 2019). Conveying information using paper media used in heritage buildings has weaknesses, namely that it is less attractive, boring, and monotonous. Information conveyed through paper media is still general information and does not provide a detailed description of historical objects. In addition, the minimum number of guides in each cultural heritage location who explain in more detail each collection is the cause of the uneven distribution of information to visitors, especially those with visual disabilities. Based on this, innovation is needed by utilizing *smartphones* that can provide more detailed information about Sumbawa culture to cultural heritage visitors, especially those with visual disabilities.

Meanwhile, , the use of *smartphones* for blind people with the use of screen reader programs has been optimized, one of which is in the field of education (Utama & Ariyanto, 2021), (Sunardi et al., 2021). The use of technology for blind people is not something new, such as screen readers that assist in independence and disability participation (Raja, 2016). Thus, screen reader programs can assist in providing convenience and increasing literacy for blind people (Fathurahmat, 2021). Optimizing the use of *smartphones* can be used for broad

information storage such as images, audio, and video (Altuwaijri & Ghouzali, 2020). Similar research was carried out in 2018 by applying *barcodes* to students with visual disabilities, with the results being able to help the learning process (Indriastuti & Saksono, 2018). Meanwhile, similar research on tourism and cultural applications was also developed in 2017 and 2022, with the results being able to make it easier to find cultural information (Hozeng & Syam, 2017), (Irawan & Rosyani, 2022), but the target of these applications is not specifically intended for blind disabilities.

Thus, the use of *smartphones* by blind people supported by android-based screen readers is able to provide convenience in the fields of education, society, and self-development to become more competent in obtaining visual information converted *into* audio (Sulistyowati & Rafi, 2020; Hermawanto et al., 2019). The addition of *a barcode* with a screen reader can display detailed cultural information on historical objects on display at five cultural heritage locations in Sumbawa Regency. An Android-based application to get to know Sumbawa culture for people with visual disabilities is equipped with two languages, namely Indonesian and English, and is already available on the Google Play Store. With this application, it can help blind people understand Sumbawa cultural literacy as an effort to obtain information and as a way of preserving regional culture.

Method

This research using a quantitative method with focused manufacturing application Android based smartphones as media literacy in introducing Sumbawa culture to disabled disability net. Manufacturing process applications use waterfall method (Novak et al., 2023) starting from *software requirements analysis*, *design*, *code generation*, *testing* and *support*. Processes carried out with use method *waterfalls* can be seen in Figure 1.
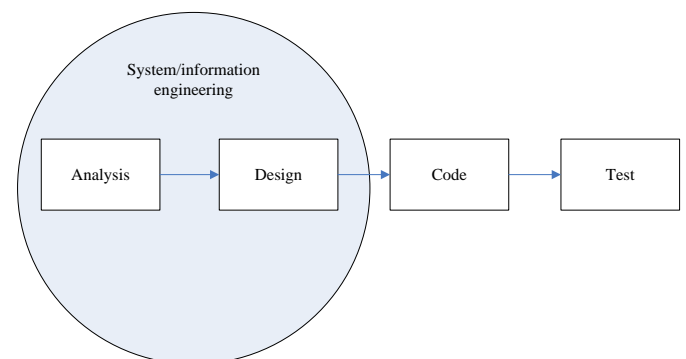

Figure 1. Stage of Waterfall Method

Each stage carried out using waterfall software development is described as follows:

Analysis

Analysis stage, collects data with Sumbawa culturalists who are members of the Tana Samawa Traditional Institute (LATS), and conducts discussions and collects data with the IT Center for the Blind (ITCFB) (Zhong et al., 2023), (Muhamad et al., 2019). This stage is carried out to find out the wishes of the blind community for application needs and determine the features of the solution application to present cultural information that is appropriate and easy for blind people to understand. At this stage, analyzing the specifications of the device used to develop applications with a minimum of 8 GB of hardware, storage using a Solid-State Drive (SSD), storage using an Intel Core i3 8th, AMD Ryzen 3000, and Qualcomm Snapdragon 8c. The processor architecture uses x64; the minimum Android used by *the user* is Android 4 (Android Ice Cream Sandwich), and the maximum Android used is Android 12 (A*ndroid Snow Cone*).

Design

Design process using the *Unified Modeling Language model*, which is the standard language in object-oriented programming (UML) (Kim, 2018) to design an application display that suits the needs of people with visual disabilities. The design process used in the application uses three UML processes, namely use case diagrams, activity diagrams, and class diagrams. The design process in the application can be seen at the point below.

1. Use Case Diagram

Modeling using use case diagrams in the application to get to know Sumbawa culture is divided into two actors who use the application. The first actor from an android device, namely all visitors, especially those with visual disabilities, at the Dalam Loka Palace, Bala Kuning Palace, Bala Puti Palace, Bala Datu Ranga, and the Sumbawa Museum, can access the language select feature, namely Indonesian and English. The next step is for people with visual disabilities to scan the barcode to get the cultural literacy information they want to know. As for the second actor, namely from the *back end* or web admin application, whose job it is to input information related to historical objects exhibited at five cultural heritage points, namely the Dalam Loka Palace, Bala Kuning Palace, Bala Puti Palace, Bala Datu Ranga, and the Sumbawa Museum, Features that can be accessed, namely the *login feature* to validate users who enter the application by entering a username and password. The next feature is a script with subscript

input features. The fourth feature is the feature about the application, and the added user feature is used to add admins to input information about Sumbawa culture.
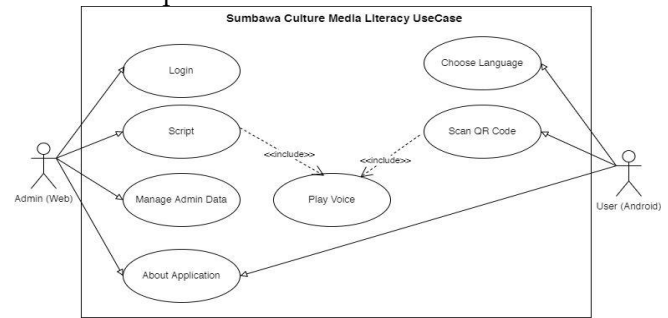

Figure 2. Use Case Diagram

2. Activity Diagram

The activity diagram model is divided into two parts: activity diagrams for users on the front end and activity diagrams for admins on the back end.
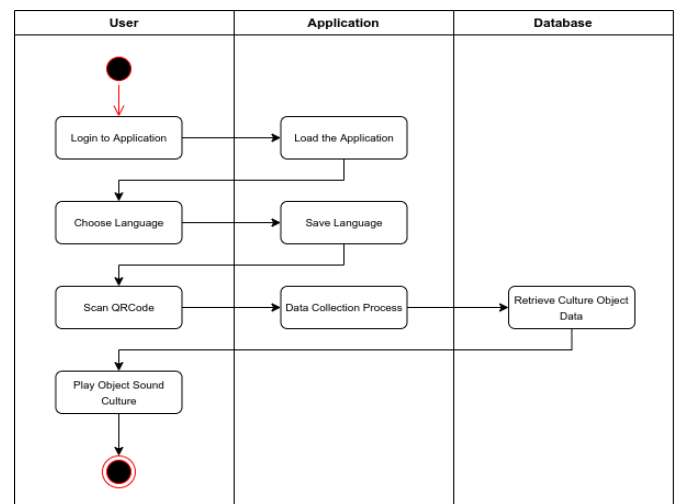

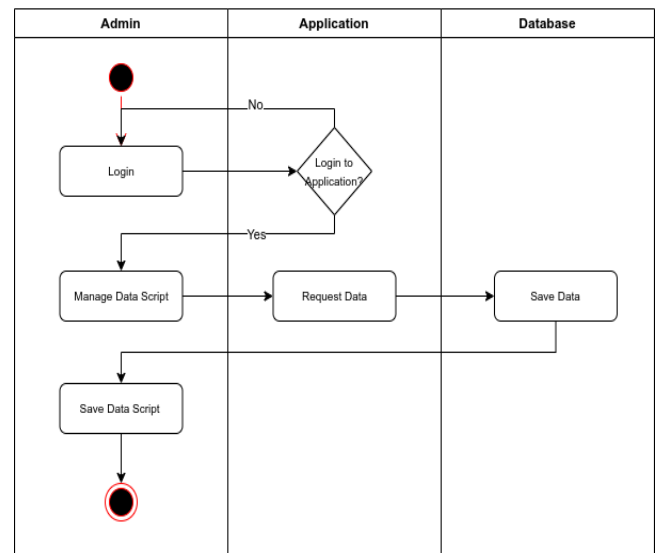**Figure 3**. User Activity Diagram

Figure 4. Admin Activity Diagram

3. Class Diagram

Modeling on design, namely using class diagrams with the aim of understanding the software more easily (Khaliq et al., 2022). In the class diagram, it is divided into three classes, namely the user class, the script class, and the location class.
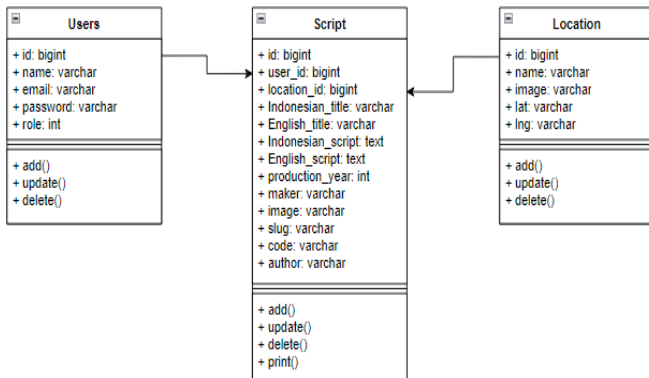

Figure 5. Class Diagram

Code

The code generation process is divided into two parts: tools used for web admin coding as the back end and Android coding as the front end. The tools used to develop web admins use the MySQL database, the PHP programming language, and the Laravel Framework (Laaziri et al., 2019; Nurmatiarista et al., 2022) . Meanwhile, the tools used to develop Android use the Dart and Flutter programming languages, and the text editor uses Android Studio and Visual Studio Code (Karnawan, 2021; Rolando et al., 2019).

Test

The testing process is the fourth process of the waterfall model and is carried out by involving IT experts from academia and users with visual disabilities (Della Nur Annisa & Nashar Utama Jaya, 2022). To measure the satisfaction aspect of Android-based application users about Sumbawa culture for people with visual disabilities, the *User Experience Questionnaire* (UEQ) test is used to measure the level of *user experience* of an application and can be seen in the *benchmark diagram* (Karunia et al., 2023; Putro et al., 2020).

Result and Discussion

The of making literacy media based on an Android smartphone application for getting to know Sumbawa culture for people with visual disabilities are divided into three processes. The first process displays an overview of the application flow. The second process displays the access rights that can be used by admins and application users. The administrator's job is to input information related to cultural applications in accordance with the historical objects described. While the second process for application users, namely blind people, is to use *a smartphone* and scan a barcode to get information about the desired cultural literacy, The following is a detailed discussion of the three processes.

Overview of Application Flow

In general, the flow of media literacy based on Android smartphone applications for introducing Sumbawa culture to people with visual disabilities is divided into two access rights. The process is carried out by the user as the first access, namely connecting to the internet using an Android smartphone and scanning the barcodes that have been provided at five cultural heritage locations. While the second access, as admin, can input data by connecting to the internet and carry out the process of inputting the data obtained for further storage in the database so that it can be accessed by users.
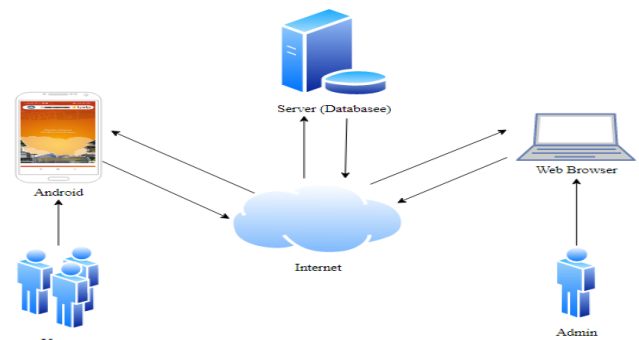

Figure 6. Overview of Application Flow

Admin Web View

The web admin display starts with the admin filling in the username and password to be able to access the main page. On the main page display, the admin can add historical object texts in Indonesian and English. The next process is saving the manuscript, which can then be edited, added to, and deleted.

1. Admin Login View

In the admin login process, the first thing to do is type in the URL, namely Budayasumbawa.id, and then a page will be displayed like figure 7.
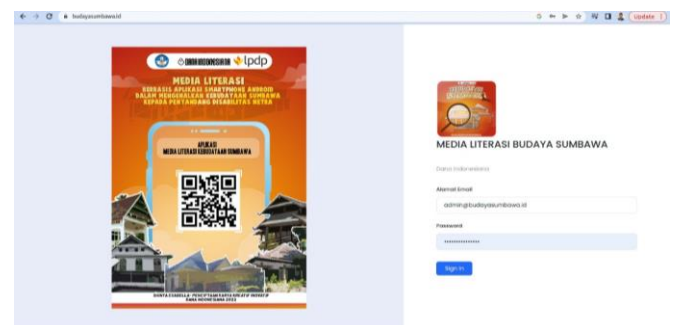

Figure 7. Display of the Admin Login Page

2. Admin Main Page Display

On the main page of the manuscript, the administrator can enter according to the field of work in one of the five cultural heritage locations. The main page for the admin displays script information that has been input and displays an added button that functions to provide additional information based on new data.
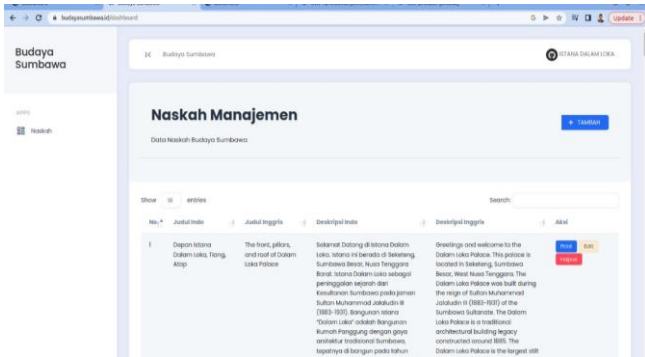

Figuer 8. Display of the Main Admin Page

3. Display of Input and Edit Manuscript Pages

The script input page is used by the admin to add new information regarding historical objects in cultural heritage locations. The new information is inputted into two languages, Indonesian and English. Meanwhile, editing the script is used to improve the narration that is input if discrepancies are found in the information displayed. On this page, the administrator is required to fill in information about the title, information about the description, information about the year of publication, and information about the maker of the information. If the information has been filled in, the admin can submit the information that has been filled in.
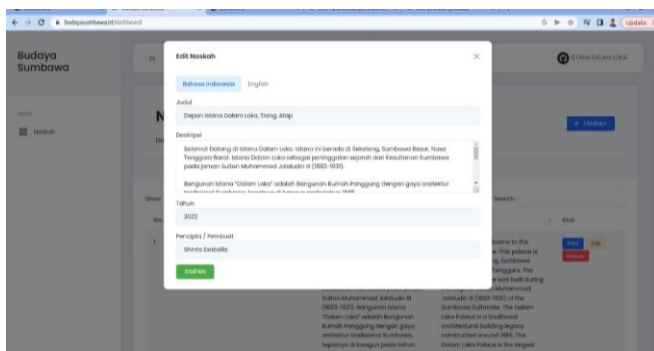

Figure 9. Display of Input and Edit Script Pages

Display User Page

The Android user display starts with the user clicking on the application icon, and then it displays Indonesian and English options. When you have chosen the language, the user can scan the available barcodes at five cultural heritage locations. The next process will display information in the form of audio that can be heard by blind people. Media literacy based on an

android smartphone application for getting to know Sumbawa culture for blind people can be accessed on the Play Store with the keyword "Sumbawa Cultural Media" and the link https://play.google.com/store/apps/details?id=com.uts.budaya_sumbawa (*Media Budaya Sumbawa*, 2023).

1. View Icon Page and Select Language

The first process carried out by the user is clicking on the application icon, which then displays Indonesian and English, which can be selected by application users.
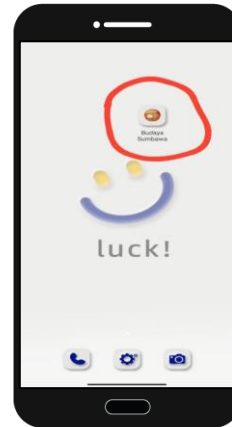

Figure 10. App Icon Display

Figure 11. Display Select Language Page

2. Barcode Scan Page Display and Audio Output

On the barcode scan page, application users who are visually impaired can use the screen reader feature on *the smartphone* used and then point the camera at the barcode that has been provided on each cultural heritage object, as attached in figure 13. After the barcode scan process is carried out, the application will then display the output in the form of audio, which can then be heard by blind people to get information about culture. This application can also be optimized for use by the general public to increase literacy about Sumbawa culture.

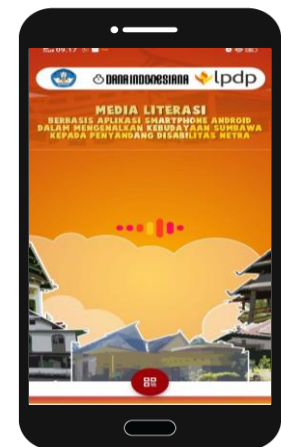**Figure 12**. Scan Barcode Display

Figure 13. Output Audio Display

User Experience Questionnaire Testing

User experience questionnaire testing is used to evaluate the designs that are made to provide effective results for application users (Agustina & Gustalika, 2022). Testing the application to know Sumbawa culture was tested on 35 respondents with 26 questions categorized into 6 scales, which include *attractiveness, perspicuity, efficiency, dependability, stimulation,* and *novelty.*

1. Process of Data Processing and Analysis

The process of data processing and analysis uses *the User Experience Questionnaire,* which was distributed to 35 respondents with visual disabilities and IT experts. Processing of data distributed to 35 respondents using UEQ tools. The first stage was carried out, namely with the respondents filling out the questionnaire, and then the results of the questionnaire were inputed into the UEQ tools. The third process, namely the transformation of questionnaire data filled out by respondents with 26 scales, The results of the data transportation are grouped into six aspects of UEQ, which include *attractiveness, perspicuity, efficiency, dependability, stimulation,* and *novelty.* The last process, namely the results of *the user experience,* can be seen in accordance with the six predetermined UEQ aspects.
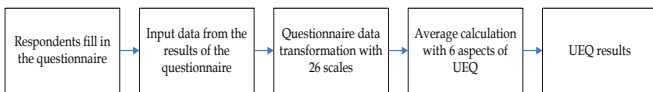
| Respondents fill in the questionnaire | → | Input data from the results of the questionnaire | → | Questionnaire data transformation with 26 scales | → | Average calculation with 6 aspects of UEQ | → | UEQ results |

Figure 14. UEQ Data Processing

2. Application user Experience Testing Results

Based on the tests that have been carried out on the application to know the culture of Sumbawa on 35 respondents with visual disabilities and IT experts using the *User Experience Questionnaire*, the average results are as shown in Figure 16.

Figure 15. Display on the Apllication Testing

The average score generated for the attractiveness aspect is 1.90, and the average score for the perspicuity aspect is 1.77. The third aspect of UEQ is efficiency, with an average value of 1.61, and the fourth aspect is dependability, with an average value of 1.55. The fifth aspect is stimulation in the UEQ model with an average value of 1.49, and the sixth aspect is novelty with an average value of 1.39.
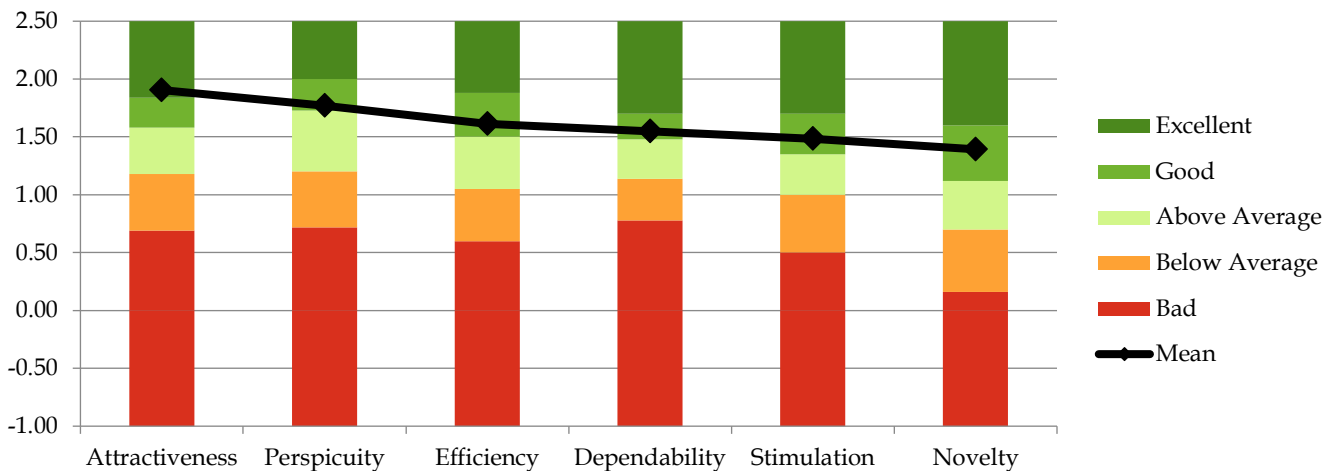

Figure 16. Average UEQ Test

From the test above, it shows that the Android-based application to get to know Sumbawa culture produces good values for aspects of *perspicuity, efficiency, dependability, stimulation*, *and novelty.* As for the attractiveness aspect, it produces very good scores.

Conclusion

Media literacy based android smartphone application in introducing Sumbawa culture to disabled disability net succeeded with using waterfall method as a development model device software and using UML

as a design model. After the testing process is carried out with use User Experience Questionnaire (UEQ) produces average value for the attractiveness aspect is 1.90 and the perspicuity aspect is with yield 1.77. The aspect of efficiency with average value of 1.61 and dependability with the average value is 1.55. Whereas stimulation aspects on the UEQ 1.49 model and novelty aspects with this is 1.39. With thus, utilization application This can give literacy culture to disability being one effort in study and preserve inheritance culture. Application This can optimize utilization by the reserve admin culture for giving information to the public specifically visual disability. Process of use application, that is with a reader screen if you choose the desired language that is Indonesian and English. Next, the disability net directs the smartphone to the barcode that is already provided with audio output that can be heard by the visual disability.

Author Contributions
The first author has contributed to presenting and conceptualizing ideas, research methodologies, and software development methods, collecting data, analyzing data, and designing applications. The second and third authors assist in the process of collecting and analyzing data, developing applications according to the development method, and writing articles. The fourth and fifth authors contributed to processing data and writing articles and updating the references used. The sixth author contributed to revising the article and overseeing the article publication process.

Conflicts of Interest
The authors declare no conflict of interest.

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