Technology and Local Language: Development of An Android-Based Sundanese-English Electronic Dictionary for The Baduy Community in Indonesia

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Article Info	Abstract
	Although a large amount of research on Sundanese language has been conducted, little attention has been paid to technology-based Sundanese language use. Therefore, academic and practical efforts should be made to contribute to the preservation of regional language use by developing educational technology-based innovations. The purpose of this research is to develop an Android smartphone-based bilingual dictionary application to facilitate English learning and Sundanese language preservation, especially for the Baduy tribe community. This research is categorized into research and development using the Design Based Research (DBR) method. This research was conducted in four stages, namely: (1) initial analysis stage, (2) prototype design development stage, (3) trial stage, and (4) reflection stage. Research data were collected through instruments including literature studies, interviews, expert assessments, and questionnaires. Then the data was analyzed descriptively as material for developing Android dictionary prototypes to be tested and evaluated until a qualified application model was obtained. The results showed that the development of an Android smartphone-based Sundanese dictionary contributes to English learning and Sundanese language preservation. Implications and recommendations from this research and recommendations are also discussed for future research.
Artikel Info	Abstrak
	Meskipun sejumlah besar penelitian tentang bahasa Sunda telah dilakukan, hanya sedikit perhatian yang diberikan pada penggunaan bahasa Sunda berbasis teknologi. Oleh karena itu, perlu adanya upaya akademis dan praktis untuk berkontribusi dalam pelestarian penggunaan bahasa daerah dengan mengembangkan inovasi berbasis teknologi pendidikan. Tujuan dari penelitian ini adalah untuk mengembangkan aplikasi kamus bilingual berbasis *smartphone Android* untuk memfasilitasi pembelajaran bahasa Inggris dan pelestarian bahasa Sunda, khususnya bagi masyarakat suku Baduy. Penelitian ini dikategorikan ke dalam penelitian dan pengembangan dengan menggunakan metode *Design Based Research* (DBR). Penelitian ini dilakukan dalam empat tahap, yaitu: (1) tahap analisis awal, (2) tahap pengembangan desain prototipe, (3) tahap uji coba, dan (4) tahap refleksi. Data penelitian dikumpulkan melalui instrumen berupa studi literatur, wawancara, penilaian ahli, dan kuesioner. Kemudian data dianalisis secara deskriptif sebagai bahan pengembangan prototipe kamus Android untuk diujicobakan dan dievaluasi hingga diperoleh model aplikasi yang berkualitas. Hasil penelitian menunjukkan bahwa pengembangan kamus bahasa Sunda berbasis *smartphone Android* memberikan kontribusi dalam pembelajaran bahasa Sunda dan pelestarian bahasa Sunda. Implikasi dan rekomendasi dari penelitian ini dan rekomendasi juga dibahas untuk penelitian selanjutnya.

I. INTRODUCTION

Local language is one of the national identities that needs to be preserved. Local languages will eventually become extinct and replaced by languages that are considered trendy by the younger generation if they are not maintained and regularly spoken. Some studies and research have proven and estimated that a language can vanish from civilization in a period of one to three months (Belew & Simpson, 2018;

Bromham et al, 2021). This can happen because the language is no longer used by the community as a means of mass communication. Indonesia is one of the countries that has the most regional languages among other countries. The number of regional languages in Indonesia according to the Central Statistics Agency or *Badan Pusat Statistik* (BPS) has increased to 718 in 2023. Unfortunately, BPS found that the use of local languages in Indonesia is continuously

decreasing over generations. To overcome the degeneration of regional languages, in addition to the government requiring regional languages to be studied in schools, it is necessary to develop technology that supports the preservation of the use of regional languages for the community, especially Sundanese which is the daily communication language of the Baduy tribe in the Lebak area, Banten Province, Indonesia.

In the modern era of the Industrial Revolution 5.0, tremendous advances in the field of information technology have had a significant impact on the education sector which provides convenience and effectiveness in the teaching and learning process. It has been widely accepted that technology in the education sector helps the preservation of regional languages used as communication and language of instruction in schools (Zein & Stroupe, 2017). With the use of technology, the preservation of regional languages such as Sundanese will be more easily socialized and reused by the wider community not only isolated to a small group of Baduy tribe communities. However, the government needs to pay attention that the technology advancement of education in Indonesia has not been evenly distributed especially in remote areas such as the Baduy tribe (Harahap, Maipita, & Rahmadana, 2020; Rosser, 2018). Baduy's indigenous children are the hardworking young generation who spend most of their time helping their parents to farm and raise livestock (Muslim, 2015). Therefore, they do not have much time to play, let alone to receive formal education with various limitation conditions they have, including technology support at school (Muslim, 2020). Therefore, it is necessary to develop technology-based learning media that can be used by the Baduy community to learn not only at school but also outside of school time.

In Indonesia, a study related to regional language preservation with the development of an android-based Lampung language dictionary for regional language maintenance facilities has been carried out (Ariyani et al, 2022). The results of this study are very helpful in preserving Lampung language which is increasingly rarely used. Nonetheless, the study of Sundanese language preservation for the Baduy tribe through the development of an android-based dictionary on smart phones is still uncommon. Therefore, this research is important to fill the gap. This study aims to answer two research questions, namely (1) how is the perception of the Baduy tribe community towards android technology-based language learning? And (2) how are the results of the development of an android-based Sundanese-English dictionary on smart phones?

II. LITERATURE REVIEW

A number of empirical studies on the development of android-based learning technologies have been conducted globally. Most researchers conducted studies on the use of android applications on smart phones as a means of learning English (Sadiq, Cavus, & Ibrahim, 2021; Şad et al, 2022). There is a literature study that reviews the use of Duolingo Game android application as a language learning tool since its release in 2012 until 2022 (Shortt et al, 2023). While research on the study of android application development on smart phones for language learning and regional language preservation is still very little done. For example, a study on technology-based indigenous language revitalization integrated with the traditional ecology of intergenerational language transmission has been conducted in the Great Lakes Region of Turtle Island North and Central America (Meighan, 2022). Moreover, another study by Guskaroska & Elliott (2021) also investigated heritage language maintenance through digital tools in young Macedonian children. These studies show that there is a concern for the preservation of local languages through the integration of technology.

Technology development studies in Indonesia, especially for the preservation of culture and local languages, are increasingly being carried out. The development of an android-based dictionary of Lampung language has been carried out to preserve the local language which is almost rarely used by the younger generation today (Ariyani et al, 2022). The research on technology development in Banten, especially in the Baduy tribe, began to be developed significantly. The utilization of Facebook social media for the Outer Baduy community has been studied to be interpreted as the opening of the Outer Baduy community to changing times, and technological developments while still following customary rules (Adrian & Briandana, 2023). A study on the preservation of Baduy language as local wisdom through an android-based Tour Guide application was developed to introduce and preserve the culture of local wisdom, especially Baduy language to the Baduy tribe tourist visitors so that Baduy local language can be recognized by local and foreign tourists (Dewi

et al, 2023). The novelty (state of the art) in this research towards the study and study of regional language from previous studies is the creation of an android-based Sundanese-English dictionary on a smartphone application developed to preserve Sundanese, especially for the Baduy community.

III. RESEARCH METHOD
A. Context of the Study

The research conducted in Ciboleger Village, Leuwidamar Sub-district, Lebak Regency, Indonesia. The participants involved in this research was the community members of Baduy Luar who live in Ciboleger Village, with the age range of 17 to 50 years old. Depending on the research stage (Reeve, 2006), several participant types were included in the study. The study enrolled 20 students, ten young Sundanese people, 15 Sundanese-Baduy native speakers, three linguists, two designers and developers. The analysis phase included students, young adults (Android users), and native Sundanese-Baduy people in addition to needs and context evaluations. Furthermore, Android application developers and designers were consulted in order to assess the Android dictionary for the project. Lastly, the application's content, design, and functioning were evaluated by native Sundanese-Baduy people and evaluators with backgrounds in information and technology, culture, and linguistics (Sundanese-English).

B. Research Design

This research is categorized into research and development using the Design Based Research (DBR) method referring to the framework of Reeves (2006) which is carried out in four stages, namely: (1) initial analysis stage to develop a theoretical basis, analyze existing English teaching materials, and conduct a needs analysis, (2) prototype design development stage to determine the feasibility of the model design, (3) trial stage to find out the product practically, and effectively, in its use in learning activities, and (4) reflection stage. Each stage has different data collection technique and data analysis. The data collection techniques used in this study were interviews, document analysis, questionnaire, observation, and Focus Group Discussion. Data Triangulation interactive analysis developed by Miles, Huberman, & Saldana

(2014) which includes: (1) data reduction, (2) data display, and (3) conclusion drawing and verification were used in the first stage. Thematic Analysis (Braun & Clarke, 2021) used to analyze data observation and Focus Group Discussion (FGD).

IV. FINDINGS AND DISCUSSION
A. Findings

An android-based Sundanese-English dictionary application for smartphones was developed through DBR, including the analysis stage, product development and design, as well as product testing and reflection stages. Each research data result was presented and explained as follows.

1. Analysis of Practical Problem

The first step in the analysis stage was conducting a context analysis using a literature review. The results of the literature review analysis demonstrated that the preservation of Sundanese through technology and Android-based apps in particular has not received much attention, despite a number of several practical and scholarly initiatives to encourage its maintenance (Adrian & Briandana, 2023; Dwi et al, 2023). To address this issue, the local government has also released public policies and municipal laws. As stated in article of the 1945 Constitution 36 explains that regional languages will be respected and maintained by the state. The position of regional languages is also listed in the Government Regulation of the Republic Idonesia number 57 of 2014 Chapter II Article 4. Moreover, local government also supported Seba Baduy as one of the traditional ceremonies of Baduy Kanekes which is held annually in Rangkasbitung square. Both foreigners and locals can learn more about the Baduy tribe through this traditional event, which also teaches Baduy Sundanese communication skills.

Considering the context study, the researchers also conducted a needs analysis by interviewing fifteen native speakers of Sundanese-Baduy. Five questions were posed regarding the preservation of the Sundanese-Baduy language. In addition, 500 frequently used terms were requested of them, of which 250 lexicons were derived following data reduction and validation.

Here is a summary sample interview results of ten native speakers of Sundanese-Baduy.

What do you think about the current preservation of the Sundanese-Baduy language?
"Further effort is required to maintain the Sundanese-Baduy language. Moreover, a lot of Indonesia's regional languages are in danger of extinction because today's youth prefer speaking Korean because they are exposed to Korean media." (Informant 6)

Is it possible that an Android-based dictionary application can overcome one of the Sundanese-Baduy language challenges in terms of language preservation?
"That's a good and interesting idea. Utilizing smartphone technology for regional language preservation. All age groups use smartphone on a daily basis these days." (Informant 5)

What kind of Sundanese vocabulary should be included in the development of this android dictionary?
"Vocabulary related to the traditional ceremony of the Baduy tribe so that both domestic and foreign visitors can learn about the tribe's culture through language." (Informant 4)

Based on the interview data, the needs of the community and Baduy tribe for the development of Sundanese-English android dictionary were described as follows. First, based on interview data, the number of Sundanese language users, particularly Sundanese-Baduy was falling. The majority of them, who were still descended from the Baduy tribe, were only encountered in familial settings. Second, the Sundanese-English android-based dictionary application is one of the alternative tools for preserving regional languages based on current technology which is expected to be able to preserve the local language. Third, the target audience as users of the Sundanese-English android dictionary is the younger generation, especially tech-savvy indigenous children and local to foreign tourists. Fourth, the Sundanese-English vocabulary needed by the community is the daily vocabulary used to communicate accompanied with some Sundanese-Baduy specific vocabulary that gives a characteristic of the Baduy language. Fifth, Sundanese-English android dictionary application was expected to be made simple in terms of its menu features so that it is easy to use by all ages. Furthermore, the design of the Sundanese-English android dictionary application was expected to display the cultural characteristics of the Baduy tribe.

2. Design Development

The data obtained from the initial analysis stage had provided various information to create a Sundanese-English android dictionary design. These data were used to obtain the feasibility of the android dictionary model. Sundanese-English android dictionary is a bilingual dictionary based on Sundanese and English vocabulary. This android dictionary uses a layout design that reflected the cultural characteristics of the Baduy tribe. Starting from the dark blue or navy background to the logo image of a typical Baduy stilt house will give the impression of a regional cultural nuance. This android dictionary provides a thousand types of Sundanese and English words in its application database. This android dictionary can be switched from Sundanese to English and vice versa. Designed in a simple way, this android dictionary has three main menus, namely "about the dictionary, the dictionary's team designer, and android dictionary features."

This dictionary can be used offline without an internet network, making it easier for Baduy people who live in remote areas. The purpose of developing this Sundanese-English android dictionary is as one of the tools for preserving regional languages, especially the Sundanese-Baduy language which is increasingly rarely used by the wider community. Sundanese-English android dictionary final version prototype application can be seen in Figure 1.
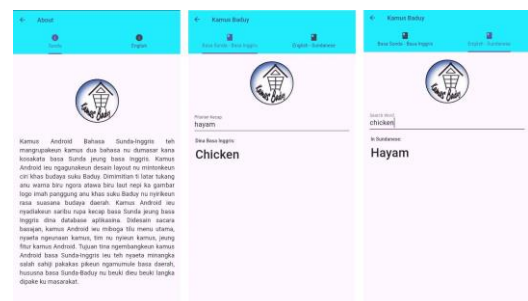

Figure 1. Sundanese-English android dictionary final version application

Expert Validation is the final phase of the developing stage. The product design and all of its contents were given to the team of experts (IT specialists, linguists, and cultural

experts) for evaluation. The researchers completed it multiple times. A validation process by experts was carried out to obtain feedback and suggestions for improving the Sundanese-English android dictionary final version application in terms of its content, design, and functionality. A column for suggestions and criticisms and a table with certain aspects are included in the validation form that was sent to the experts. A summary of experts' validation feedback is given in Table 1.

Table 1. The Result of Experts Validation

No	Expert Judgement (Feedback and Suggestion)	Follow up
A.	**Linguist Expert**	
1	The words stored in the dictionary application contain at least 500 words specialized in Sundanese-English Baduy language.	Revised
2	It is necessary to do further analysis to use some words appropriately.	Revised
3	Need to do word matching, grammatical correctness, and appropriate word usage based on context.	Revised
B.	**Cultural Expert**	
1	Insert colloquial Sundanese vocabulary	Revised
2	Add elements of Baduy culture	Revised
3	if possible, include the Sundanese dialect of the Baduy tribe	Not revised (not applicable)
C.	**IT Expert**	
1	The design needs a sort of improvement	Revised
2	Add short information about how to use the dictionary on about the dictionary menu	Revised
3	Need improvement on functionality, e.g. setting, main page layout	Revised

Based on the results of the experts' validation, the researchers revised several components in the android-based Sundanese-English dictionary according to input from the dictionary design, language content, and dictionary application functions. Revisions from the experts became one of the considerations in the feasibility of the android-based Sundanese-English dictionary prototype development to be tested in the user community.

3. Tryout and Reflection

Product tryouts were conducted three times by implementing an android-based Sundanese-English dictionary application on Baduy community members. The tryout was conducted to obtain the feasibility of the product. There were two techniques in collecting data during the trial, namely FGD (Focus Group Discussion) and questionnaires. FGD with native speakers of Sundanese-Baduy was conducted to reflect on the implementation of each tryout. Implementation was completed when the product was considered optimal and feasible to be used. At the end of the tryout, the researchers distributed questionnaires to the Baduy community to find out their responses and comments on the product. Evaluation was conducted after the tryout of the android-based Sundanese-English dictionary application prototype was completed to obtain input as material for revising the product. Tryouts and revisions were carried out several times to get a quality of the product.

The results of the FGD discussions on the three Android dictionary application tryouts were summarized in Table 2.

Table 2. Result of FGD

No	Feedback of FGD
1	The users said that the android dictionary application was simple and easy to use.
2	When users try to input some everyday Sundanese words that they commonly use but are not yet available in the application such as "*nyaraan*" they suggest adding it even though there is already an equivalent word with the same meaning, namely "*sasapu*" which means cleaning.
3	In order to assist users in connecting with foreign tourists, users have requested the addition of a word group for buying and selling Baduy handcraft goods.
4	The users said that overall the Sundanese English dictionary application was very helpful for them to learn the language independently and facilitated Baduy tribe children who cannot attend formal schools.
5	The users argued that the Sundanese-English android dictionary can be an alternative tool for preserving regional languages that are based on current technology.

The FGD results showed that the android dictionary application users were enthusiastic about trying and learning how to use the Sundanese English dictionary on their smart phones. There were no significant problems when trying to use the android dictionary to find the meaning of words. It is only that some users ran into issues when they first installed the application because they lacked the connection to the internet. Hence, the researchers share internet signals through internal wifi on smartphones. Once installed on a smart phone, users no longer need to be connected to the internet because the dictionary application can be used offline.

Meanwhile, the researchers also distributed questionnaires to the Baduy community who volunteered to be research participants. Table 3 was the result of the questionnaire.

Table 3. Users' Testimony of Android-based Dictionary Application

No	Statement	Response				
		SD	D	MA	A	SA
1	The Android-based dictionary is well-designed	-	-	5%	20%	75%
2	The color design and logo of the dictionary application represent the Baduy tribe	-	-	-	10%	90%
3	Easy to use with a straightforward design that does not require an internet connection	-	-	2%	8%	90%
4	The Sundanese vocabulary is in accordance with the daily words used by the Baduy tribe	-	-	-	3%	97%
5	There are some additional vocabularies for buying and selling Baduy handicrafts to communicate with foreign tourists	2%	-	3%	7%	88%
6	This android dictionary application is quite light when accessed and does not require a lot of data memory on smart phones	1%	3%	22%	4%	70%
7	Android-based dictionary application helps me learn Sundanese and English independently	-	5%	8%	10%	77%
8	I became interested in learning English just by typing Sundanese vocabulary using this android dictionary	-	11%	18%	3%	68%
9	This android dictionary really helps me to communicate with foreign tourists	-	15%	10%	20%	55%
10	This technology-based android dictionary application contributes to the preservation of Sundanese-Baduy language	-	-	6%	21%	73%

Note: SD (strongly disagree); D (disagree); MA (moderately agree); A (agree); SA (strongly agree).

The questionnaire was distributed to 40 users. There were ten questions assessed in

the questionnaire related to satisfaction in using the android dictionary application. Each item should be assessed using five criteria, namely strongly agree, agree, moderately agree, disagree, and strongly disagree. According to Table 3, the users assigned the Android dictionary application a very high rating of 90% on average for its attractiveness and distinctiveness in representing the Baduy tribe. This was rated as outstanding. With an average score of 92.5%, the dictionary's content which consists of Sundanese vocabulary and special additional words also received a respectable rating. Meanwhile, the Android dictionary's design and memory device gained points with an average of 72.5% in the sufficient area. With an average score of 68.25%, the users found that using android dictionaries as an alternative to learning and maintaining regional languages is a valuable functionality. Therefore, it can be concluded that the overall results of the questionnaire that was conducted among the users of the android-based Sundanese-English dictionary indicated a fairly excellent value in the dictionary's development as well as the feasibility of the product's use in the community.

B. Discussion

All users favored the development of an Android-based Sundanese-English dictionary application for the regional language maintenance. It is common knowledge that mobile applications, which have proliferated and emerged as the most cutting-edge technology of all technology goods, are now familiar to people all over the world (Ghorbani & Ebadi, 2020; Guskaroska & Elliott, 2021). In addition, social media now has an important role in the preservation and maintenance of regional languages that are increasingly rarely used (Dewi et al, 2023; Meighan, 2022). Furthermore, the results of this study suggest that some of the users of the Android dictionary are native speakers of Sundanese-Baduy, have a favorable opinion of the language, and are driven to acquire and utilize Sundanese-Baduy (Adrian & Briandana, 2023; Dewi et al, 2023). In other words, the positive feedback from users or study participants suggested that this android dictionary application helps maintain regional languages. The findings align with Guskaroska

and Elliott's (2021) study that participants demonstrate an interest in utilizing technological tools, with educational applications being preferred, even if few researches are currently available for learning indigenous languages.

The design and content of the android dictionary application were developed, revised and reconstructed based on the experts' suggestions and tried-out to the Baduy community as the application users. During the development and tryout stages of the android-based Sundanese-English dictionary prototype, there were several suggestions and inputs from experts and users that added to the completeness and feasibility of the dictionary. This is in line with Pravitasari & Rahayu (2021); Afiyattena & Pravitasari's (2022) studies on the development of electronic books that need to be tested on users so that the results of the prototype products developed are feasible to use.

It is expected that the development of this technologically advanced dictionary application for android will assist in the preservation of regional languages within the community, particularly for the Baduy tribe. Social media and technology can be utilized to link speakers and learners globally and encourage the usage of indigenous and heritage languages (Adrian & Briandana, 2023; Jany, 2018). Furthermore, it was discovered that technology intervenes in and supports the ideological construction that links language practices, social identity, and socio-cultural judgment, hence facilitating the practice of electronic mediation (Ariyani et al, 2022; Dewi et al, 2023). Artifacts are produced by this kind of electronic mediation, like the documentation and preservation of linguistic elements that are rarely used.

V. CONCLUSION AND SUGGESTION
A. Conclusion

In the preservation and maintenance of minority languages, particularly regional languages of certain tribes that are progressively becoming extinct, technology plays a crucial role. An android-based Sundanese-English dictionary application designed for smartphones has effectively helped to maintaining and preserving the Sundanese-Baduy language. As a means of maintaining and preserving minority

languages in the digital age, this android-based dictionary application garnered favorable responses from the users. In addition, the development of this android-based Sundanese-English dictionary facilitates the autonomous learning of the language by the Baduy community using their smartphones. Technology can facilitate informal language learning through online platforms. However, self-directed learning that occurs outside of the classroom and is not linked to any specific course or institution lacks a well-defined structure and is predominant or institution is not well structured, and is often unintentional or coincidental. Therefore, supervision is still needed from various parties, especially educators and the government to improve education, especially in remote areas inhabited by regional tribes that need to be preserved.

B. Suggestion

The current study does have limitations such as the android dictionary products developed are still very limited in terms of the variety of application features offered. This android-based Sundanese-English dictionary can only be used to search for Sundanese and English vocabulary. Both pronunciation and the voice note feature are unavailable. This dictionary is also designed to be easy enough to use without an internet connection, making it more convenient in remote areas. Consequently, there is a limit to the quantity of up-to-date vocabulary that can be provided, and it cannot be updated automatically. Suggestions for future researchers who are interested in developing android-based dictionary applications can develop this dictionary prototype by upgrading the features of the dictionary that are not yet available in order to optimize the use of this dictionary and contribute in the preservation of regional languages.

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