



Development of Academic Information System Mobile Application Prototype at SD Inpres Touiu, Rote

*Vienda Miccela Seldry**, Hamidillah Ajie, Murien Nugraheni

Informatics and Computer Engineering Education Study Program, Universitas Negeri Jakarta, Indonesia

*Correspondence: E-mail: viendramiccela@gmail.com

ABSTRACT

In era society 5.0, where technology is generally a supporting factor in many ways, it turns out that there are still some aspects that have not taken advantage of existing technology. For example, Inpres Touiu Elementary School, Rote in providing information is still done manually, such as the recipient of the information coming directly to the location of the information or information being delivered by the school to the recipient of the information such as the teacher coming directly to the house of each student. The purpose of this research is to produce a prototype of an Android-Based School Academic Information System with a Case Study of SD Inpres Touiu, Rote which is useful in providing an information system design in the form of a front-end, so that in the future it can be redeveloped into a real android application. The results of the development in the form of a high-fidelity prototype using the Flutter framework with the Waterfall Method resulted in the SIKALA prototype being tested for Usability Testing using Black box testing and the Think-aloud method. The results of the test got 94% good response and 100% overall task success.

© 2024 Universitas Pendidikan Indonesia

ARTICLE INFO

Article History:

Submitted/Received 26 Feb 2024

First Revised 26 Apr 2024

Accepted 06 Jun 2024

First Available Online 07 Jun 2024

Publication Date 15 Sep 2024

Keyword:

Black box testing,

Prototype,

School Academic Information

System,

Think-aloud,

Waterfall

1. INTRODUCTION

In the era of society 5.0, the development of information technology has progressed very rapidly, making everyone must be able to follow the path of technological development, including being a supporting factor in the world of education (Tuhuteru et al., 2023). In the world of education, schools are one of the places in delivering information to teachers, students and parents, especially in the outermost regions of Indonesia, with the lack of infrastructure and the use of technology that is still lacking. Often information is conveyed manually using paper, such as lesson schedules, report cards and school information which will later be disseminated by the school, by means of the recipient of information coming directly to the school or the school that delivers to the recipient of information. Such manual methods are time-consuming and can cause very high human error and hinder the process of delivering information and become inefficient and ineffective. There are several schools that still do not use technology including SD Inpres Touiu, Rote.

Therefore, there needs to be an effort to change the information delivery procedures used today. Based on these problems, the author provides an alternative by making an Android-based Information System Prototype in the form of a User interface (UI) limited to the front-end which if it can provide an overview and reference in making real Android applications.

In addition, this information system can make it easier for schools, including teachers, to provide direct information to students and parents. Information systems through android applications are an alternative in an effort to facilitate schools and teachers. Based on a report by the Ministry of Communication and Information (2021), 89% of the Indonesian population uses smartphones. This also applies to residents of SD Inpres Touiu, according to a questionnaire that has been made to produce data 90% of SD Inpres Touiu residents are accustomed to using android. Then 80% choose to buy a smartphone instead of a PC / Laptop because they feel no need. Communication needs are done using smartphones, besides that because the price of smartphones is cheaper than the price of PCs / Laptops.

Based on the existing phenomenon, researchers are interested in focusing on researching the Development of Android-Based School Academic Information System Prototypes (Case Study of SD Impres Touiu, Rote) so that it can be a reference for subsequent research and become the initial stage of making a School Academic Information System for the next developer. This research uses the Flutter Framework in its creation so that it only uses one programming language, namely Dart Language. The method in this study is the Waterfall method, although in testing, the methods used are Black box testing and the Think-aloud Method.

2. Theoretical Basis

2.1. School Academic Information System

School Academic Information System is a technology in managing to disseminate computer-based information to store and manipulate data in schools can also be used as a means of communication media between students and students, students and teachers with school components related to anyone in the school environment (Helmina et al., 2023).

2.2. Android Apps

An application is software that combines certain features in a way that can be accessed by users (Ningsih & Nurfauziah, 2023).

2.3. User Interface (UI)

User interface (UI) is a system that is displayed graphically and is directly related to the user (Wiwesa, 2021). In designing a user interface, not only the visual aesthetic aspect is important, but it is also necessary to consider the functional aspect (Wibawanto & Nugrahani, 2018).

2.4. Prototype

Prototype mode is a software development method, which is a physical working model of the system and serves as an initial version of the system (Rangan *et al.*, 2020).

2.5. Metode Waterfall

The Waterfall method is serial and will not repeat at previous stages starting from the process of analysis, design, code and tests (Siahaan & Shiddiqi, 2023). The waterfall method process flow can be seen in **Figure 1**.



Figure 1. Waterfall method flow (Siahaan & Shiddiqi, 2023).

2.6. Framework

A framework that helps programmers compile code to create an application (Warsito *et al.*, 2014). Framework is a framework that makes it easy for programmers to create applications with libraries of functions that have been organized to be able to create a program quickly (Suharsana & Wirawan, 2016). According to (Sidik, 2012), by using frameworks, we do not need to create programs from scratch, but we have been given libraries of functions that have been organized to be able to create a program quickly.

2.7. Flutter

Flutter is a cross-platform framework, which means applications built with Flutter can be run on multiple platforms (Fauzi *et al.*, 2021). Flutter was created to simplify and speed up the process of developing mobile applications that can run on Android and iOS, without the need to learn two programming languages separately (Raharjo *et al.*, 2009).

2.8. Think-aloud Method

Think Aloud Evaluation (TA) is a user-focused testing method, where end users are asked to continuously express their thoughts while using the system (Diarsa, 2021). The Think-aloud method is a method of testing a system that engages users in a verbal way about what the user feels like in using the system. Through the process of verbalization, the observer can understand the parts of the interface that are having problems (Nielsen, 2012).

2.9. Black Box Testing Method

The Black box testing method is a software testing process by finding errors in several categories such as missing functions, errors in data structures or in accessing them externally, initialization and termination errors and errors in the interface (Cholifah *et al.*, 2018).

3. Methods

This research was conducted at Inpres Touiu Elementary School, Rote, Oetutule, Rote Barat Laut, Rote Ndao, East Nusa Tenggara, 85381. This research was conducted from July 2021 to January 2022. In developing an Android-based School Academic Information System Prototype under the name SIKALA using laptop hardware with specifications Intel® Core™ i5-8265U Processor, CPU @ 1.60GHz (8 CPUs), ~1.8GHz, 8 GB RAM, 1 TB Hard Drive, AMD Radeon R5 M435 VGA. In addition, it uses Qualcomm Snapdragon 665 Chipset Smartphone hardware, Adreno 10 Graphic card, Android 9.0 OS, 8 GB RAM, 128 GB ROM. As well as Windows 10 64-bit laptop software as an Operating System, Microsoft Office 2019 as a Word Processor, Visual Studio Code Version: 1. 56.2 as a Text Editor that will be used for coding Dart and Flutter programming languages, Dart v3.22.0 as a Programming Language that will be used, Flutter v3.22.0 as a Framework for the Dart programming language that will be used for Prototype development in the form of User interface (UI).

3.1. Research Flow Chart

Research to make a prototype of this Android-based School Academic Information System uses the waterfall method. So as to prioritize the efficiency and effectiveness of this research. Because it uses the waterfall method, the author does not need to repeat the steps worked on because the initial nature of this method is flowing so that the author does not need to do a stage twice. Data Collection Techniques and Procedures.

3.3.1. Analysis

The analysis stage is the process of writing knowing what problems exist and completing the data needed in making a prototype of an android-based school academic information system by proposing the SIKALA Use Case Diagram and SIKALA Functional Requirements which can be seen in **Figure 2** and explained in **Table 1**.

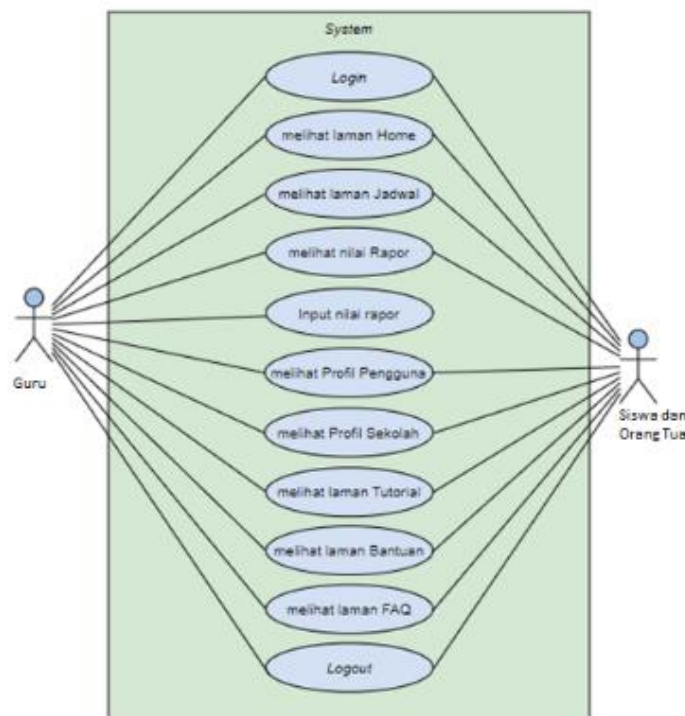


Figure 2. Use case diagram SIKALA.

Table 1. Functional requirement SIKALA.

No.	Functional Requirement	Actor
1	View the login from display on the Login Screen	All User
2	See what the Home Screen looks like	All User
3	View the schedule screen view	All User
4	See how report card scores show on the report card page	All User
5	View student report cards	All User
6	Enter report cards for student grades	Guru
7	Viewing user profile on the profile screen	All User
8	View your school profile	All User
9	Display tutorial features for users	All User
10	Display FAQ feature for users	All User
11	Display help features for users	All User

3.3.2. Design

The design stage is a design process carried out by designing and discussing the design of the SIKALA User interface limited to wireframes so that it can be developed again into an android application. So it does not wait for the final design results, but if the author feels the results are appropriate, they will proceed to the next process, namely the coding process. The design that has been made can be seen in **Figure 3**.

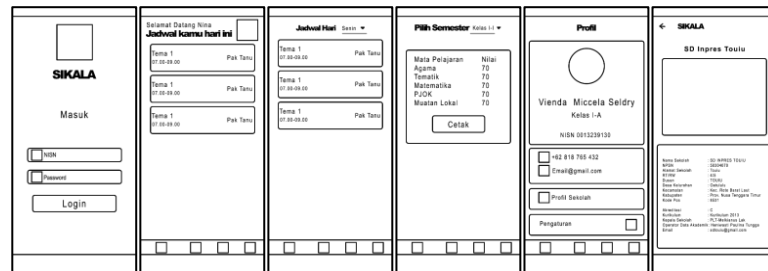


Figure 3. SIKALA wireframe display.

3.3.3. Code

The code stage is the process of creating a front-end school academic information system using the Dart programming language with the Flutter framework. The structure of the flutter code used can be seen in **Figure 4**.

```

import 'package:flutter_apps/constants.dart';          IMPORT
void main() => runApp(MyApp());                        MAIN

class MyApp extends StatelessWidget {                  WIDGET
  // This widget is the root of your application.    TREE
  @override
  Widget build(BuildContext context) {
    return MaterialApp(
      debugShowCheckedModeBanner:
      false,
      title: 'Flutter Apps',
      theme: ThemeData(
        primaryColor: kPrimaryColor,
        scaffoldBackgroundColor:
        Colors.blue,
      ),
      home: WelcomeScreen(),
    );
  }
}
    
```

Figure 4. Flutter code structure.

3.3.4. Testing

This last process is the process of determining whether this research is successful or not because this process knows whether the front end of the school's academic information system is running well or not. Testing at this stage uses two methods, namely Black box testing and the Think-aloud Method. The testing scenarios described in **Table 2**.

Table 2. Task scenario

No.	Task Scenario	Expected Results	Result
T1	Open the Application until the display becomes Welcome Screen.		
T2	Select the START button to enter the Login Screen.		
T3	Enter NISN and Password to Login into Home Screen.		
T4	Find the schedule menu to see the Schedule.		
T5	Find the Report Card menu to see the Report Card.		
T6	Find the Profile menu to view your Profile.		
T7	On the Profile Screen find the School Profile menu.		
T8	Then go back to the Profile menu to enter the Settings menu.		
T9	On the Settings menu, select the Tutorials menu to enter the Tutorial View.		
T10	Go back to the Settings menu to enter the FAQ menu.		
T11	Go back to the Settings menu to enter the Help menu.		
T12	Go back to the Settings menu to select the exit menu to return to the Login Screen display.		

These four processes are the reference of this study so as to produce a flow chart that can be seen in **Figure 5**.

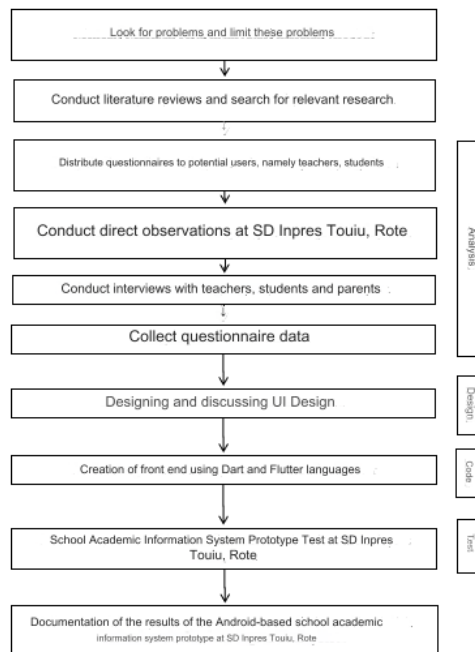


Figure 5. Research flow chart.

3.2. Data Collection Techniques and Procedures

3.2.1. Observation

At the observation stage, it was carried out to obtain data needs on the system in the development of the School Academic Information System Prototype, namely SIKALA. The observation instruments used are described in **Table 3**.

Table 3. Observation instrumen.

No	Assessed Aspects	Indicator
1	State of the Environment	<ul style="list-style-type: none"> • School Location • Learning Process • How to convey Information
2.	Conditions of School Residents	<ul style="list-style-type: none"> • How to communicate • How to exchange Information

3.2.2. Interview

The interview guidelines were conducted to obtain the data needs and criteria desired by users for making an android-based SD Inpres Touiu value processing information system application. The interview instruments used can be seen in **Figure 6**.

Name:
Status:

What do you think about the colors used?
 What do you think about the font used?
 What do you think about the feature?
 What are your suggestions for this application in the future?

Figure 6. Interview guideline instrument.

3.2.3. Kuisiонер

The questionnaire contains questions about the use of smartphones, what applications respondents use, and what features are easy to understand by respondents which will later be useful for the selection of icons, features and colors that will be used by the author in making a School Academic Information System Prototype at SD Inpres, Touiu based on Android. The questionnaire instrument used can be seen in **Figure 7**.

1. Name : _____

2. Status : Teachers / Students / Parents *)

3. Smartphone users : True / Not *)

4. Length of use of smartphone : <1 year / <3 years / <5 years / >5 years *)

5. Duration of smartphone use per day: <1 hour / <3 hours / <5 hours / >5 hours *)

6. Check if you know the features below: _____

Google Assistant Operating System installed on your Smartphone

7. Social Media : _____

Facebook Instagram Twitter Snapchat

Other _____

8. Instant Messaging/Instant Message:

WhatsApp Messenger Line Telegram

Discord KakaoTalk WeChat Other _____

Mchat BlackBerry Messenger

9. Education:

Edmodo Ms. Teams Moodle Google Classroom

10. E-Conference:

Zoom Ms. Teams Discord Google Meet

Google Duo Cisco Webex Other _____

11. E-Commerce:

Tokopedia Bukalapak Shopee Lazada

OLX Jibon Zilingo Sun _____

Carousell AliExpress eBay BSN

Didi Other _____

12. Entertainment:

TikTok Youtube Twitch Disney Hotstar

Video Viu Netflix Amazon Prime

iFix Other _____

No.	Question	Type	Answer
1	Name	Short Answer
2	Status	Multiple choice	Teacher Student Parent
3	Are you a Smartphone user?	Multiple choice	Yes No
4	How long have you been using it? Smartphones? (Time used is annual)	Multiple choice	0-1 year 1-3 years 3-5 years >5 years
5	Duration of Smartphone use in 1 day. (The time used is hours)	Multiple choice	0-1 hour 1-3 hours 3-5 hours >5 hours

Figure 7. Instrumen kuisiонер.

3.3. System Analysis

Analysis of the system is the stage of identifying the system requirements that will be created in SIKALA which results in User Flow and System Functional. The resulting user flow can be seen in **Figure 8** and the functional needs of the system are described in **Table 4**.

Table 4. Functional needs of school academic information systems.

Fungsional Sistem	Description
Login	Functionality to log into the system
Logout	Functionality to log out of the system
Home	Functionality for the first page that displays daily schedules and school announcements
Jadwal	Functionality to sort and view schedules
Rapor	Functionality to view report card data
Profil pengguna	Functionality to view application user information
Profil sekolah	Functionality to view school information
Tutorial	Functionality to introduce the features of the application
FAQ	Functionality to create answers to frequently asked questions
Bantuan	Functionality to provide support to users in case of errors in the application

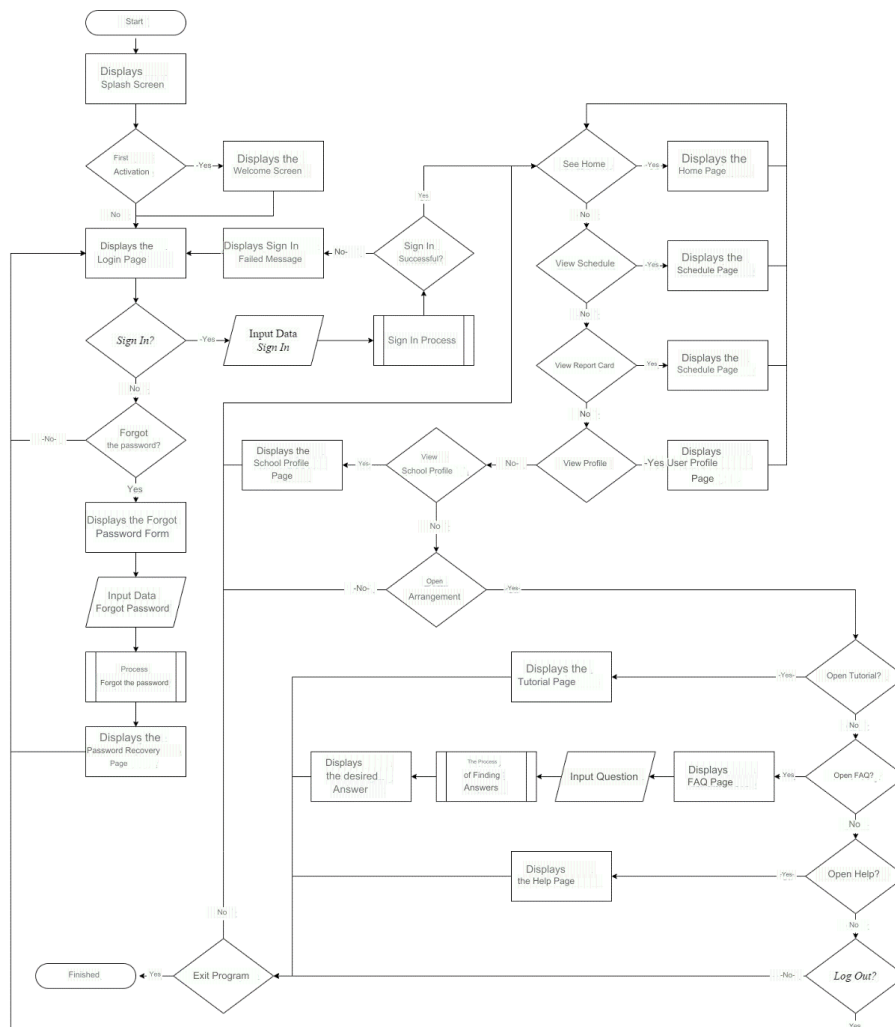


Figure 8. User flow diagram of the school's academic information system.

3.4. Data Analysis Techniques

The technique of analyzing the data used is Black box testing to test whether there is an error in the function of the application, and the Think Aloud method is based on user responses when verifying the school's academic information system. After testing the prototype of the Android-based school academic information system application, users were asked to provide comments for researchers in the form of positive or negative responses.

4. RESULTS AND DISCUSSION

4.1. Research Data Analysis

In the first stage, a direct analysis was carried out at SD Inpres Touiu, Rote to find out how the application criteria can be used by residents of SD Inpres Touiu, Rote by means of questionnaires by spreading questions via google form to residents of SD Inpres Touiu, Rote. Observations are also made to assess the background of the existing problems. As well as interviews conducted to obtain solutions that produce use case diagrams and user flow. The results obtained from 10 respondents are 90% using smartphones, 80% of whom choose to use smartphones rather than using and buying a laptop or PC. The design stage is an advanced stage after analyzing so as to produce a User interface design that will be used at this stage, discuss with the design team, then wait for the wireframe results from the design team. The design used is a design that according to the author matches the results of the analysis and if later it has entered the coding stage, the author will not repeat the design again and continue the code stage. The code stage is carried out after the author feels that the existing design has been suitable as a reference. At the implementation stage in the form of writing code using the Flutter framework with Dart Language to produce a prototype of the SIKALA android-based application. The result of coding produces a prototype with a level of high-fidelity accuracy prototype in the form of a front end from SIKALA with a display of SIKALA which can be seen in **Figures 9a and 9b**.

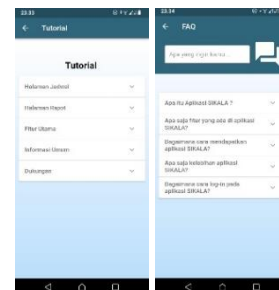
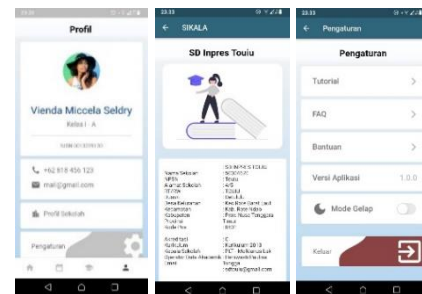
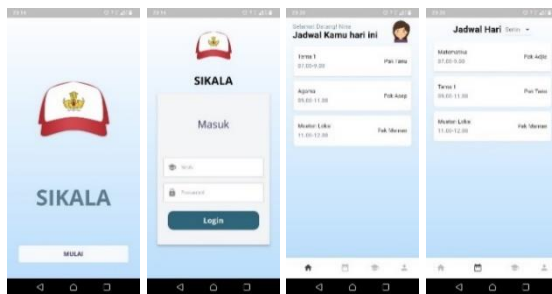


Figure 9a. Design user interface prototype SIKALA.

Figure 9b. Design user interface prototype SIKALA.

After the coding stage, the author conducted a test stage which is a test of whether the SIKALA prototype can run using the Black box method which can be seen in Table 5 and Think-aloud with test results can be seen in Table 6.

Table 6. Black box test results.

No	Task Scenario	Expected Results	Result
1	Open the Application until the display becomes Welcome Screen.	Show <i>Welcome Screen</i>	Appropriate
2	Select the START button to enter the <i>Login Screen</i> .	Display <i>Login Screen</i>	Appropriate
3	Enter NISN and Password to <i>Login into Home Screen</i> .	Enter on the <i>Home Screen</i>	Appropriate
4	Find the schedule menu to see the Schedule.	Display the Schedule Page	Appropriate
5	Find the Report Card menu to see the Report Card.	Featured Report Card Page	Appropriate
6	Find the Profile menu to view your Profile.	Show Profile Page	Appropriate
7	On the <i>Profile Screen</i> find the School Profile menu.	View School Profile Page	Appropriate
8	Then go back to the Profile menu to enter the Settings menu.	Enter the Settings menu	Appropriate
9	On the Settings menu, select the Tutorials menu to enter the Tutorial View.	Log in on the Tutorials page	Appropriate
10	Go back to the Settings menu to enter the FAQ menu.	Log in on the FAQ page	Appropriate
11	Go back to the Settings menu to enter the Help menu.	Sign in on the Help page	Appropriate
12	Go back to the Settings menu to select the exit menu to return to the <i>Login Screen display</i> .	Back to <i>Login Screen</i>	Appropriate

Table 7. Think-aloud with test results.

Task Scenario	Feronica (Parents)	Grace (Student)	Christin (Parents)	Dharma (Teacher)	Explanation
Open the Application until the display becomes <i>Welcome Screen</i> .	Good response (show)	Good response (show)	Good response (show)	Good response (show)	100%
Select the START button to enter the <i>Login Screen</i> .	Good response (show)	Good response (show)	Good response (show)	Good response (show)	100%
Enter NISN and Password to <i>Login into Home Screen</i> .	Good response (show)	Good response (show)	Good response (show)	Good response (show)	100%
Find the schedule menu to see the Schedule.	Confusion Response (show)	Confusion Response (show)	Confusion Response (show)	Good response (show)	25%

Table 7 (Continue). Think-aloud with test results.

Task Scenario	Feronica (Parents)	Grace (Student)	Christin (Parents)	Dharma (Teacher)	Explanation
Find the Report Card menu to see the Report Card.	Good response (show)	Good response (show)	Good response (show)	Good response (show)	100%
Find the Profile menu to view your Profile.	Good response (show)	Good response (show)	Good response (show)	Good response (show)	100%
On the Profile Screen find the School Profile menu.	Good response (show)	Good response (show)	Good response (show)	Good response (show)	100%
Then go back to the Profile menu to enter the Settings menu.	Good response (show)	Good response (show)	Good response (show)	Good response (show)	100%
On the Settings menu, select the Tutorials menu to enter the Tutorial View.	Good response (show)	Good response (show)	Good response (show)	Good response (show)	100%
Go back to the Settings menu to enter the FAQ menu.	Good response (show)	Good response (show)	Good response (show)	Good response (show)	100%
Go back to the Settings menu to enter the Help menu.	Good response (show)	Good response (show)	Good response (show)	Good response (show)	100%
Go back to the Settings menu to select the exit menu to return to the display <i>Login Screen</i> .	Good response (show)	Good response (show)	Good response (show)	Good response (show)	100%

4.2. Discussion

Functional in this study using the Waterfall method development method which is made in the form of a high-fidelity prototype, namely the front-end of the SIKALA application prototype by implementing a wireframe design into an android application using the Flutter framework with Dart Language as its programming language. With the function of the Prototype in the form of an illustration or reference with front-end results that can be run from the SIKALA prototype application which has various features such as the home screen displaying the schedule for today, the Schedule Screen displays the schedule of lessons every day, there is also a Report Card page that will display report card scores, Profile Screen that

displays profiles of users and there is also a school profile that contains school data and information.

This research has passed 2 testing processes, namely Black box testing and the Think-aloud Method. Black box testing is carried out by the author as the developer of the SIKALA prototype which can be called Alpha Testing and this test can be seen the absence of errors or errors in each function of the SIKALA prototype. The test was carried out with the Think-aloud Method to 4 respondents from 3 different statuses, namely teachers, students and parents with the results of usability testing using the Think-aloud method with the formula (total points: 4 x 100%) and got an average score of 94% good responses from the overall response, namely 48 responses from respondents gave good responses and 3 of them were still confused, so it can be said that positive responses are more dominant and percentages The success of the existing task scenario is 100% successful.

The results of this research can be used as a reference in making an android-based School Academic Information System at SD Inpres Touiu, Rote to create applications on a large scale that can later help convey information from the school to school residents who can display schedules, report cards and school profiles of SD Inpres Touiu, Rote.

4. CONCLUSION

An Android-Based School Academic Information System Prototype has been made at SD Inpres Touiu, Rote which aims to be useful in providing Information System design using the Flutter Framework with Dart Language in the form of a prototype with a high-fidelity prototype type so that in the future it can be developed back into a real Android application. Based on the results of Analysis, Development and Testing using Black box testing and the Think-aloud Method on each function in the SIKALA prototype has been obtained The results of the development in the form of a high-fidelity prototype using the Flutter framework with the Waterfall Method resulted in

- (i) Prototype of School Academic Information System Based on Android SIKALA
- (ii) The results of the test received 94% good responses and 100% overall task success through Usability Testing using Black box testing and the Think-aloud method.
- (iii) High-fidelity prototype with results limited to the front-end prototype SIKALA which can be said to be appropriate without any errors and the function of the prototype can run without any errors and has met the criteria.
- (iv) The design of the SIKALA application can assist schools in designing products on a large scale so that information from the school is no longer provided manually and information such as schedules, report cards and other school information can be delivered efficiently and effectively.

Suggestions from the author through this study so that it can be further developed in the next research, namely:

- (i) Perform needs analysis for UI with a larger scale and more resource persons to produce more diverse data.
- (ii) If you want to develop this prototype into a real Android application, you are expected to look back at adjusting to new design needs such as the curriculum used by the school.
- (iii) There needs to be additional features for schools, teachers, students and parents to communicate with each other on the application.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

6. REFERENCES

- Tuhuteru, L., Solehudin, M., Muhammadiyah, M. U., and Rais, R. (2023). Pendidikan dan tantangan pembelajaran berbasis teknologi digital dan informasi di Indonesia pada era disruptif.
- Helmina, A., Irfan, D., and Effendi, H. (2023). Rancang bangun sistem informasi berbasis web di SMK N 1 Ranah Batahan. *Jurnal Vokasi Informatika (JAVIT)*, 64-71.
- Ningsih, W., and Nurfauziah, H. (2023). Perbandingan model waterfall dan metode prototype untuk pengembangan aplikasi pada sistem informasi. *Jurnal Ilmiah METADATA*, 5(1), 83-95.
- Wiwesa, N. R. (2021). User interface dan user experience untuk mengelola kepuasan pelanggan. *Jurnal Sosial Humaniora Terapan*, 3(2), 2.
- Rangan, A. Y., Yusnita, A., and Awaludin, M. (2020). Sistem monitoring berbasis internet of things pada suhu dan kelembaban udara di laboratorium kimia XYZ. *Jurnal E-Komtek*, 4(2), 168-183.
- Siahaan, D. O., and Shiddiqi, A. M. (2023). Perancangan audiometer tutur kata berbasis android dengan penerapan voice recognition dalam pelaksanaan tes pendengaran pekerja. *Jurnal Teknik ITS*, 12(3), A233-A238.
- Warsito, A. B., Yusup, M., and Yulianto, Y. (2014). Kajian yii framework dalam pengembangan website perguruan tinggi. *Creative Communication and Innovative Technology Journal*, 7(3), 437-451.
- Suharsana, I. K., and Wirawan, I. W. W. (2016). Implementasi model view controller dengan framework codeigniter pada e-commerce penjualan kerajinan Bali. *Jurnal Sistem dan Informatika (JSI)*, 11(1), 19-28.
- Sidik., Betha. (2012). Framework Codeigniter. Bandung: Infomatika.
- Wibawanto, W., and Nugrahani, R. (2018). Desain antarmuka (user interface) pada game edukasi. *Imajinasi: Jurnal Seni*, 12(2), 133-140.
- Fauzi, M., Teddyana, A., and Enda, D. (2021). Pengembangan aplikasi mobile tanggap bencana di Kab. Bengkalis menggunakan framework flutter. *ZONAsi: Jurnal Sistem Informasi*, 3(1), 27-36.
- Raharjo.B, Heryanto. I, Arif Haryano. (2009), Mudah Belajar JAVA, Bandung, Informatika

Diarsa, I. W. B. (2021). Evaluasi sistem informasi rumah sakit umum daerah kabupaten Bangli pada aspek usability dengan metode user experience questionnaire dan think aloud. *Jurnal Ilmu Komputer Indonesia*, 6(2), 34-48.

Nielsen, Jakob. (2012). Usability 101: Introduction to Usability. All Usability.

Cholifah, W. N., Sagita, S. M., Knowledge, S., and Pengujian, B. B. Testing pada aplikasi action and strategy berbasis android, 3(2), 206–210.