

# The Development of Android-Based Balinese Dance Dictionary

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**Abstract**— Almost all of the terms used in Balinese dance adopt words or terms from the Balinese language which can make difficulties for those who are interested in learning Balinese dance. Current technologies, especially in mobile technology, can certainly be a solution and become medium to disseminate the Balinese dance. This study was about an Android-based dictionary of dance application that described the meaning of words or terms in Balinese dance with multimedia visualization features, using images or videos. The development was carried out using the prototyping development paradigm. A total of more than 700 words or terms and their meanings could be searched and found together with over 300 visualizations of dance movements. The dictionary application was developed to be accessible globally, therefore two language versions can be selected, in Bahasa Indonesia and English. Test results showed that this dictionary can be used easily and worked properly.

**Keywords**—dictionary; Balinese dance; android; Balinese dance dictionary; mobile technology.

## I. INTRODUCTION

Balinese dance is one of the cultural wealth that attracts tourists to visit Bali due to its beauty and the deep meaning in each of its movements. Balinese dance is a traditional art that has its own uniqueness compared to other dances from other areas or regions, such as the clothes, its movement, and the accompanying gamelan. Apart from its different characteristics, the types of Balinese dance are also diverse, from welcoming dances to the sacred dances that are only performed during the religious ceremonies or rituals. Balinese dance itself has become an important part of Balinese culture besides the music, theatre, or handicrafts [1].

Balinese dance is not only performed for shows only but also has been part of the culture that is learned not only by Balinese people but also tourists of both domestic and international. There are service providers, travel agents or even dance studio, that offers a number of tour packages that include learning Balinese dance. The activities are guided by instructors who are experts in Balinese dance. Such activities are possible since many villages located in an area that makes it able to interact with tourists and also possible for them to be active participants in the Balinese dance course [2] with the fact that Balinese dance can be learned by anyone.

However, problems will arise when a person who is no longer accompanied or guided by dance instructors or someone who know or understand about Balinese dance. One of the causes is that Balinese dance consists of terms that use the Balinese language. Therefore, that person will have difficulties to know or understand the dance movements that most are pronounced in the Balinese language that would sound very strange to the person who does not have basic knowledge of Balinese dance or language.

The passion or willingness to learn traditional dance is not limited to only local residents. It is also applied to the Balinese dance. Therefore, media can help people to know or understand the terms that are used in Balinese dance. The dictionary becomes one of the solutions to tackle the problem. However, the availability of the Balinese dance dictionary is still very limited. Most of the dictionaries of Balinese dance that can be found in the markets or stores are in the form of books that can be tricky in searching for the terms. Sometimes, the term that people try to search is not based on the provided terms that already sorted, instead it is based on the part of the definition itself. It will challenge people to find the terms or the correct definition that they are looking for. Visualization of the movements will be limited to figures when it comes into book.

The latest technology, specifically the information and communication technology (ICT), has raised possibilities for the development of various online products that are able to deliver information globally. Even more, the development of current mobile technologies brings the ease of access to information, whenever and wherever. Approximately over 100 million smartphone users in Indonesia in 2018 [3] or around 2.87 billion users globally [4]. Meanwhile, based on the operating system, Android devices are used by 75% of the users of mobile devices all over the world [5].

The development of multimedia technology also becomes one of the common features of information delivery. The ability of such technology in presenting messages in the form of video brings the enrichment of information delivery for users. Recent mobile-technology based devices have already supported the existence of such technology, especially with the vast development of the world internetworking technology, the internet. It reached an average of 7.2 Mbps of speed [6] which in such rate multimedia can be accessed

without any problems. Based on the facts above, the use of mobile technology especially the Android-based devices is very promising and has potential to deliver information related to the Balinese dance, including the supporting multimedia such as video files.

In this work, an Android-based Balinese dance dictionary application has been successfully developed. The application was built by using the software development approach based on mobile technology. The development of the application utilized React Native that allows further development targeting other devices using a different operating system such as iOS. Furthermore, the application provided the translation of the Balinese dance terms into two languages, namely Bahasa Indonesia and English. Therefore, the developed dictionary was equipped with the description of the terms' definition to reach the audience from both national and international.

## II. THEORETICAL REVIEW

Dictionary as a tool providing the word or term description which has been developed in various forms, printed or in digital version [7,8,9,10,11,12]. Focusing on the art of dance itself, several researches have been done and produced in form of printed dictionary books or websites on the internet [13, 14]. Research on reference [14] developed a digital media to publish the Balinese dance arts based on web technology. The technology eases the access of information from users all around the world and can be accessed from various devices as long as connected to the internet.

In recent years, many researchers have resulting dictionary applications based on the mobile technology [15,16,17,18]. References [15] and [16] utilized multimedia features in order to provide a description of the searched terms. Meanwhile, references [17] and [18] had shown how to utilize the smartphone-based dictionary in various fields of interest.

In order to introduce Balinese dance using the digital technology, several products had been developed in some research [19, 20]. Reference [19] had successfully developed an educational game application based on Android technology. The game displayed fourteen types of Balinese dance costumes with a total of 40% of respondents who gave a rating of "good" for the application. Meanwhile, reference [20] emphasized the use of augmented reality for an Android-based application. From the survey, they received positive responses. However, related to the helpfulness in learning Balinese dance, the built application only received a total of 16.7% of the "sufficient" rating.

There are also several theories regarding the definition of the dictionary itself. Reference [21] stated that a dictionary is a book that provides a list of words sorted alphabetically and describes the meaning of the words. Meanwhile, the big dictionary of Bahasa Indonesia [22] describes a dictionary as (1) reference book containing words or phrases, usually sorted alphabetically, along with the information regarding their descriptions, usage, or the translations; and (2) book containing a group of terms or names that are alphabetically sorted together with the explanation about the description and its usage.

The rapid development of the ICT and internet makes the dictionary is no longer limited to the printed form only, but shift to the utilization of advantages provided by digital technology. A digital dictionary or electronic dictionary shows up with the feature of ease of use in case of mobility and also data updates can be done in a fast manner without having to increase the dimension of the dictionary itself significantly, unlike the printed version. The product of an electronic or digital dictionary is not a new thing anymore.

According to reference [23], there are three types of an electronic dictionary. The first type is the dictionary that can be carried out easily (hand-held dictionary). This kind of dictionary is popular in Asian countries such as Japan, China, Korea, and some south east Asian countries. The disadvantages of this type of dictionary are the price, relatively expensive for a device that "only" dedicated to a dictionary. The second type is a dictionary in the form of CD-ROM. It has a limitation regarding its media player. A computer will be required to play such media. With the current trend of using portable storages, the usage of CD-ROM has been drastically dropped as static storage. The last type is online dictionaries which have been implemented vastly in recent years. This type of dictionary becomes popular due to its ease of use and accessible from anywhere at any time.

The increase of the utilization of mobile devices also influences the preference of people in using the dictionary. Technology enables the development of applications with the multimedia features to be utilized online and therefore enrich the forms and types of the dictionary itself. The presence of smartphone devices with a particular operating system has brought up the forms of hybrid dictionary that facilitate users in finding the meaning of a word.

## III. MATERIAL AND METHODS

The development of this Balinese dance dictionary was done using the standard approach in the software development paradigm, the prototyping method. This approach consists of several steps that are the requirement analysis, fast design, prototype development, prototype evaluation, prototype improvements based on the evaluation, and ended in the product engineering. Phases on the method used in this work can be seen in figure 1.

The requirement analysis was done by providing the standards for development itself, hardware and software. In the case of development of this dictionary, there were several requirements that had been observed such as the targeted devices, the compatibility of operating system versions, software, interface, form and characteristics of the dictionary, including the requirements of the multimedia materials. The resources related to the lemma or terms that were going to be used in the dictionary were also observed. The key point was that the requirements of the system could be defined in detail by involving resources, humans or systems, to provide the big picture of the planned application form which can provide the detailed materials that had to be prepared.

The fast design was done after the requirements were successfully defined, in detail. The purpose was to acquire the initial interface from the application, the scenario of features

functionalities, and the planning of the data flow and contents within the application. Materials were prepared based on the results of the requirements analysis. The design included the flow of data and processes, the steps of the access of the pages, the links and features in the pages, and how the contents of the dictionary would be displayed.

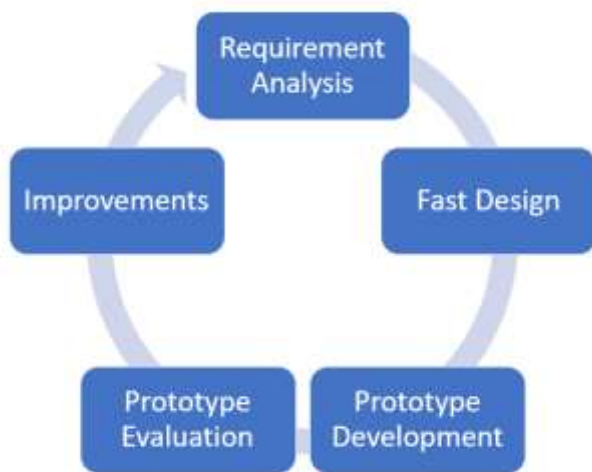


Fig 1. The paradigm of software development using a prototyping approach

After the design had finished, the prototype then developed. In this phase, there were two major works that had been done. The first one was the implementation of the Android-based application and the second one was the recording of the dance movements that would become the content of the application later. The application was built based on the design that had been done earlier. The main functionality was built followed the workflow in the previous phase. The developed application was then installed in devices running Android OS and tested to provide the correctness of its functionality. Meanwhile, the recording of the dance movements was done to get the visualization of it.

The resulting prototype was evaluated to achieve the agreement between the developer and the initial user as the form of the good development process. Feedbacks were obtained as the result of evaluation processes. Based on the evaluation, the feedbacks were used to provide improvements of the developed prototype. The improvements put the process into the next cycle. This cycle ended when the agreement has been reached between developers and the users.

#### IV. RESULTS AND DISCUSSION

The application was designed to be able to utilize multimedia features, in this case the video. The application only required a mobile device with an Android operating system and standard multimedia features installed, and therefore even the simplest Android device can be used to run this application. However, devices that can be found in the market do not longer include Android operating system below the version of Nougat. We did not test the application for the latest version, Android 10. However, our application should

have worked properly with little effort of development since there were no specific features that we had used to build it.

The dictionary application was designed to be able to show basic functionalities that are mostly used in the dictionary itself such as word or term searching, display the meaning of the searched words, also display and play the related video files. From the test, the developed Balinese dance dictionary could have provided the dance terms using two methods, by searching or by browsing terms. As explained previously, the application supported two languages to provide the meaning of the words or terms which are Bahasa Indonesia and English. Videos were shown accordingly. The initial fast design is shown in figure 2.

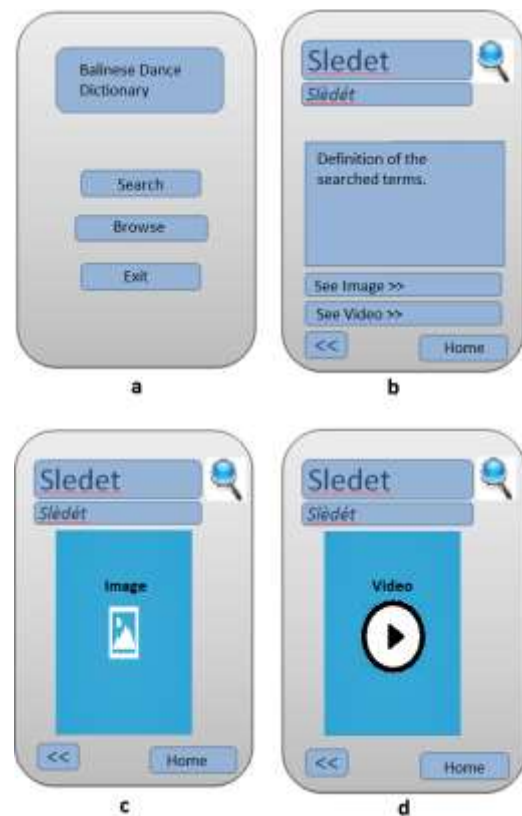


Fig 2. The initial design of the application display which includes (a) the choice of user actions; (b) the process of searching and displaying the meaning of words; (c) displaying images; and (d) displaying videos.

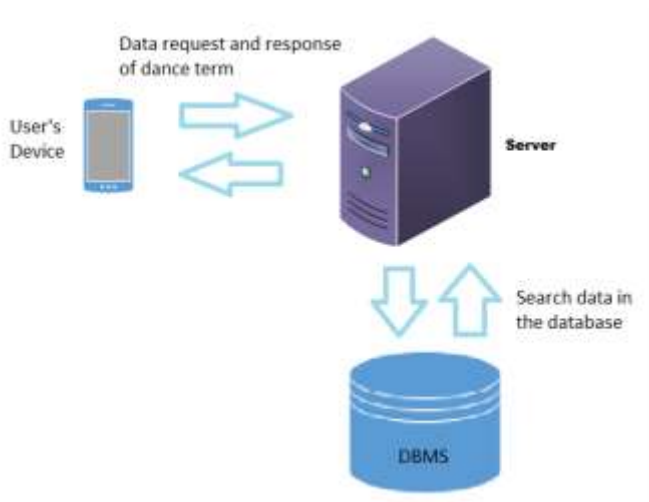


Fig 3. The process of data communication is the search for the meaning of dance terms between devices, application servers and database servers

The application was designed to be used to search the Balinese dance terms and able to stream the required multimedia files. Considering that the dictionary was basically a continuously developing application, the storage and the database were predicted to increase fast. Therefore, the offline access to the contents of this application was opted out. The server was the only node that kept the data of the dictionary. The data flow between the server and application is shown in figure 3.

The implementation of the dictionary application was done based on the designed that had been provided previously. An evaluation was done when implementation met the expectation of the initial development. The result of the evaluation used for the improvements of the application itself. In this research, the evaluation was done by giving questionnaires to a total of 40 users. Important points of the questionnaires were related to interface, illustration, layout, fonts, colors, and its interactivity. The result of the first cycle was 3.3 out of 5 which meant that the initial application did not meet the expectation of the users. After improvement processes, the same survey was done and a rate number of 4 was obtained. Several feedbacks for improvements were also given by users. These feedbacks were considered to be done for further improvements for this dictionary.

It was explained that the developed dictionary was able to provide terms in two methods, by searching and browsing. Figure 4 showed the process of the searching process and the related search results. If the searching method found similar results, then all of the terms found were displayed.

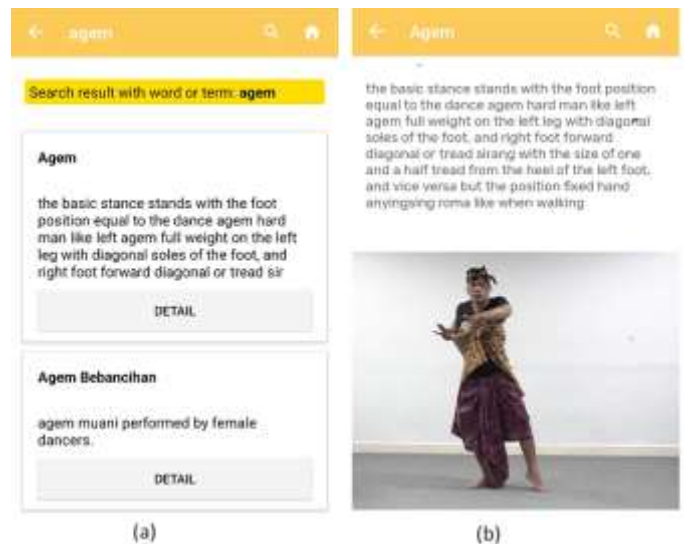


Fig 4. Display word search meaning. (a) the searched word or term, and (b) the search result will be displayed based on its suitability with the word searched together with its related video

The other method to retrieve Balinese dance terms is the "browse" method. Users can choose the provided alphabet, a to z, which then displayed the related terms begun with the corresponding letter. Figure 5 below shows the list of terms that was displayed when user had chosen the letter "A". When a term was tapped, the detail of the selected term will be shown.

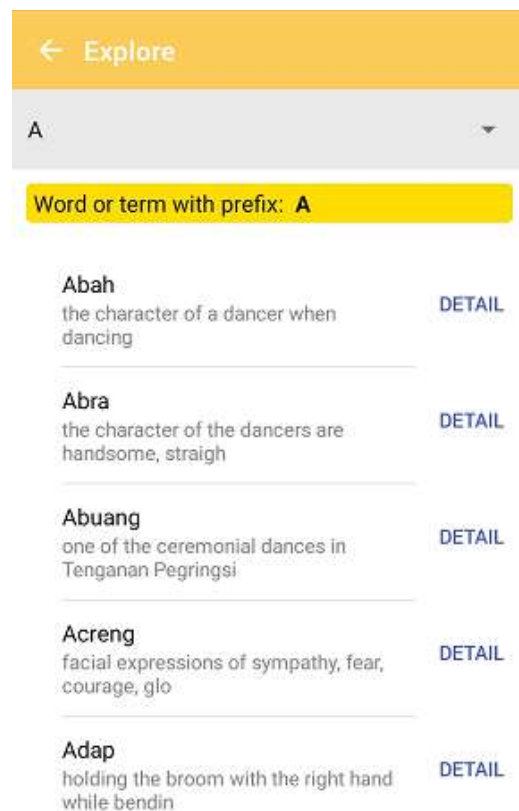


Fig 5. Display a list of dance words or terms in the dictionary after pressing the roaming key and the initial letter sought

Both of the methods above have a result on the display of terms that match the searching criteria. Either way will lead the user to the display of the description of the intended term or word. Furthermore, when a video related to the selected term is available, it means that the user can play the video that visualize the movements of the dance term itself.



Fig 6. The visualization of the dance moves that correspond to the dance term they are looking for

The built application was an Android-based Balinese dance dictionary. The dictionary was tested under different versions of Android operating system. Table 1 shows the functionality of the features within the application. We tested the application using 3 (three) different versions of Android operating systems, namely the 7 (Nougat), 8 (Oreo), and 9 (Pie).

TABLE 1. FEATURES ON APPLICATION RUNNING ON DIFFERENT VERSION OF ANDROID OPERATING SYSTEMS

Version	Load Apps	Search Feature	Browse Feature	Play Media
7 (Nougat)	√	√	√	√
8 (Oreo)	√	√	√	√
9 (Pie)	√	√	√	√

√: working well, without problem  
x: not working

The final product was the Android-based of Balinese dance dictionary. However, the final prototype still had limitation that should be improved in the future. Some features could be added to enrich the ability of the dictionary itself. Based on the focus group discussion which was attended by experts on dictionary, dance, language, and information technology, several improvements were proposed for this dictionary.

The dictionary required implementation of advance technologies or methods that could improve the functionality of the prototype itself. Some important features were proposed. An audio (text-to-speech and vice versa) would be useful for the non-native learner to retrieve the correct pronunciation of the terms. A suggestion or autocomplete method could be helpful for the user to get a more precise searching result, since not all user will be very familiar with

specific terms. Searching history could provide the traceback of the previous searching results when needed. Even though current network technology has developed vastly, the support of an offline dictionary will still be a great feature for the users. However, it can only be applied for the term details only.

There are two versions of the application that can be installed, namely the free version (free) and the paid version (commercial). The free version can be installed freely by the user from the Google Play. Meanwhile, the paid version will allow users to display the application freely, both from the absence of advertisements in the application and the integrity of the content.

## V. CONCLUSION

A software product in the form of a Balinese dance dictionary application based on Android has been successfully built using a prototyping approach. This application can provide the meaning of words from Balinese dance terms that have been included in the database. Multimedia features can enrich and assist users in understanding the meaning and mimicking the motion of the terms sought. This application is able to make it easy for users to find and understand the meaning of words in two languages, Indonesian and English.

## VI. ACKNOWLEDGMENT

Authors would like to thank LPDP, who has funded this research through RISPRO fund in the year 2019.

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