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Development of a Gayo Language Dictionary Application for Android-Based Learning

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ABSTRACT

The Gayo language is one of Indonesia's local cultural treasures that must be preserved, especially considering the declining use of regional languages among the younger generation. This study aims to develop an Android-based Gayo Language Dictionary application as an interactive learning medium that is easily accessible to the public. The research method used is Research and Development (R&D) with the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation). The Gayo vocabulary data was obtained from official documents published by the Ministry of Education and Culture and other related institutions. The application was developed using the Kotlin programming language on Android Studio, with Supabase as the database and Firebase Authentication for user login. The main features of the application include bidirectional translation, word search, favorite marking, and historical information about the language. Testing results showed that all features performed well based on smoke testing and user acceptance testing (UAT). The application received an average score of 81% for functionality, interface, and content; 79% for system performance; and the highest score of 85% for user satisfaction. In conclusion, the Gayo Language Dictionary application has proven to be an effective tool for language learning and preservation through a modern technological approach.

Keywords: gayo language, digital dictionary, android, language preservation, user acceptance testing

INTRODUCTION

The development of technology that is currently growing and advancing, is widely used and utilized to help human life. One of the technologies that is currently growing is the Android-based operating system, which is currently widely used as a smartphone operating system because many applications are supported by Android[1]. The development of technology is increasingly rapid and fast, one of which is the development of mobile devices based on the Android platform[2]. The more modern and sophisticated a technology is, the more innovations will emerge and transform[3]. Various human activities have changed due to the rapid development of information technology. Many activities have changed from conventional ones that are done manually to modern ones that are usually digital. Because they offer convenience, accuracy, and speed in carrying out daily activities, modern methods are preferred by the community[4].

With the support of a wide ecosystem and high accessibility, Android has become one of the mainplatforms for the development of various types ofapplications, including educational applications. Likewise, the development of mobile technology has been able to reach all levels of society. The development of mobile technology has significantly influenced the evolution of electronic dictionary applications, increasing accessibility, functionality, and user engagement [5], [6]. The development of technology is also seen to be very rapid, one of which is dictionary technology. Now, dictionaries are packaged digitally and are starting to emerge, one example of which is the Indonesian-English dictionary[7].

One form of national wealth is the regional language which is an indication of the existence of civilization, art, and culture in a nation. Regional language is a symbol or sound that is meaningful and articulated which is used in the environment of a city or region which is used as a connecting language between regions in the region[8]. The existence of regional languages in Indonesia is very diverse[9]. Gayo language is a language spoken by the Gayo ethnic community who inhabit the Aceh Province area including Central Aceh Regency, part of East Aceh, West Aceh, South Aceh, North Aceh and Aceh Tamiang. The Gayo tribe itself is divided into several tribes, namely GayoLut, GayoDeret, and GayoLues, GayoLokop or Serbajadi and GayoKalul. Gayo language together with other languages such as Acehnese, Malay, and Javanese

have become a means of communication between residents. In certain areas there are people who master more than one language as previously mentioned, due to the diversity of tribes in the same place[10].

In general, the use of regional languages is still strong even though it is experiencing symptoms of decline everywhere. This is evident from the many complaints that have emerged, especially regarding the use of regional languages among the younger generation. This condition is related to the symptoms of the decreasing ability of the younger generation in terms of mastering regional languages. The younger generation no longer fully uses regional languages when communicating with each other, but tends to use Indonesian. However, the use of regional languages has experienced a decline in use in everyday communication. This can be seen from the habits of the younger generation who prefer to communicate with slang rather than the regional language they use. Regional languages are increasingly being marginalized and even seem old-fashioned among the general public [11]. To prevent the death of regional languages, technological developments that can be utilized, one of which is a dictionary based on Android smartphone applications [12]. The extinction of languages will have an impact on the loss of local wisdom to the ideas held by an ethnic group, moral values that are a means of educating the nation's character are also eroded[13].

In the era of globalization, many regional languages face challenges in maintaining their existence, including the Gayo language. The results of the journal study concluded that 40% of young people still often use their regional language in everyday conversation and there are 66.7% of people who use the national language, namely Indonesian, more often than regional languages and other languages to communicate at school and at work. This raises concerns about the decreasing use of regional languages, so that concrete efforts are needed to preserve them through technology that is relevant to the modern lifestyle of society. One way to preserve regional languages and scripts is through mobile technology as a medium of education and learning, the users of which are teachers, students, and also the general public in the region[14]. The decrease in the number of regional language speakers is in line with the limited number of digital-based regional language learning facilities [15].

Android-based applications offer an efficient and easily accessible solution for learning regional languages such as Gayo. By utilizing devices that almost everyone has, the Gayo dictionary application can be a practical and effective learning tool. In addition, this application can also be an interactive media, not only providing information in the form of vocabulary, but also features such as word translation, word search and history of the Gayo language to deepen users' understanding of the Gayo language. A dictionary in the form of an application is the right solution in the era of technological development. Innovation for dictionaries in the form of printed books has begun to change into the form of applications[16]. The current dictionary is still conventional in the form of hardcopy or printed so that it is less practical to carry around, so a dictionary in digital form is needed[17]. Conventional dictionaries in the form of books take a long time in terms of searching for words and are less practical to carry around, so that it has a lazy effect on users to seek knowledge and insight [18]. To help translate words or sentences efficiently, a digital dictionary can produce a lot of information.

This research has novelty in the development of digital-based learning media that focuses on preserving and learning the Gayo language through the Android platform. Unlike previous research which is generally limited to documentation of regional languages in the form of printed books or static digital dictionaries, the application developed in this research is designed interactively and educationally. In addition, the use of an Android-based approach allows for broad and flexible access, in accordance with technological developments and modern learning needs in the digital era.

With this background, this study aims to develop an Android-based Gayo language dictionary application. This application is expected to help the community, especially the younger generation, to learn and preserve the Gayo language, as well as being a form of technological contribution in supporting the preservation of local culture.

RESEARCH METHODS

This study uses the Research and Development method with the ADDIE model approach (Analysis, Design, Development, Implementation, Evaluation). Development research is research that aims to produce a product and test the effectiveness of the product[19]. This method was chosen because this study aims to produce a product in the form of an Android-based Gayo language dictionary application that can be used as a learning medium. This method allows research to focus on the process of developing innovative, structured, and testable products to ensure their quality and effectiveness. By using the research and development method and the ADDIE model, this study is expected to produce an effective Gayo language dictionary application as a learning medium.

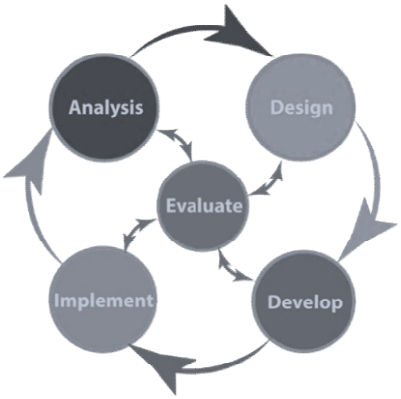

Figure1. ADDIE Models

The research was conducted at the Library and Archives Service of Central Aceh Regency and accessed

the online repository of the Ministry of Education, Culture, Research, and Technology as a source of additional data and verification. The main data was taken from the Kemdikbud online repository, while application development was carried out in Panggoi, Lhokseumawe. The research period began in December 2024 and is expected to be completed in May 2025.

Data collection was conducted to obtain the information needed during the research. The data collection of this research used several methods in the form of documentation, literature study techniques, and using questionnaires. System testing is an important stage in the software development process. This application was tested using two main methods, namely early stage testing (alpha testing) with the smoke testing method to ensure that all features in the application run as they should and are in accordance with the needs and specifications that have been designed and the second stage testing (beta testing) using the user acceptance testing (UAT) method to evaluate the quality of the system from the developer and end user side.

RESULTAND DISCUSSION

This study uses the ADDIE development model consisting of five systematic stages, namely Analysis, Design, Development, Implementation, and Evaluation. In the analysis stage, researchers identified user needs through interviews with teachers and observations of students in the Gayo area, especially in Central Aceh Regency. The results of the analysis show that preserving the Gayo language is very urgent considering the limited learning media available, while the use of Android devices among students is quite high. This shows that the development of Android-based applications has the potential to be a strategic solution in supporting regional language learning.

The design stage is carried out by designing the application structure and its main features. The researcher created a user interface (UI) wireframe that includes a home page, a bilingual vocabulary list (Gayo–Indonesian), audio pronunciation features, illustrative images, and interactive quiz exercises. The application design is designed to be user-friendly, easily accessible to students, and supports independent learning and is visually appealing. At this stage, media validation instruments and practicality rubrics for the next stage are also prepared.

Next is the development stageare the stage where the previously designed application design begins to be implemented in real form. At this stage, all system components are developed and combined into a single functioning application unit. The Gayo Language Dictionary application was developed using the Kotlin programming language on the Android Studio platform, with backend support from Supabase as a database service provider, and Firebase Authentication for the user login system.

The home page of the application is the welcome page which is the initial interface displayed to the user when they first open the Gayo Language Dictionary application. The design of this page is designed with a clean and attractive appearance using a typical Gayo cultural background motif that strengthens the local nuances and cultural values of this application. On this page, users are given two options to continue to the system, namely Login with Google, and Login with Email. Both options are integrated with Firebase Authentication, a service from Google that is used in this application to manage the user authentication system safely and efficiently. The use of Firebase Authentication allows the login and registration process to be faster, more stable, and supports user data security. At the bottom of the page, there is also a link that directs users to the registration page if they do not have an account. Brief information about the application's functions is also provided in the middle of the screen to give users an idea of the main benefits of this Gayo Dictionary application. This display not only functions as a gateway to the application, but also reflects a modern and professional first impression for users. The welcome page can be seen in Figure 2.

Next, there is a registration page that functions to allow new users to create an account in the Gayo Language Dictionary application. On this page, users are asked to fill in three main data columns, namely email, password and password confirmation. All user input will be processed automatically through Firebase Authentication, which is used to store user data securely and encrypted. After successful registration, the user will be directed directly to the application and a notification popup will appear that the account has been created. Meanwhile, to log in to the application, users who have registered an account can click the login page. Users simply fill in their Email and Password, then press the Sign In button to log in. The system will send this input data to Firebase Authentication for verification. If the verification is successful, the user will be directed directly to the main page of the application. The login page design is made simple but informative, with intuitive buttons and icons, and navigation to move to the registration page if the user does not have an account.

Figure 2. Home Page View

After logging in, the application will go directly to the home page or dashboard which is the main navigation center in the Gayo Language Dictionary application that displays various main features. On this page, users can access features such as "Translate Words" which will direct them to the two-way translation feature between Indonesian and Gayo. In addition, there is a button to the "History of the Gayo Language" feature which displays information about the background and development of the Gayo language, as well as the "Search and Find Words" feature which directs users to search for the word they want to search for. On the dashboard page there are also random word recommendations from the database every time the dashboard page is opened, so users can learn new vocabulary regularly. At the bottom of the page, there is a navigation bar with three main icons, namely the home icon (dashboard), the favorite icon, and the settings icon.

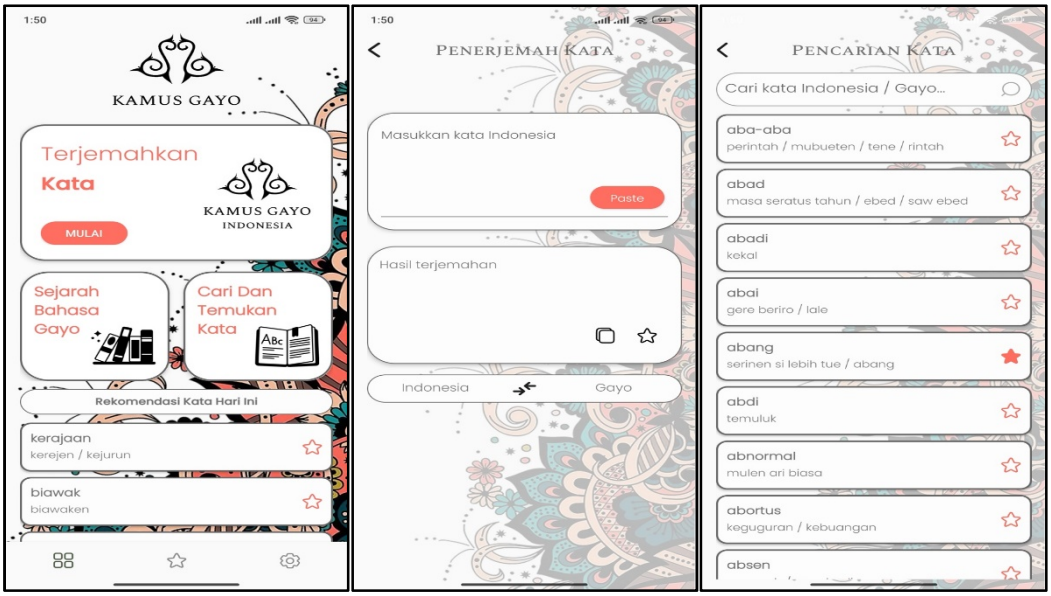

Figure 3. Application Core Page View

The “Translate words” page allows users to translate words from Indonesian to Gayo or vice versa. There are input columns and translation results, as well as a language switch button. This feature is also equipped with auto-suggestion which displays word suggestions when typing, this feature makes it easier for users to find the intended word without having to type it completely, and helps avoid spelling errors. Translation results can be copied or marked as favorites. The entire process runs in real-time with Supabase support as the backend. Another part of the application is the word search page which is a feature to make it easier for users to find vocabulary equivalents from Indonesian to Gayo or vice versa. Users can search manually by pressing the search button, or automatically through the live search feature which will display results when users type keywords. This word search feature uses the string matching method to filter and display relevant results from all dictionary data. The matching algorithm used includes searching based on full similarity (exact match), prefix match, and substring match. Search results are arranged based on relevance level, so that the words that are most similar or closest to the user's input will be displayed first. If no matching results are found, the system will display a message that the translation is not available. This word search feature is expected to provide an efficient and responsive search experience for users. The speed and accuracy of search results are obtained thanks to the system's integration with the Supabase database service, which allows real-time data retrieval and processing. The application of a result arrangement algorithm based on word similarity also improves the quality of search results, making this feature one of the main advantages of the Gayo Language Dictionary application.

After the application is developed, a system test is conducted. System testing is an important stage in the software development process that aims to ensure that all functions and features in the application run according to the needs and specifications that have been determined. At this stage, the Gayo Language Dictionary application is tested using two main methods, namely early stage testing (alpha testing) with the smoke testing method and second stage testing (beta testing) using the user acceptance testing (UAT) method, to evaluate the quality of the system from the developer and end user sides.

Table 1. Overall Feature Smoke Test Results

Features	Testing Steps	Expected Results	Status
Welcome page	Open the app without logging in	Showing UI with login and register buttons	✓Succeed
Login with email	Enter valid email and password, click login	Successfully logged in to the home page	✓ Succeed

Features	Testing Steps	Expected Results	Status
Login with Google	Click the Google login button, select an account, and continue	Successfully logged in and directed to the home page	✓ Succeed
Register New Account via email	Fill in email, password, confirm, click register	Account created and immediately enter the application	✓ Succeed
Validate Registration Form	Empty input, wrong email format input, password < 6 characters	Displays error on every invalid input	✓ Succeed
Home Page	After logging in, access the home page	Features: Translate, Search, History, and Recommendations	✓Succeed
Translate Words	Enter a word into the input field	Displaying correct translation results	✓Succeed
Auto-Suggestion Feature	Type a part of a word in the input field	Relevant word suggestions appear	✓Succeed
Mark as Favorite	Click the star icon in the translation results or word list	Word added to favorites list	✓Succeed
Favorite Pages	Access favorite icons in the bottom navigation	Displays a list of words saved as favorites	✓Succeed
Gayo Language History Page	Click the history button on the homepage	Showing a description of the history of the Gayo language	✓Succeed
Word Search Page	Type a word in the search field	Displays results live and responsively	✓Succeed
Dark/Light Mode	Access the settings menu > change theme	Theme appearance changes according to choice	✓Succeed
Logout	Click the logout button on the settings page	Exit and return to the welcome page	✓Succeed
No Internet Connection	Turn off internet access and open the application	Displays no connection warning and retry button	✓Succeed

Alpha testing is done to ensure that all features in the application run as they should and are in accordance with the needs and specifications that have been designed. At this testing stage, the smoke testing method is applied as an initial approach to verify that the basic functions of the application have run as they should. Smoke testing focuses on initial testing of the main components of the application to ensure that there are no major failures (critical failures) that can hinder the further testing process.

Table 2. Smoke Test Results of String Matching Algorithm

Features tested	Test Case	Algorithm Applied	Expected results	Status
Exact Match	The user types the word "burn"	Full match, input exactly matches data. Implemented with Equals()	Displaying dictionary entries with the word "burn" correctly.	✓ Succeed
Prefix Match	The user types in a prefix, for example "pem"	Matching based on word prefix. Implemented with Starts With()	Displays words like "arson", "government" (if they exist in the database)	✓ Succeed
Substring Match	The user types part of the middle string of words, for example "root"	Matching a portion of text anywhere in a word. Implemented with contains()	Showing words like "burn", "fire"	✓ Succeed
Case sensitive	The user types "MeMbAkAr" (a combination of capital and small)	Case insensitive matching with ignoreCase=true parameter	The system can still find the word "burn"	✓ Succeed
No results found	The user types an irrelevant string, for example "xyzabc"	Empty search validation	Empty Displays the message "word not found"	✓ Succeed
Responsivitas Live Search	Users type letters one by one in the search field.	TextWatcher + matching combination	Search results are displayed directly while typing	✓ Succeed

Beta testing was conducted by involving a number of end users to test the Gayo Language Dictionary application in real conditions. This testing aims to evaluate user experience on functionality, appearance, performance, content, and general satisfaction. The method used in this testing is User Acceptance Testing (UAT) with a questionnaire approach, where respondents are asked to provide an assessment of several important aspects of the application using a Likert scale of 1–5. This questionnaire contains 13 questions and is distributed to 25 respondents consisting of students, teachers, and the general public. The results of the UAT analysis are presented in the following figure.

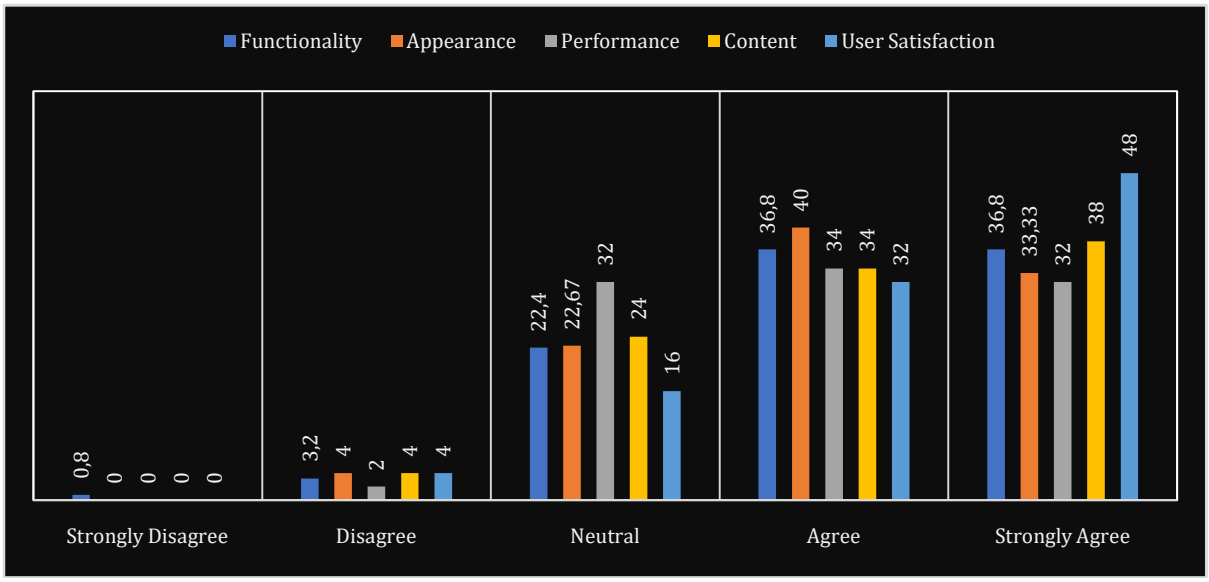

Figure 4. User Acceptance Tasting Results for 5 Application Aspects

From the graph above in Figure 4, it can be seen that the total number of users who gave an agree and strongly agree rating to the Gayo Language dictionary application is on average above 65% in terms of functionality, appearance, performance, content, and user satisfaction. This shows that this Gayo Language dictionary application can be used by the community. Even the aspect of user satisfaction has an acceptance percentage of up to 80%.

Table 3. Recapitulation of Test Results Based on Indicators

Rated aspect	Indicator	Number of Items	Percentage (%)	Information
Gayo Dictionary Application	Functionality	5	81	Very Good
	Appearance	3	81	Very Good
	Performance	2	79	Good
	Content	2	81	Very Good
	User Satisfaction	1	85	Very Good

From the calculations on the data provided, it can be concluded that the Gayo language dictionary application has succeeded in becoming a relevant technological innovation and has succeeded in becoming a relevant and useful technological innovation in supporting the preservation of regional languages through a digital approach that is easily accessible to the public. Based on the results of beta testing using the User Acceptance Testing (UAT) method, in terms of functionality, the application scored 81%, indicating that the main features work very well. In terms of interface appearance, the application also scored 81%, indicating that the design and layout of the interface were very well received by users. For system performance, a score of 79% was obtained, which is still in the good category and indicates that the application is running quite smoothly. In terms of content, namely related to word equivalents and completeness of vocabulary, the application scored 81%, indicating that the information presented is quite accurate and relevant. Meanwhile, the overall user satisfaction aspect scored the highest at 85%, meaning that users are very satisfied with the overall experience of using the Gayo Language Dictionary application.The presence of thisapplication also has a positive impact, includingparticipating in using sophisticated technology toimprove students' intelligence in regional languagesthrough an Android-based dictionary application.

CONCLUSION

Based on the results of the design, implementation, and system testing that have been carried out on the Gayo language dictionary application, several important things can be concluded as follows:

1. Utilization of Android technology increases the accessibility of preserving the Gayo language. The Gayo Language Dictionary application has successfully implemented Android-based technology

as a means of preserving regional languages that are easily accessible to the public. By utilizing commonly used mobile devices, this application is able to reach users more widely, especially the younger generation, and become a modern and practical learning medium.

2. The application received a positive response from end users based on the results of User Acceptance Testing (UAT) of 25 respondents, the application obtained an average score of 81% with a very good category, and the highest score of 85% in the aspect of user satisfaction. This proves that the application as a whole is well received in terms of functionality, appearance, content, and performance.

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