

Developing a Tonsawang Vocabulary Application for Elementary School Students

Vicky Rolando Langi*, Nancy Jeane Tuturoong, Arie Salmon Matius Lumenta

Universitas Sam Ratulangi, Indonesia

Email: vickyrolando01@gmail.com*, nancy.tuturoong@unsrat.ac.id, al@unsrat.ac.id

KEYWORDS

Elementary School;
Mobile Application;
Rapid Application
Development; System
Usability Scale;
Tonsawang Language
Learning.

ABSTRACT

Tonsawang is one of the regional languages in North Sulawesi that is increasingly less frequently used by younger generations, raising concerns regarding its preservation. The lack of interactive and accessible learning media for elementary school students remains a challenge in introducing Tonsawang vocabulary effectively. This research aimed to design and develop a mobile-based Tonsawang vocabulary learning application for elementary school students. The application was developed using the Rapid Application Development (RAD) method, which includes the requirements planning, user design, construction, and cutover stages. The application was implemented using Android Studio and the Kotlin programming language and was evaluated using Black Box testing and the System Usability Scale (SUS). The results showed that all application functions operated successfully, achieving a 100% success rate. Field testing also demonstrated that the application effectively supported independent learning and received positive responses from students, as indicated by high usability scores. Therefore, the application can serve as an effective digital learning medium while supporting the preservation of the Tonsawang language in the modern era.

INTRODUCTION

Regional languages are an important part of the cultural identity of a society. Each regional language has its own uniqueness in terms of vocabulary, grammar, and accompanying cultural expressions. In addition to functioning as a means of communication, regional languages also play a role in inheriting cultural values, traditions, and local wisdom from generation to generation (Pengelola Web Direktorat, n.d.). However, along with societal development and the increasing dominance of national and international languages, many regional languages are at risk of extinction, including the Tonsawang language (Brickell, 2019).

Although the Tonsawang language still has speakers among the indigenous people of Minahasa, particularly in North Sulawesi, it currently faces significant challenges in maintaining its existence. Younger generations are increasingly using this language less frequently in daily life and tend to prefer Indonesian or foreign languages in various communication contexts (Farisayah & Zamzani, 2018; Hidayat et al., 2021; Prismadianto et al., 2026; Rohmadi et al., 2023). This condition raises concerns that the Tonsawang language may become increasingly marginalized and potentially disappear in the future (Hardiningtyas et al., 2024).

To address these challenges, concrete preservation efforts for the Minahasa Tonsawang language are needed, one of which is through education. Formal education incorporating local content related to the Tonsawang language is considered an effective approach to familiarizing younger generations with its use (Insain, 2025; Jorolan-Quintero, 2018). Through structured

learning processes, students can recognize, understand, and practice the use of the Tonsawang language in a more systematic manner.

In today's digital era, mobile technology has developed rapidly and is widely used by various groups, including children. Mobile devices such as smartphones and tablets are not only used for entertainment purposes but also have significant potential as learning media. The use of mobile applications in the learning process has been shown to increase students' learning motivation, as demonstrated by a study conducted in Surakarta (Kusuma et al., 2022). The integration of mobile application technology into learning has transformed language education into a more innovative, accessible, and inclusive approach (Wahyuni et al., 2024). Based on this background, a mobile-based Tonsawang vocabulary learning application was developed specifically for elementary school students. This application presents Tonsawang language learning materials in an engaging, educational, and child-friendly format.

Watomakin et al. conducted research entitled “Mobile Application Design of Learning Word in Lamaholot Language for Children Using User-Centered Design”. The similarity lies in the focus on developing mobile-based regional language vocabulary applications. However, the difference is that their study applied a User-Centered Design approach, whereas the present study applied the Rapid Application Development (RAD) method.

Tahil et al. conducted research entitled “Preserving and Nurturing Tausug Language: The Bahasa Sug Mobile Learning Application Tool for Enhancing Mother Tongue Development for Toddlers”. Similarities were found in the use of mobile technology for language preservation. However, this study differs in terms of its target users, as it specifically focuses on elementary school students.

Zalukhu et al. conducted research entitled “Design of an Android-Based Nias Regional Language Dictionary Application with the Rapid Application Development (RAD) Method Using Android Studio”. Significant similarities were identified in the use of the same system development method (RAD) and development tools. However, the difference lies in the type of application, as Zalukhu's research developed a dictionary application, whereas this research developed a vocabulary learning application equipped with interactive multimedia features.

Hidayat conducted research entitled “Designing Mobile Application for Learning Sasak Language and Script for Elementary School Students”. The similarity lies in the target users, namely elementary school students, and the focus on multimedia features within the application. However, the difference is that the present study does not include script learning materials but focuses on audio pronunciation from native Tonsawang speakers.

Yuandi conducted research entitled “Android-Based Tolaki Regional Language Dictionary Application”. This research used the Android platform as the basis for developing a regional language dictionary application. The similarity lies in the utilization of the Android platform for language preservation. However, the difference is that Yuandi's research focused on a unidirectional dictionary function, whereas this study provides structured learning modules.

Nursyahbani et al. conducted research entitled “Design of Indonesian–Sundanese-English Bilingual Learning Application Equipped with an Android-Based Dictionary”. The similarity lies in the implementation of quiz features within the application. However, the difference is that their research focused on multilingual learning, whereas this study focuses specifically on one regional language, namely Tonsawang.

Putri and Wahyono conducted research entitled “Design and Build Mobile-Based East Sumba Language Learning Application as an Effort to Preserve the Nation’s Cultural Heritage”. The similarity lies in the main objective of preserving cultural heritage through technology. However, the difference lies in the language object and the cultural location examined.

Kawulur et al. conducted research entitled “Interactive Learning Animation of Tontemboan Language Introduction for Elementary School Students”. Similarities were found in the focus on a regional language from North Sulawesi and the target users of elementary school students. However, the difference is that this study combines the RAD method with user acceptance evaluation using the System Usability Scale (SUS) to empirically measure student satisfaction.

Based on the review of previous studies, several research gaps highlight the urgency of this study. First, although several studies have developed mobile applications for regional language learning, research specifically focusing on the Tonsawang language remains limited. Second, most previous studies have focused on dictionary functions or basic vocabulary without integrating structured learning modules, multimedia features, or audio pronunciation from native speakers. Third, studies combining the RAD method with usability evaluation using the System Usability Scale (SUS) in the context of regional language learning for elementary school students remain scarce. Fourth, research specifically targeting elementary school students in the Tonsawang-speaking area, particularly Tombatu Subdistrict, with learning materials tailored to their needs has not been widely conducted. This research addresses these gaps by developing a mobile-based Tonsawang vocabulary learning application using the RAD method and evaluating it through Black Box testing and SUS.

The novelty of this research lies in several aspects that distinguish it from previous studies. First, this research develops a Tonsawang vocabulary learning application specifically designed for elementary school students, which has not been previously developed. Second, the application integrates structured learning modules covering nouns, verbs, and numbers with interactive quizzes and audio pronunciation from native Tonsawang speakers, providing a more comprehensive learning experience compared with dictionary-based applications. Third, this research combines the RAD method with usability evaluation using SUS to empirically measure student satisfaction and application usability. Fourth, the application is developed based on direct observations and interviews with teachers and students in the Tonsawang-speaking area, ensuring contextual relevance and cultural appropriateness. Fifth, this research conducts comparative testing between conventional learning methods and application-based learning to demonstrate the effectiveness of the application as an independent learning medium.

A mobile app is software designed to operate on mobile devices, such as smartphones and tablets, to meet user needs (Putra et al., 2023). Android is an open-source operating system developed by Google in collaboration with the Open Handset Alliance (OHA) for smartphones and tablets (Satyaputra & Aritonang, 2014). The Rapid Application Development (RAD) method was introduced by James Martin in 1991 as a software development approach emphasizing speed, efficiency, and user involvement (Martin, 1991; Aulianita & Mukhayaroh, 2025). The System Usability Scale (SUS) is a reliable measurement instrument used to assess system usability based on user perceptions (Brooke, 2013).

Based on this background, a mobile-based Tonsawang vocabulary learning application was developed specifically for elementary school students. This application presents Tonsawang language learning materials in an engaging, educational, and easy-to-understand format for children. The integration of mobile application technology into learning has transformed language education into a more innovative, accessible, and inclusive approach (Wahyuni et al., 2024). Through this application, students are expected to learn Tonsawang vocabulary more innovatively while supporting efforts to preserve regional languages amid modernization and globalization.

METHOD

This research was conducted to design and develop a mobile-based Tonsawang vocabulary learning application for elementary school students. The research was carried out from March to November 2025 at SD Negeri 2 Tombatu and SD Negeri Inpres Tombatu 1, located in Tombatu Subdistrict, Southeast Minahasa, North Sulawesi, an area where the Tonsawang language is spoken. The target respondents were fifth- and sixth-grade elementary school students, with a total of 36 students participating in the field testing.

Research Tools and Materials.

Table 1. Research Tools and Materials

No.	Category	Resources	Remarks
1.	Hardware	Laptop	It is used for application development, data recording, and test result processing.
2.	Hardware	Huion pen tablet	Used as an aid in the creation of illustrations and graphic elements
3.	Hardware	Smartphone android	It is used for the process of testing and simulating the use of applications by users.
4.	Software	Android studio	As the main platform for building applications.
5.	Software	Kotlin	For application logic implementation.
6.	Software	Draw.io	Used for designing low-fidelity prototype application interfaces.
7.	Software	Chalk	Used for image and graphics creation on applications
8.	Instruments	Black Box	Used to record the results of the functionality test of each app feature based on system input and output.
9.	Instruments	System usability scale	It is used to get feedback from students on the ease of use of the application.
10.	Instruments	Observations and Interviews	It is used in the Requirements Planning stage to find out the needs of users and the conditions of learning the Tonsawang language in schools.

Source: Author's own elaboration based on research needs and literature on application development tools

Data Collection Methods

Primary data were collected through observation and interviews to identify the use of the Tonsawang language as well as validate linguistic and pedagogical materials. Secondary data were obtained through literature studies and comparative analysis of digital learning applications as the basis for designing functionality and application interfaces.

Development Method

Application development uses the Rapid Application Development (RAD) method that emphasizes iterative processes and expert engagement. The requirements planning stage is carried out through observation, interviews, and consultations with linguists and teachers to identify the functional and non-functional needs of the application. The user design stage is carried out by designing the application usage flow, creating low-fidelity prototypes, and compiling a data structure of learning materials and supporting media. Furthermore, in the construction stage, the application implementation was carried out using Android Studio with the Kotlin programming language, the creation of visual and audio pronunciation assets, and functional testing using the Black Box method. The last stage, namely the cutover, is carried out through application trials to elementary school students and evaluation of the usability level using the System Usability Scale (SUS) method.

RESULTS AND DISCUSSION

System Analysis and Design

The system is designed to provide an intuitive learning experience for elementary school students. System modeling is carried out using Unified Modeling Language (UML).

1. Use Case Diagram

The Use Case Diagram in Figure 1 illustrates the interaction between the Student/User actor and the application system. Users can access the main features available, namely selecting learning categories (nouns, verbs, and numbers), learning vocabulary materials, taking ability tests, and viewing profile information. This diagram shows all the functions that users can access in the app.

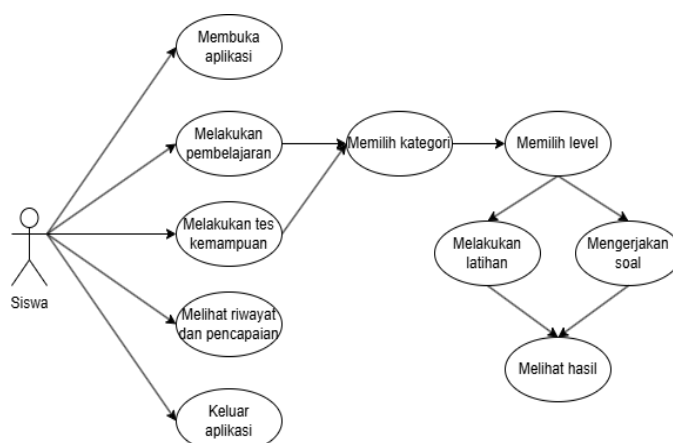


Figure 1. Use Case Diagram

Source: uthor's own elaboration using UML modeling (Draw.io, 2025)

2. Activity Diagram

Activity Diagrams are used to describe the flow of user activity when using the app. Figure 2 shows the learning flow that starts from category and level selection to the user learning vocabulary through text, images, and audio. Figure 3 shows the flow of the ability test, starting from displaying questions, receiving user answers, validating answers, to displaying

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sequenceDiagram
    participant Pengguna
    participant Sistem
    Pengguna->>Sistem: Membuka Aplikasi
    Sistem->>Pengguna: Menampilkan Menu Utama
    Pengguna->>Sistem: Pilih Menu, Balok
    Sistem->>Pengguna: Menampilkan Kategori
    Pengguna->>Sistem: Memilih Kategori
    Sistem->>Pengguna: Menampilkan Level
    Pengguna->>Sistem: Memilih Level
    Sistem->>Pengguna: Menampilkan Menu
    Pengguna->>Sistem: Menampilkan Hasil (Sukses, Tidak berhasil, dan Pesan Error)
    Pengguna->>Sistem: Menampilkan ke Layar
    Sistem->>Pengguna: Menampilkan Halaman
  
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sequenceDiagram
    participant Pengguna
    participant Sistem
    Pengguna->>Sistem: Membuka Aplikasi
    Sistem->>Pengguna: Menampilkan Menu Utama
    Pengguna->>Sistem: Pilih Menu Tes Kuantitatif
    Sistem->>Pengguna: Menampilkan Kategori
    Pengguna->>Sistem: Memilih Kategori
    Sistem->>Pengguna: Menampilkan Level
    Pengguna->>Sistem: Memilih Level
    Sistem->>Pengguna: Menampilkan Tes
    Pengguna->>Sistem: Memilih Jawaban
  
```

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sequenceDiagram
    participant Pengguna
    participant Sistem
    Pengguna->>Sistem: Membuka Aplikasi
    Sistem->>Pengguna: Menampilkan Menu Utama
    Pengguna->>Sistem: Pilih Menu Profil
    Sistem->>Pengguna: Menampilkan Riwayat dan Pencapaian User
    Pengguna->>Sistem: Kembali ke Menu Utama
  
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Figure 2. Learning Diagram Activity

Source: uthor's own elaboration using UML modeling (Draw.io, 2025)

The app is implemented using the Kotlin programming language on Android Studio. The interface design is made attractive with the use of colors and icons that appeal to children.

Figure 5 shows the splash screen which is the first view when the app is opened before the user enters the main menu.

Figure 6 shows the main page that serves as a navigation center for users to access the material categories, namely Nouns, Verbs, and Numbers.

The material is divided into several levels of difficulty to provide a sense of accomplishment. Figure 7 shows the level selection display.

Figure 8 shows the interface of the learning module. This feature presents vocabulary supported by visual and audio elements of pronunciation to facilitate the understanding of the material.

Figure 9 shows the ability test feature used to measure student understanding through random questions with four answer choices.

Figure 10 shows the Score page interface displaying the final results of the quiz as an evaluation of student learning outcomes.

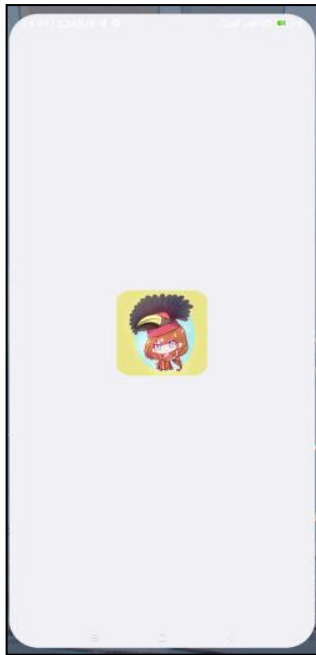


Figure 5. Splash Screen
Source: uthor's own elaboration using UML modeling (Draw.io, 2025)



Figure 6. Home
Source: uthor's own elaboration using UML modeling (Draw.io, 2025)

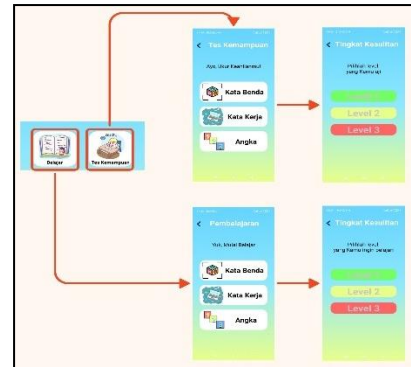


Figure 7. Level Selection
Source: uthor's own elaboration using UML modeling (Draw.io, 2025)

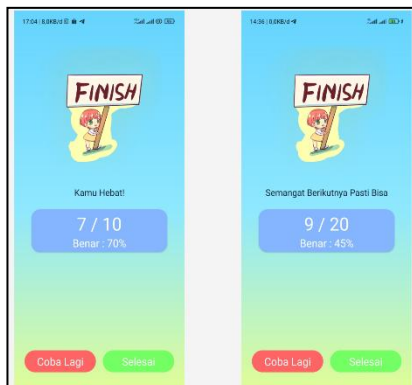


Figure 10. Score
Source: uthor's own elaboration using UML modeling (Draw.io, 2025)



Figure 9. Ability Test Page
Source: uthor's own elaboration using UML modeling (Draw.io, 2025)



Figure 8. Learning Modules
Source: uthor's own elaboration using UML modeling (Draw.io, 2025)

Test Results

1. Black Box Testing

Black Box Testing: Functional testing is done to ensure all features are running as planned. The test results showed that the navigation between pages, the audio playback function, and the score calculation logic on the quiz worked 100% (successfully). The results can be seen in table 2 of the Black Box Test Results.

2. Field Testing

The field trial was carried out at SD N 2 Tombatu and SD N Inpres 1 Tombatu involving 36 respondents from grade V and VI students. The test was carried out through a comparative study between conventional learning methods (teachers) and the use of applications.

The results of the first phase of the test showed that the average score of the group using the application was 92.78, only a slight difference of 1.66 points from the conventionally taught group (94.44). This proves that the application has a very adequate independent ability to transfer material to students.

In the Second Phase of testing, a change of method was carried out. The group that switched to using the app experienced a significant increase in the average score to 98.88. In contrast, the group that switched to the conventional method experienced a decrease in the average score to 92.22.

3. Pengujian SUS (System Usability Scale)

The evaluation was carried out through an interest and acceptance questionnaire distributed to 36 respondents. Using a 4-point Likert scale (where 1 indicates the highest approval), the result was obtained that students gave a "Strongly Agree" response to all major indicators. The results can be seen in table 3.

CONCLUSION

Based on the design results and a series of tests that were conducted, it can be concluded that the mobile-based Tonsawang vocabulary learning application was successfully implemented as a valid and effective medium for regional language preservation among elementary school students. Functional testing using the Black Box method showed a 100% success rate, indicating that all navigation features, audiovisual elements, and quiz systems functioned as designed. The findings of this study demonstrated that the application served as a reliable medium for independent learning, as students who used the application in the second testing stage achieved the highest average score of 98.88. A significant advantage of the application was its ability to support students who experienced limitations with one-way conventional learning methods, as visual elements and repeated independent audio practice contributed to improved vocabulary comprehension. Thus, the application prototype fulfilled the research objectives as a digital learning instrument capable of bridging the needs of regional language learning in an engaging manner.

Based on the findings of this research, further development can be directed toward expanding learning materials to include adjective and adverb categories, as well as introducing sentence structures and daily conversations to improve students' overall language competence. In addition, technical improvements may include the integration of gamification features, such as leaderboard systems, to maintain learning motivation; expansion of the platform to iOS or web-based versions to increase accessibility; and the use of professional audio recording

techniques to ensure clearer pronunciation from native Tonsawang speakers across various playback devices.

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