Innovative Counseling Solution for Education: Development of an E-Counseling Application

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ABSTRACT

This research aims to develop a web-based E-Counseling application using Visual Studio Code, programmed with HTML, CSS, PHP, and JavaScript, and utilizing the Laravel framework. Additionally, this study designs a mobile Android application using Android Studio with the Kotlin programming language. Both applications will be connected through a REST API to send and retrieve data from a database, which serves as the storage for student information and counseling schedules. This application serves a dual purpose, assisting counselors in managing student data and aiding students in scheduling counseling appointments and recording their concerns. The E-Counseling system enables students to easily access counseling schedules, submit their concerns, and interact with counselors online. On the other hand, counselors can manage student data, create counseling schedules, and respond to student concerns. This research employs a Data Flow Diagrams (DFD), and Entity-Relationship Diagrams (ERD) to design the application with a structured and efficient framework. The system is expected to facilitate communication and interaction between students and counselors. The development of this application represents an innovative solution in the field of education, integrating information technology to streamline the counseling process and student data management. The research outcomes are anticipated to make a positive contribution to education and student well-being while simplifying counselor guidance and support.

General Terms

Application, HTML, Kotlin, PHP, Laravel

Keywords

E-Counseling, Android Application

1. INTRODUCTION

In school life, we often hear about guidance and counseling services that have a special position and role in helping students deal with their problems[1]. Assessment in guidance and counseling measures students' internal conditions, both from the aspect of insight, cognitive, attitude to behavior, to understand students holistically[2]. Assessment activities in guidance and counseling are essential for students' self-understanding and became the need for assessment for guidance and counseling programs[3].

The assessment services of guidance and counseling should be carried out by a counselor. In addition to assisting students in solving their problems, counselors also record student data, consultation data, attendance recapitulations, student performance data, student complaints, and home visits. In the process of implementation, the counselors in schools in Indonesia still do it manually, mainly on the SMK PGRI 1 NGANJUK.

Education follows technological advances that are increasingly up-to-date with a combination of education and technology that drives the creation of innovation[4]. Information technology has become a facility for the activities of various sectors of life and has touched guidance and counseling services[5]. The role of the counselor as a guidance and counseling practitioner is expected to be whole and professional in applying all forms of rules and principles of service in the guidance and counseling[6]. The need for students to obtain information about guidance and counseling becomes relevant by using an android application[7]. The implementation of the guidance and counseling service program while still focusing on the rules and principles of service implementation would certainly be a reliable alternative to deal with these dynamics[8]. A good learning system will produce good quality education, then a good assessment system will encourage teachers to determine good teaching strategies and motivate students to learn better[9].

2. RESEARCH METHOD

The research methodology in this application will be explained by referring to the system architecture as depicted in Fig 1.
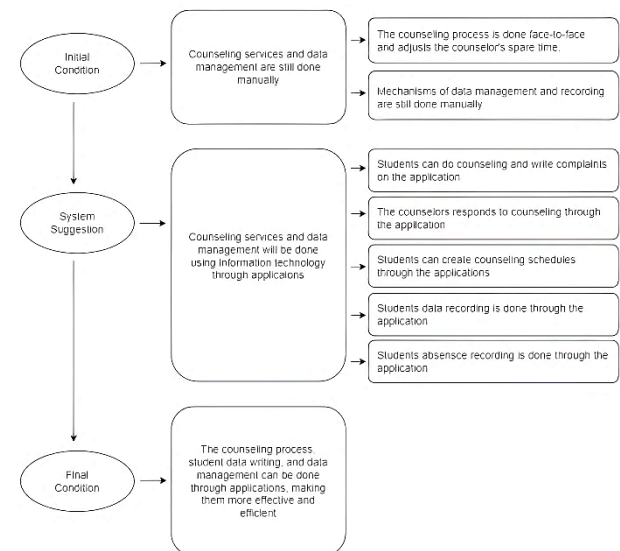

Fig. 1 Research Framework

In this system of research, the research framework serves as a guide that guides researchers in conducting research systematically and structured. In Fig 1, this research framework defines how the counseling system currently operates, details the design of the proposed counseling system, and describes the expected end result to be achieved.

2.1 Architecture System

The system uses the application as a means of recording data, viewing profiles, writing complaints, and entering consultation schedules. The counselor will manage the websites connected to the student application. Websites and applications can send and retrieve data from the database through the REST API.
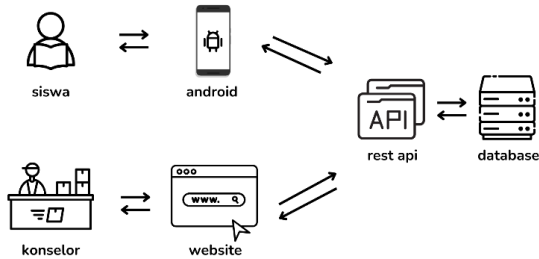

Fig. 2 Architecture System

2.2 Data Collection Procedure

2.2.1 Interview

An interview is a structured and intentional mode of interpersonal communication that brings together a minimum of two individuals in a typically informal and comfortable setting. During an interview, the participants engage in a purposeful conversation that can take various forms, such as asking and answering questions, engaging in discussions, or even engaging in debates, depending on the context and objectives. The primary objective of an interview is to accomplish a particular purpose, such as obtaining information, assessing a person's qualifications, sharing ideas, or gaining deeper insights into a topic.

2.2.2 Observation

Observation is the systematic process of keenly examining, documenting, and noting the characteristics, behaviors, or occurrences of the specific phenomena or symptoms that are the subjects of study. This methodical practice often involves the collection and recording of relevant information with the intent of gaining a deeper understanding or drawing meaningful conclusions about the observed subject matter. Observation is a fundamental tool used across various fields, including science, research, education, and everyday life, to gather valuable data and insights for analysis and interpretation.
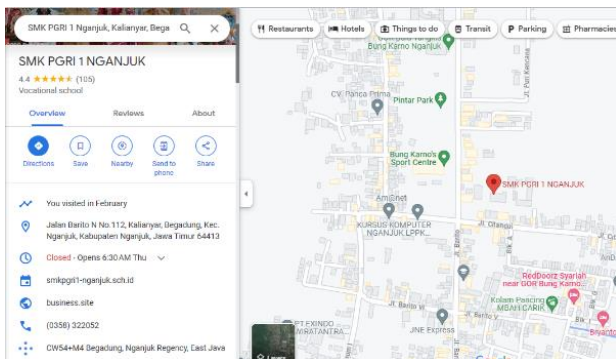

Fig. 3 SMK PGRI 1 NGANJUK Location

2.2.3 Literature Study

In this phase, researchers engage in what they refer to as a "literature review," where they examine reference materials and findings from prior research that align with their own study.

The purpose is to establish a theoretical groundwork for comprehending the issue at hand. Theory serves as the bedrock that enables researchers to grasp the question thoroughly and within the context of scientific reasoning.

2.3 Design Logic

2.3.1 Data Flow Diagram (DFD)

A data flow diagram is a visual depiction illustrating how data moves within an information system [10]. Data flow diagrams are a fundamental component of system analysis and design, offering a visual and structured way to understand data movement and provide a basis for system development and maintenance. In this section, counselors and students are required to log in using their identities. After that, counselors can enter, edit, and access all student data. As for students, they can also view profiles, input consultation schedules, and write complaints.
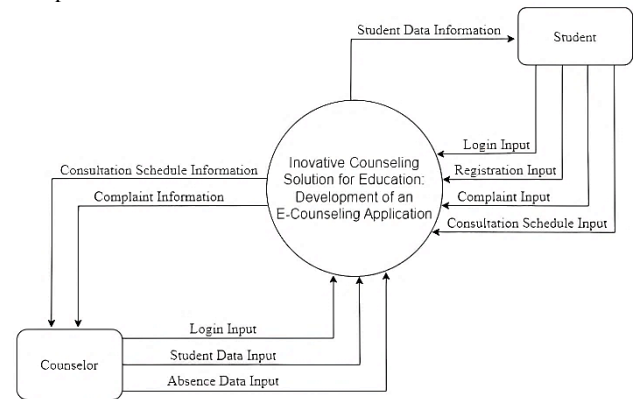

Fig. 4 Data Flow Diagram

2.3.2 Entity Relationship Diagram (ERD)

Entity-Relationship Diagram (ERD) is a visual representation in the field of database design and information systems that is widely used to provide a structured picture of business entities and relationships with each other[11]. The entity relationship is illustrated in the diagram in Figure 3.
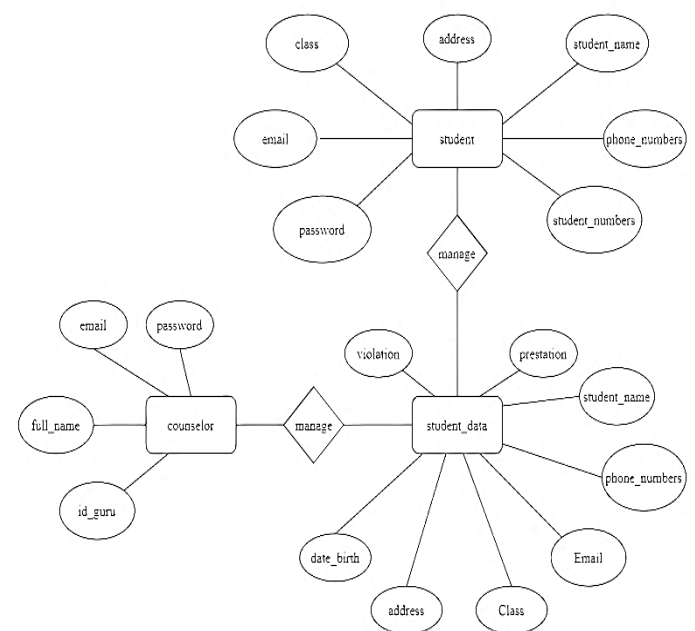

Fig. 5 Entity Relationship Diagram

2.4 Physical Design

The physical database design involves making highly detailed determinations about the structure of tables within the database. This encompasses specifying the data types to be applied to each column, defining the maximum length of data fields, setting constraints, and other attributes. In this context, attention is focused on the technical details that will affect how data is managed and accessed within the physical database.

Fig. 6 Database Design Table

2.5 Interface Design

This website design framework is carefully designed using Figma software, which provides a basic representation of how the application interface will be shaped. The website interface is designed with careful consideration to ensure convenience and ease of use for consultants, taking into account a well-planned layout.
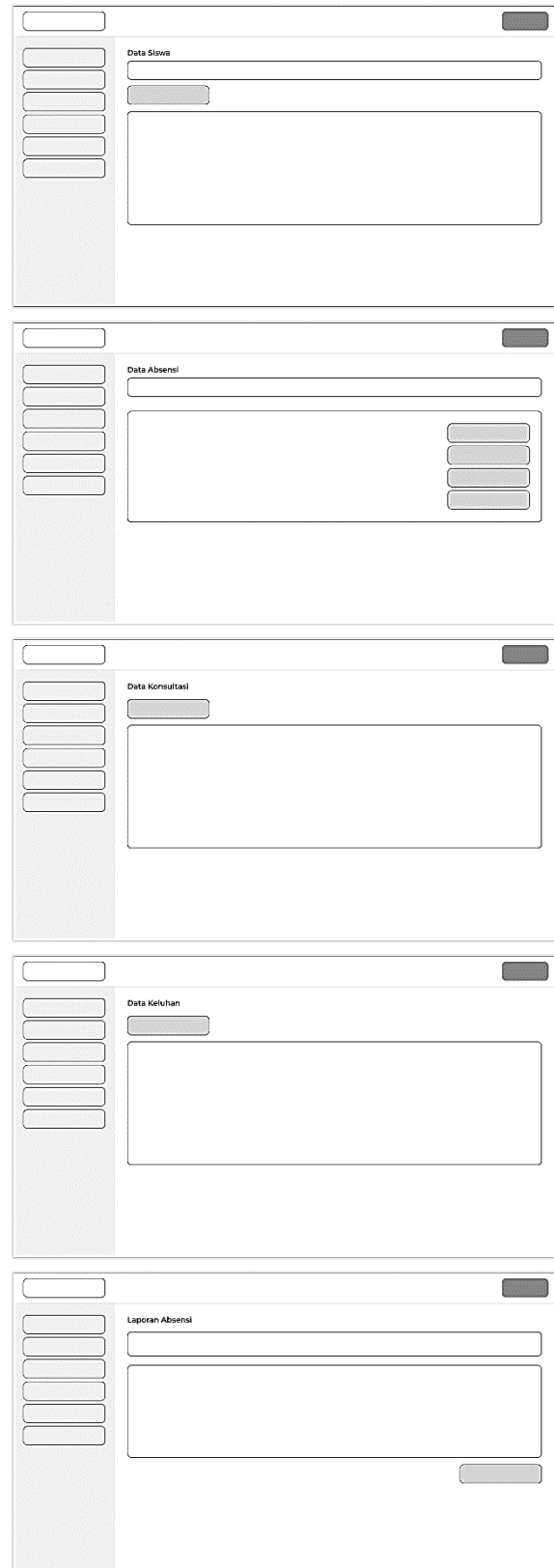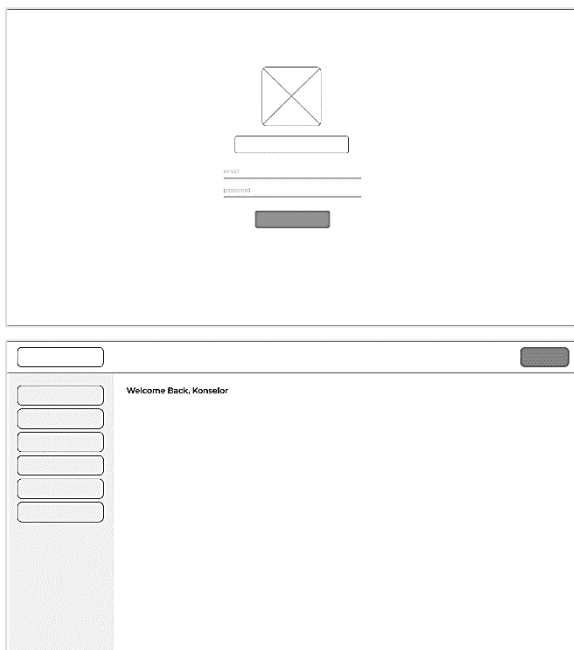

Fig. 7 Wireframes Website App

The framework for the Android application design was also created using the same software, Figma. The application design prioritizes user comfort and is crafted with a modern interface to enhance the user experience and reduce eye strain.
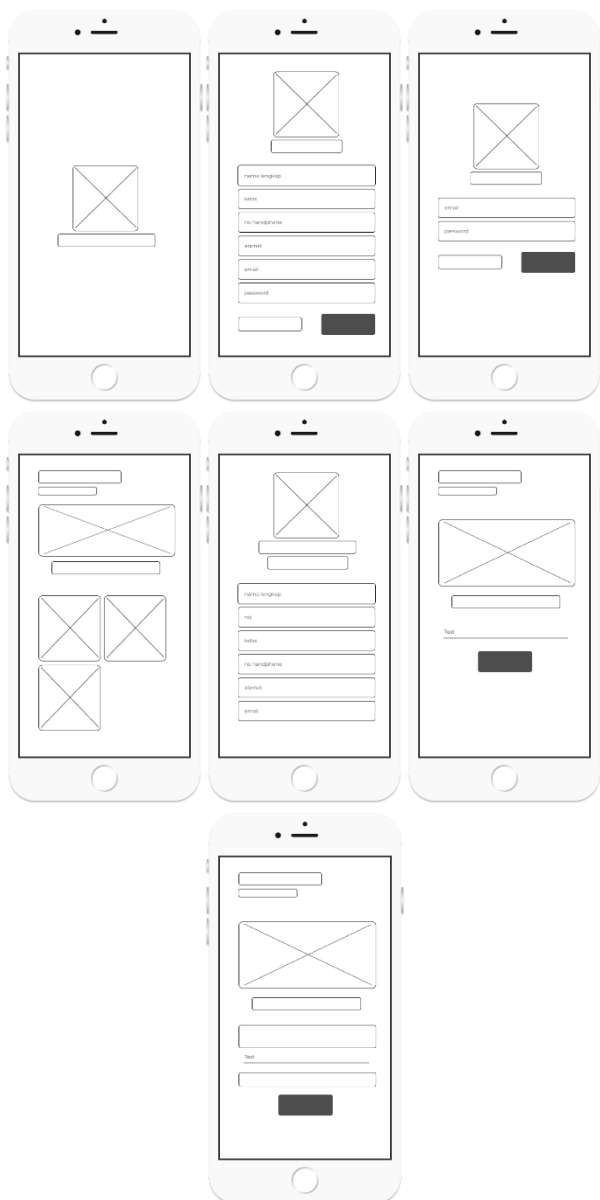
Fig. 8 Wireframes Android App

3. RESULT AND DISCUSSION

3.1 Assumptions

Students are the primary users of the E-Counseling app which has access to a variety of features that have been provided. These features include the ability to submit complaints, schedule consultations, and view and edit student personal profiles.

Instead, the role of a consultant in this application is that of an administrator who has full authority to manage all the related data. A counselor can perform a variety of actions, such as entering, editing, and deleting student data. They can also record student absences and print student absence reports based on their classes.

In the context of school operating hours, which last from 07:30 to 14:30, the app allows students to easily schedule counseling sessions according to a scheduled schedule. In addition, the complaint writing feature is a very useful tool for students who

may feel less confident or reluctant to engage in direct counseling.

3.2 Hypothesis

This hypothesis is announced based on research that has been carried out in the research methodology stage. The research "Innovative Counseling Solution for Education: Development of an E-Counseling Application" has the potential to make significant contributions to improving the effectiveness and efficiency of the work of counselor and students.

3.3 Feature

The system provides a range of features aimed at assisting counselors and students in carrying out their duties within the school environment. Here are some of the features offered by the E-Counseling application.

Table. 1 List of Features

No.	Actor	Description
1.	Counselor	login, dashboard page, input, edit, dan delete student data, record absence data, view complaint record, view counseling schedules, and generate absence data reports.
2.	Students	register, login, student profile, write complaint, and make counseling schedules.

3.4 Run an Experiment

After the wireframing stage is completed, the next step is to proceed with coding to build the system in accordance with the finalized design. The web coding process is carried out using Visual Studio Code, utilizing several programming languages such as HTML, CSS, PHP, and JavaScript, with the integration of the Laravel framework. Simultaneously, the coding for the Android application is executed using Android Studio, and the programming language employed is Kotlin.

3.5 Implementation

3.5.1 Counselor Login Page

The login page is used to authenticate a counselor who has access to the website to manage student data, absence data, consultation data, complaint data, and print absence reports.
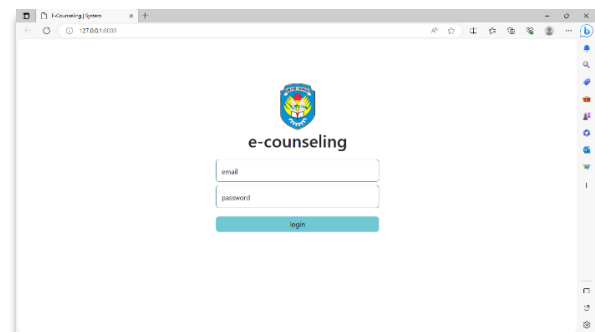

Fig. 9 Counselor Login Page

3.5.2 Counselor Dashboard Page

Upon the successful completion of the login process, you will be directed to enter the dashboard page.
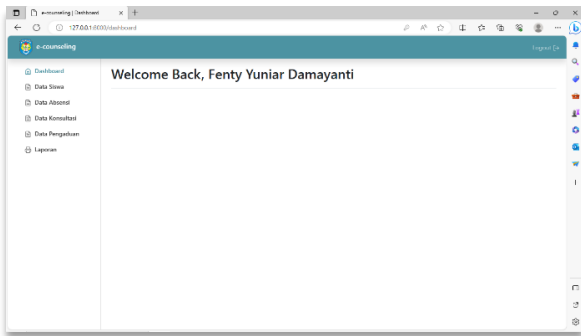
Fig. 10 Counselor Dashboard Page

3.5.3 *Counselor Page (Students Data List)*
On the student data page, the counselor has the capability to input, view, edit, and delete student records.
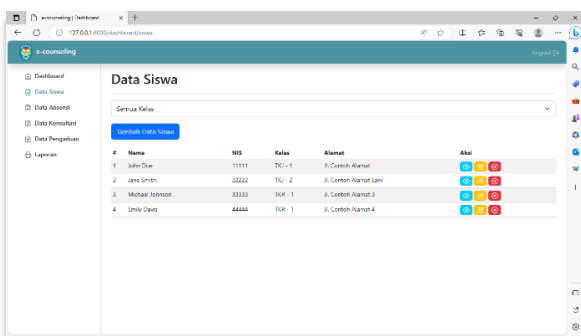

Fig. 11 Counselor Page (Student Data List)

3.5.4 *Counselor Page (Student Absence List)*
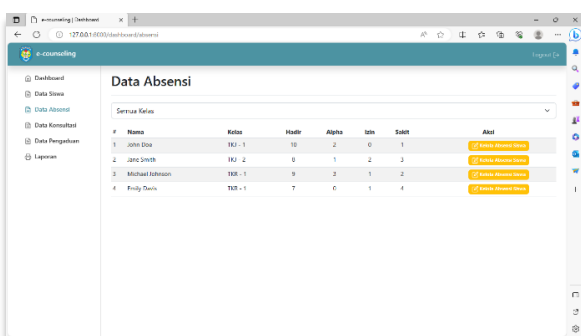The counselor utilizes this application to enter attendance data summaries.

Fig. 12 Counselor Page (Absence List)

3.5.5 *Counselor Page (Counseling Schedule)*
On this page, counselors can view and delete counseling schedules that have been selected by students through the application.
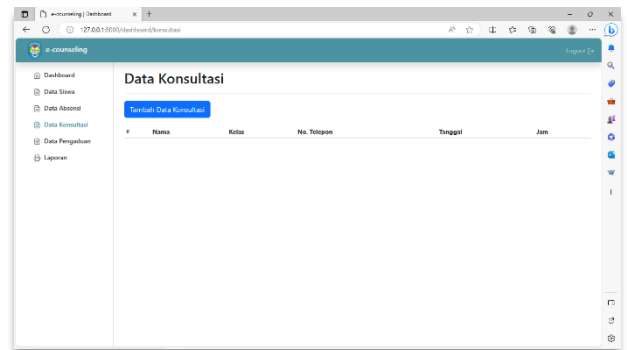
Fig. 13 Counselor Page (Counseling Schedule)

3.5.6 *Counselor Page (Student Complaint)*
On this page, counselors can both view and remove complaints submitted by students through the Android application.
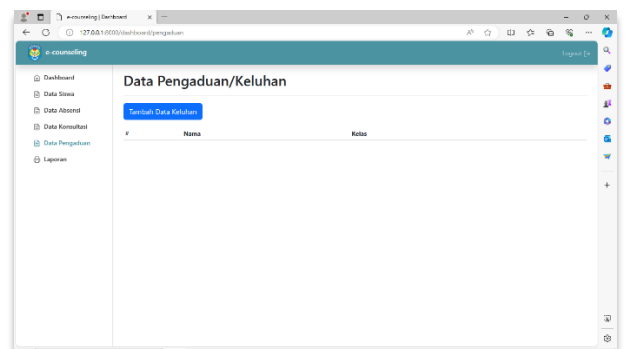
Fig. 14 Counselor Page (Student Complaint)

3.5.7 *Counselor Page (Absence Report)*
Counselors have the ability to print monthly or semester-based attendance reports for students.
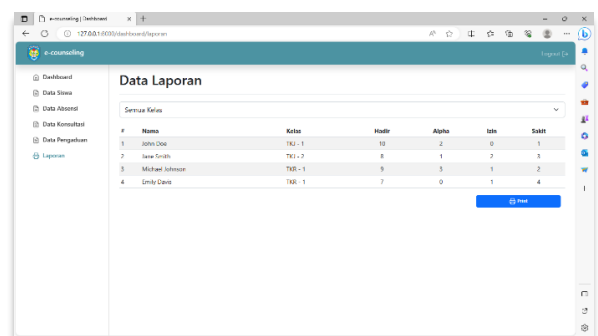
Fig. 15 Counselor Page (Absence Report)

3.5.8 *Splash Screen Page*
A splash screen is an initial display or image that briefly appears when you open an application or piece of software. It is a brief image or animation typically used to convey the brand identity, provide a welcome message, or load the resources

required by the application before the main application interface becomes visible. The primary purpose of a splash screen is to indicate that the application is loading and to offer a more engaging user experience during the initialization process.

Fig. 16 Splash Screen

3.5.9 Register and Login Page

At the first time they become users of this application, students are required to register an account by entering their full name, class, no mobile phone, address, email, and password. Once the account registration process is complete, the student will log in to the login page. This page will ask for registered emails and passwords to perform an authentication process to confirm that the email and password used are registered.
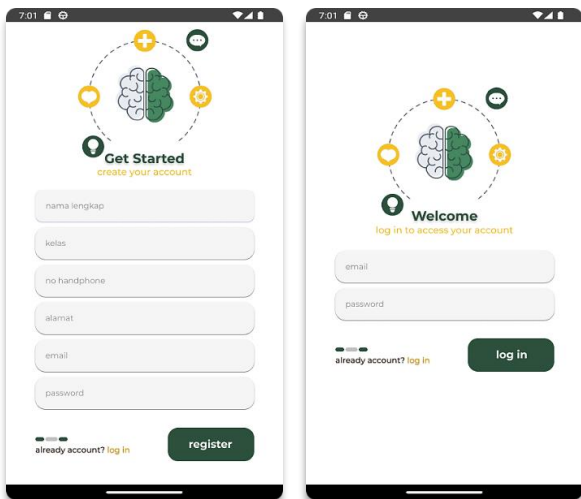

Fig. 17 Register and Login Page

3.5.10 Home and Profile Page

Once the login process is complete and the authenticated user is registered, the student will go to the home page, which contains three menus for these E-Counseling applications and other assets. The first menu on this app is the student profile. The student profile menu contains student self-data according to who the student is logging in.
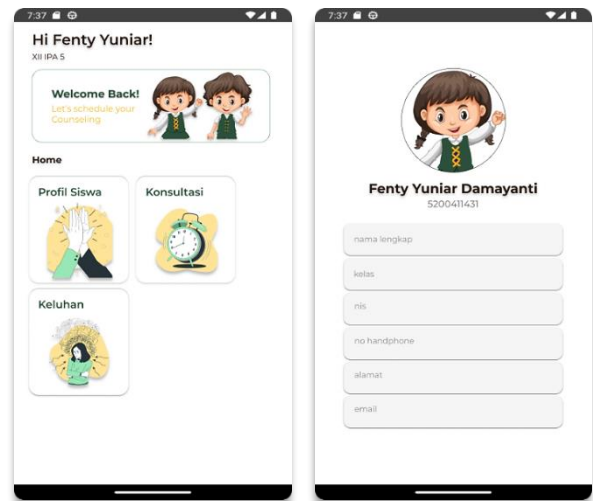

Fig. 18 Home and Profile Page

3.5.11 Complaint and Consultation Page

Next, the second menu on this app is the consultation menu. On the consultation menu, students can choose a schedule for counseling. This menu is designed so that students can have a definite schedule to do counseling and do not collide their schedule with other students. The third menu is the complaint menu. In this menu, students can write down complaints they experience but do not dare to submit them in person. With this menu, it is expected that students will be able to communicate their complaints more easily so as not to interfere with their daily lives.
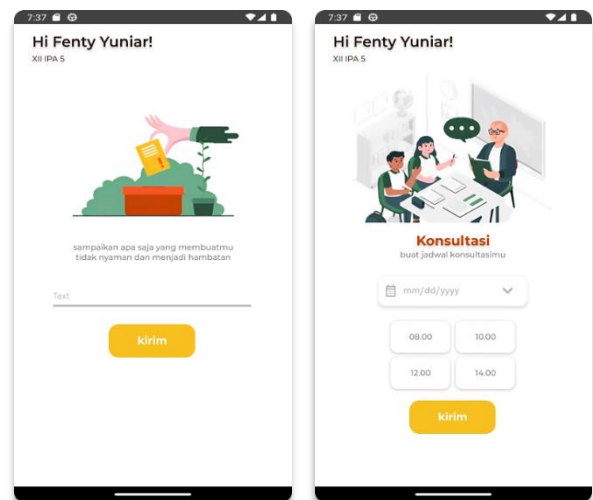
Fig. 19 Complaint and Consultant Page

3.6 Feedback and Result

After the coding phase is completed, the next essential step is to conduct testing, or application testing. The developed application will undergo testing using the Black Box Testing method. Black box testing is a method employed to assess the functionality of the application under construction or development. Below are the outcomes of the system testing.

Table. 2 Website Featuring Testing (Counselor)

No.	Feature	Condition	Status
1.	Login	The email column and password are incorrect,	Success

No.	Feature	Condition	Status
		or one of the columns is not filled in, or the login failed. The email column and password are correct and match the data; they will go to the dashboard page.	
2.	Manage Student Data	Counselors can add, view, edit, and delete student data.	Success
3.	Manage Absence Data	Counselors can add, view, edit, and delete student absence data.	Success
4.	Manage Complaint Data	Counselors can see the complaints the students have filed.	Success
5.	Manage Consultation Data	Counselors can see, and delete consultation data.	Success
6.	Printing Absence Data Report	Counselors can print student absence data reports.	Success

Table. 3 Application Featuring Testing (Student)

No.	Feature	Condition	Status
1.	Registration	The columns on the registration form are filled in accordingly, and a successful registration will go to the login page.	Success
2.	Login	Email columns and passwords filled in correctly and in accordance with the data will go to the home page.	Success
3.	Student Profile	Students can view their personal data in detail according to the data entered by students.	Success
4.	Consultation	Students can choose a consultation schedule with dates and times.	Success
6.	Complaint	Students can write a complaint	Success

In this research, both counselors and students, who are users of this system, were required to conduct application testing. The results of Black Box Testing indicate that the features on both the website and Android application are functioning successfully. This status confirms that all features are operating in accordance with the established design.

4. CONCLUSION

Research on E-Counseling Mobile-Based Applications in SMK PGRI 1 NGANJUK has the main objective of improving the effectiveness of teachers and students' duties. This Android app allows students to plan their counseling sessions and provides features to express their concerns through the app. Besides, the web-based applications used by consultants offer significant benefits. All data managed by the consultant is stored securely in the database, reducing the risk of data loss that may occur when relying only on conventional recording methods. This application in the future has the potential to improve time efficiency for counselors and students in performing their duties, as it is accessible from anywhere and reduces the time it takes to obtain student data. As shown by the test results above, the application works as successfully as expected.

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