The Development of an Android-Based *Anggah-Ungguhing* Balinese Language Dictionary

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Abstract—Indonesia is an archipelago country with a variety of local languages; one of which is Balinese (mother tongue), used by the Balinese people in daily life and in certain ritual ceremonies. In Universitas Pendidikan Ganesha, Department of Balinese Language Education, students have been given Anggah-Ungguhing in speaking subjects where they are taught to understand the use of Balinese language based on social strata. But in the process of learning the Anggah-Ungguhing, there are some problems, including: 1) There is no media that supports learning of Anggah-Ungguhing vocabulary. 2) The motivation of students when learning Anggah-Ungguhing by using books is low. Based upon the analysis on the problems and previous researches, this study aims to: 1) Development of mobile dictionary to support the learning process Angggah - Ungguhing anywhere and anytime. 2) Measuring the level of student's motivation are using mobile dictionary while learning vocabulary Anggah - Ungguhing. The method used in this research is Software Development Life Cycle (SDLC) with Waterfall based model. Based on the results of tests that have been done, mobile dictionaries can be declared successfully developed based on user needs. In this research has distributed about 60 questionnaires to measure the level of student's motivation who use mobile dictionaries on learning Anggah - Ungguhing Balinese language. The result of the student's motivation measurement shows that the motivation of the students that the learns Anggah - Ungguhing Balinese languange using mobile dictionary is in the positive category.

Keywords—Mobile Learning, Mobile Dictionary, *Anggah - Ungguhing*, Balinese languages, Mother Tongue, Android, Waterfall Model, Student Response.

1 Introduction

Indonesia is an archipelago country with various regional languages; one of which is Balinese language that, as a mother tongue, is used for everyone particularly among Balinese people in daily life or in a ritual ceremony. UNESCO in 21st February has defined the importance to protect and preserve Balinese language ("*ajeg Bali*") as the mother tongue and as the World Mother Tongue Day since 1999 [1, 2].

Department of Balinese Language Education, one of the existing Language and Art Faculties in Universitas Pendidikan Ganesha, indirectly has become a parameter for

the process of coaching, developing and preserving Balinese language. Through the material of *Anggah-Ungguhing* Balinese language in speaking subject, the students are taught about the word structure and the sentence level to understand the communication of Balinese language both in the class and in social life with any social strata.

From the observation result, the researcher also working as the lecturer in speaking subject has identified a number of problems in the learning process including:

1. There is no media that supports learning of Anggah-Ungguhing Balinese language. Currently the learning process Anggah – Ungguhing Balinese language is only based on books provided by the lecturer. This resulted in a lack of interest of students to learn Anggah – Ungguhing Balinese language outside the classroom.
2. The motivation of students when learning Anggah-Ungguhing Balinese language by using books is low.

Along with the advance of technology of communication and information a learning process is possible to be conducted not only in the classroom but also in anywhere and anytime. It is highly influenced by the technology development – particularly mobile technology [3, 4, 5, 6].

A number of researches have been successfully conducted regarding the mobile-based learning development for the local language dictionary such as the Android-based application developed for Sundanese language [7], the development of the android-based application of Indonesia-English dictionary and the one for Nias [8]. Other studies were also conducted by [9] to develop the application of Balinese- Indonesian language dictionary. However, this research did not use any level of *Anggah-Ungguhing* Balinese language.

Based upon the analysis on the problems and previous researches, it has been found the importance of the development of the android-based application of Balinese language dictionary to facilitate the rapid and practical learning process of *Anggah-Ungguhing* Balinese language at Department of Balinese Language Education without requiring any books.

2 Literature Review

This research used a number of literature reviews related to the educational aspect and mobile technology including: M-Learning; *Anggah-Ungguhing* Balinese Language.

2.1 Balinese Language Level (*Anggah-Ungguhing* Balinese Language)

Balinese language is one of regional languages in Indonesia and has been well maintained by its speakers, in this case Balinese people. It is a mother tongue or main language for most of Balinese people and used as a communication tool in any social activities. Hence, it becomes a support for the sustainability and development of Balinese cultures. Regarding the number of native speakers, Balinese language is

spoken by around half million people and becomes a tradition of literature of Balinese language. Historically, there are three periods in Balinese language:

1. *Kuna* Balinese Language (ancient). It is Balinese language used as a communication media in the ancient era of Balinese kings and it is the invention of the inscription of ancient Bali in the form of papyrus containing some letters or ancient Javanese language.
2. *Tengahan* Balinese language. It is a language used to write the Balinese literary works such as *Kidung, Babad, Wariga, Usada, Usana*, or *Niti.*
3. *Kepara* Balinese Language (Common Language). It is Balinese language still used as the communication media in today daily life or to interact with other people.

In recent period, Balinese language, regarding its users, has a language levelling system called as *Sor - Singgih* Balinese language. In its usage, *Sor - Singgih* Balinese language, as stated in Indonesian Language dictionary issued by Basic Education Agency of Bali Province, is defined as low, smooth or respectful language. In other words, *Sor-Singgih* Balinese language deals with the rules of high or low level about feeling that refers to solidarity by respect through Balinese language to other people. The division of phase in accordance to *Sor-Singgih* Balinese Language consists of:

1. Basa Kasar, Kasar Pisan/ Kasar Jabag
2. Basa Andap
3. Basa Madia
4. Basa Alus, Alus Sor, Alus Mider, and Alus Singgih
5. Basa Mider.

Table 1. The level of *Anggah-Ungguhing* Balinese language

Anggah-Ungguhing Balinese Language		
No	*Word level (Rasa Basa Kruna Basa Bali)*	*Sentence level (Rasa Basa Lengkara Basa Bali)*	*Paragraph level (Rasa Basa, Basa Bali)*
1.	kruna alus singgih	lengkara alus singgih	Basaalus
2.	kruna alus madia	lengkara alus madia	Basamadia
3.	kruna alus sor	lengkara alus sor	Basaandap
4.	kruna alus mider	lengkara andap	Basakasar
5.	kruna mider	lengkara kasar	
6.	kruna andap		
7.	kruna kasar		

Balinese language has a levelling system. The first person talking about the Balinese language levelling as written in documentation is J. de Vroom (1872), a Dutch using a term called "*Masor Singgih*". The Balinese language level is also known as "*Anggah-Ungguhing*" [10, 11, and 12]

2.2   M-Learning Theory

Mobile learning or m-learning is mostly referred to e-learning. In its first definition, m-learning refers to learning using cellular technology from e-learning [13]. It is globally introduced as a flexible learning approach and as a learning process delivered through a wireless mobile phone enabling a learning to be conducted flexibly in time and place. M-learning is used for the learning process of individual and community in an isolated area in the social and geographical perspective [14].

There is no any specific definition of mobile learning but many definitions have been developed purposely to identify it. Quinn [15] defined m-learning as a mobile device-based e-learning such as Palms, machine of Windows CE, even digital cellular phone". Mobile learning is also viewed as "the exploitation of hand hardware in everywhere, wireless network and cellular phone to improve and extend the scope of learning process" [16]. A study in 2004 conducted by Naismith et al. [17] suggested that mobile technology could be connected with six types of learning or categories of activity: behaviourist, constructivist, situated, collaborative, informal/lifelong, and support/coordination. Jones et al. [18], by contrast, considered the motivational or affective aspects of mobile learning as the defining characteristics, namely control (over goals), ownership, fun, communication, learning-in-context and continuity between contexts. The works of Winters [19] concluded that the perspective in mobile learning today commonly consists of four categories:

1. Techno-centric: mobile learning is primarily seen as a learning supported by mobile devices
2. An extension of e-learning: mobile learning is a subset of e-learning
3. Augmenting formal education: mobile learning complements the formal education
4. Learner-centred: mobile learning is about mobility and context

The mobile devices are not only limited to the communication devices, but also as a tool for the students in accessing knowledge anywhere and anytime. More educational institutions worldwide move to mobile learning as a way to enhance the education quality. The potential of mobile learning applied in education is able to contribute a significant benefit in terms of cost effectiveness, comfort, learning motivation, accessibility, and flexibility, closeness of information and interaction [13, 14, 15, and 16]. As a part of e-learning, m-learning automatically is a part of distance learning (d-learning).
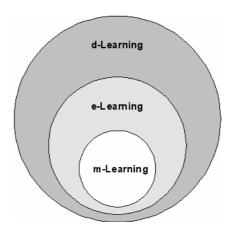
Fig. 1. Perspective of learning paradigms [5]

3 Methodology

3.1 Research setting and procedures

This research used Waterfall Model method. The research roadmap using the waterfall model is presented Table 2.

3.2 Variable

The independent variable in this research was the android-based application of Balinese language dictionary; while the dependent one measured in this research was the response of the students in Department of Balinese Language Education using the dictionary application as the supplement in the learning process of *Anggah - Ungguhing* Balinese language in speaking subject.

3.3 Research Sample/Subject

Sample/subject in this research was the students of Department of Balinese Language Education taking speaking subject in the second semester in the academic year of 2014/2015.

3.4 Sampling Technique

In the second semester of the academic year of 2014/2015, the number of students randomly taken was 30 students (1 class) that had a smart phone (android).

Table 2. The research roadmap

Phase	Activities	Location	Deliverable
Analysis	1) Analysis on the learning process of *Anggah-Ungguhing* Balinese language in speaking subject 2) Literature study in Journal and Existing System 3) Data collection for the glossaries of *Anggah-Ungguhing* Balinese language from a number of dictionaries and lecture materials. 4) Analysis on the flow of procedure in management system to be developed.	1) Classroom of Department of Balinese Language Education 2) LCI 3) LCI 4) LCI	1) The problems in the learning process of *Anggah-Ungguhing* Balinese language in speaking subject were identified 2) The theories of *Anggah-Ungguhing* Balinese language, Mobile learning and some theories from relevant researches were described. 3) The glossaries about *Anggah-Ungguhing* Balinese language from some sources were collected. 4) The entity/user of system and characteristics of the users were described.
Design	1) The design of the system architecture 2) The design of the interface system 3) Design of ERD	1) LCI 2) LCI 3) LCI	1) An android-based leaning system design to the dictionary of *Anggah-Ungguhing* Balinese language 2) Mobile and web-based interface design for the dictionary of *Anggah-Ungguhing* Balinese language. 3) The database and relational design
Develop-ment	1) Database Implementation 2) Interface System Implementation 3) System implementation to the server 4) Collecting data to the lexicons of *Anggah-Ungguhing* Balinese language	1) LCI 2) LCI 3) LCI 4) Department of Balinese Language Education	1) Database was implemented 2) Interface System implementation 3) System has been applied in server and ready in use. 4) The data of lexicons of *Anggah-Ungguhing* Balinese language were collected.
Testing	1) Unit testing 2) Integration testing 3) System testing 4) User acceptance testing	1) LCI 2) LCI 3) LCI 4) LCI and classroom in Department of Balinese Language Education	1) Each function/class has been verified in accordance with the algorithm flow 2) The integration of function/class has been verified in accordance to the algorithm of flow class 3) The system entity has been verified in accordance with the algorithm flow 4) The system entity has been validated in accordance with the users' needs.
Further Testing	1) Field test to the students of Department of Balinese Language Education 2) Field test to the lecturers of speaking subject	1) Classroom in Department of Balinese Language Education 2) Classroom in Department of Balinese Language Education	1) Percentage of response from the students (users) of Department of Balinese Language Education 2) Percentage of response from the lecturers (users) of speaking subject in Department of Balinese Language Education.
Maintenance Phase was not done in this research			

3.5 Data Analysis

The responses of the students were descriptively analysed using the questionnaires by means of Likert Scale 5 (score 1 to 5). The conversion of the response of the students can be seen in Table 3.

Table 3. Likert Scale [20]

The range of values	Response categories
$M_i + 1,5\ S_i \leq x$	Very Positive
$M_i + 0,5\ S_i \leq x < M_i + 1,5\ S_i$	Positive
$M_i - 0,5\ S_i \leq x < M_i + 0,5\ S_i$	Undecided
$M_i - 1,5\ S_i \leq x < M_i - 0,5\ S_i$	Negative
$X < M_i - 1,5\ S_i$	Very negative

M_i = 1/2 (highest score ideal + lowest score ideal)
S_i = 1/6 (highest score ideal - lowest score ideal)

3.6 Research Achievement Criteria

The development and the use of android-based dictionary of *Anggah-Ungguhing* Balinese language have facilitated the students in learning the vocabularies of *Anggah-Ungguhing* Balinese language in Department of Balinese Language Education. It would be successful if this application could fulfil the criteria of this research including: (1) the application of android-based dictionary of *Anggah – Ungguhing* Balinese language has been successfully developed and 2) the response of students using this application was in the category of positive or above.

4 Results and Discussion

This research developed the android-based application of *Anggah-Ungguhing* Balinese language in speaking subject. This research was conducted for eight months from March to October 2015. The development of this application consisted of mobile application and web application. The development of mobile application used android, and the web application was developed using PHP.

4.1 System Architecture

Based upon the analysis on the characteristics of students in learning the *Anggah-Ungguhing* Balinese language and other needs, the system architecture can be designed as shown in Figure 2.
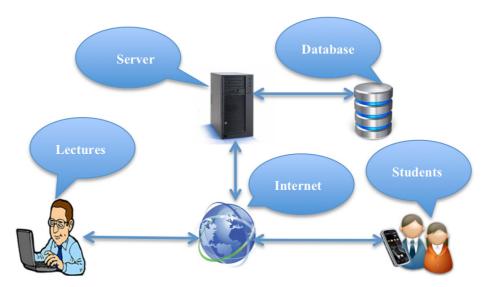
Fig. 2. Architecture design

Based on the system architecture, there were two entities that can access this system entity among students in accessing the android-based application and the entity of lectures accessing the web application and as administration. All data (vocabularies) would be saved in database server. This application development using MySQL database. The programming language used for lecturers' application is PHP while the students' application uses the android.

4.2 Mobile-based dictionary application

Mobile based application was used by the users (students) to translate the words from the *Anggah--Uugguhing* Balinese language into Indonesian Language or vice versa. There have been some processes that have been reached in this research including:

As seen in Fig. 3 the users are able to do a translating process to the vocabularies by putting the words of the *Anggah-Ungguhing* Balinese language or Indonesia language and by clicking the button of *Translate*. To do the translating process, it must be firstly ascertained that the mobile phone has been connected to internet.

The translation results from the vocabularies can be seen in Figure 4. For instance, the word translated was "Kaki" (leg), the translation result *in Indonesia language w*as Kaki, Kruna Alus Singgih was "cokor", Kruna Alus Sor was "buntut ", and Kruna Andap =" Batis ".
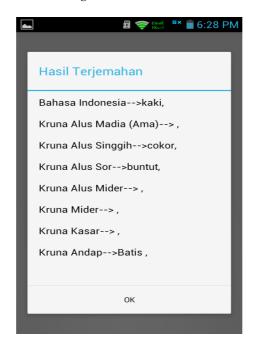
Fig. 3. Translation form

Fig. 4. Form of translation results.

4.3 Web-based dictionary application

The web-based application used by the admin to manage the words of *Anggah-Ungguhing* Balinese language into Indonesia Language or vice versa. There are some processes that have been conducted in this research:

Figure 5 presents a display of main menu for an administrator. In this menu, there are some features used by administrator to manage the *Anggah – Ungguhing* Balinese language such as the types of words and *Unggah-Ungguhing* Balinese language.

Figure 6 shows the process of managing the data of word types, and menu was used by administrator to manage the word types (Indonesia, *Kruna alus singgih, Kruna alus madia, Kruna alus sor, Kruna alus mider, Kruna mider, Kruna andap, Kruna kasar*).

Figure 7 shows the word types used by the administrator in managing the data of the *Anggah-Ungguhing* Balinese language. The administrator is able to process the input of words, edit or delete the words in accordance with the word types existing in the database.
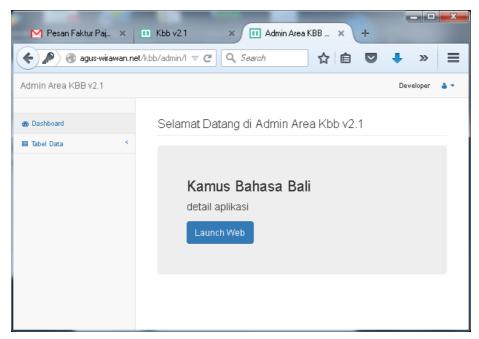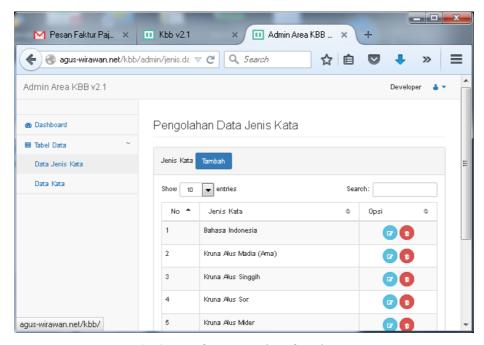

Fig. 5. Main form.

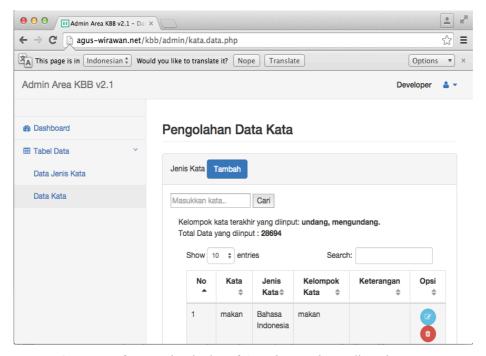**Fig. 6.** Form for manages data of word types.

Fig. 7. Form for managing the data of *Anggah-Ungguhing* Balinese language.

4.4 Testing

This research involved three testing phases including:

1. Testing on technique (technical testing) was conducted by the application developer to test the functionality of application (Black Box Testing) and to check the structure of software algorithm (White Box Testing). The process of this testing was conducted during the software development process. The testing process was based upon the White Box Testing and Black Box Testing. The results on White Box Testing and Black Box Testing conducted by the developer were stated successful and compatible with the need analysis of the system.

2. The test on software as a learning media conducted through the test by experts in media aspect and test by expert in content.
   (a) The test on application conducted by the experts in media was performed in 1st July 2015. From the result of test, there were some points needed to be revised related to the inaccuracy of image and incompatibility of image with the material content.
   (b) The test on the software by the expert regarding the content was conducted in 2nd July 2015 in which the elements of content eligibility were still inaccurate - in this case in the inaccuracy of the selected font type.
   (c) In the first test by the expert in media, there were some weaknesses to be revised. For this, the second phase of test was conducted in 5th July 2015. The test result at the second phase stated that the application of the *Anggah-Ungguhing* Balinese language dictionary as a learning media has been declared compatible.
   (d) In the first test with the content experts, there were a number of weaknesses to be revised; thus, the second phase of this test was conducted in 5 July 2015. The test result stated that the application of the *Anggah-Ungguhing* Balinese language dictionary from the content of learning was declared compatible.

3. The field test was conducted by means of the test on the students in Department of Balinese Language Education, Universitas Pendidikan Ganesha, taking the speaking subject. The test was conducted from 9 July to 10 July 2015. This test was used to obtain the response of the students taking the speaking subject. The result of the response of the students consisting of 10 declarations was then measured using Likert Scale of Likert 1-5. The highest ideal score and the lowest one were found at 50 and 10 respectively. The measurement of ideal mean and deviation standard was presented as follows:

> Mean ideal = 1/2 (the highest ideal score + the lowest ideal score)
> = 1/2 (50 + 10)
> = 30
> The ideal deviation standard = 1/6 (the highest ideal score - the lowest ideal score)
> = 1/6 (50-10)
> = 6.7

The responses of the students using the android-based dictionary of Anggah – Ungguhing Balinese language in speaking subject showed that 20 students stated it

very positive (66,67%), 8 students stated positive (26,67%) and 2 students were doubtful (6.67%). Thus, it can be explained that on average the students were in the category of very positive (67,7%) and positive (23,3%). This was because they were very interested and felt much helped by the use of this application in following the lecture - particularly in speaking. However, 2 students were doubtful to use this application because having no android smartphone. The distribution of response of the students using the Balinese language dictionary and android is presented in the graph.

4.5   Discussion

The development of this application used the programming language of android and PHP; while the database used was MySQL. For the connection between the cellular phone and the database application, it needed the web service application using the PHP language. With the development of the dictionary of *Anggah - Ungguhing* Balinese language, any hindrance faced in the learning process could be settled particularly in speaking subject. The development of android-based dictionary of Anggah-Ungguhing Balinese language was able to be an alternative media in the learning process anywhere and anytime. The development of the mobile-based application in learning process can support the Go-Green concept in Universitas Pendidikan Ganesha. In the limited test conducted in the classroom, the response of the students using the application of the dictionary of *Anggah – Ungguhing* Balinese language in the learning process of speaking subject tended to be very positive.

5   Conclusion

Based on the research and discussion above, it can be concluded that:

1. The application of android-based dictionary of *Anggah – Ungguhing* Balinese language is able to model the glossaries of *Anggah-Ungguhing* Balinese language.
2. The development of android-based dictionary of *Anggah-Ungguhing* Balinese language was able to be an alternative media in the learning process anywhere and anytime.
3. The response of the students using the android-based dictionary of Anggah-Ungguhing Balinese language for the learning process of vocabularies of *Anggah-Ungguhing* Balinese language was very positive.

Based on the results above, the suggestion can be presented as follows:

1. For further research it is necessary to develop word structure and the sentence level to understand the communication of Balinese language both in the class and in social life with any social strata.
2. For further research it is necessary to develop a database SQLite for the choices that translation can be made offline.
3. For the further research, it can do the experiment from the development in this research; thus, the learning outcome from the students can be identified.

4. For the further research, it is possible to combine the learning strategy to make the learning process more interactive.

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