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Implementation of An Android-Based Mobile Application for Real-Time Student Learning Reports at SMP IDN Jonggol, West Java

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Abstract: This research implements an Android-based mobile application for real-time student learning reports at IDN Jonggol Middle School, West Java, which can provide information about real-time student learning reports at IDN Jonggol Middle School using an Android-based mobile application. This research was conducted because many parents of IDN Middle School students wanted to see their children's development directly. This research aims to implement an Android-based application to help parents of students at IDN Middle School monitor their children's learning progress in real time by applying technology that is currently developing and making it easier for parents to access information about their children's development anywhere and anytime. This qualitative research method aims to create a system and display the information presented in the application being created. To obtain data relating to student learning

progress, we could access the data in spreadsheet form. With the Android application in this research, parents can access information about their child's learning progress directly anytime and anywhere.

Keywords: Android; School; Parents; Learning Progress; Student Learning Reports.

1. Introduction

In this digital age, the delivery of academic information has undergone a significant transformation, shaping the educational landscape in ways never before imagined. In line with technological advances, the delivery of academic information is no longer limited to conventional methods but opens up new opportunities for innovation and broader connectivity. The importance of conveying academic information appropriately and effectively is becoming increasingly prominent amidst the continuous flow of information. This includes not just announcing student achievements or academic schedules but also sharing knowledge and inspiring ideas. In this foreword, we will explore the significant changes in how we deliver academic information and how this is shaping a new paradigm in the world of education. One of the systems currently used at IDN Middle Schools as a means of conveying information to date is in the form of PDF files, activity reports, and teaching and learning activities in class, which are given to parents every week; this report is still not well systemized, and The input for this report is still carried out semi-manually, where the emphasis is still placed on humans, in this case, the class teacher.

As an IT-based school, IDN Middle School still needs a digital-based academic information system, especially in reporting activities or student learning progress, which is reported weekly. This is not because the teachers or teaching staff at IDN Middle Schools cannot create this system but because the teachers at IDN Middle Schools are too busy with learning plans, breakthroughs on how learning can be fun, and other agendas that are non-academic in nature. Parents who entrust their children to gain knowledge and improve their morals also want to know how the children they have entrusted have developed. This application was developed to make it easier to disseminate information to parents regarding their child's development and to facilitate IDN Middle Schools' having and developing applications following the Academic Information System that align with what is expected.

Implementing an Android-based Mobile Application for Real-time Student Learning Reports at IDN Jonggol Middle School, West Java, is an innovation that can increase the efficiency and effectiveness of the learning process. Various studies have been conducted on developing Android-based applications in the educational context. Research by Ikhbal and Musril (2020) designed Android-based physics learning media [1]. They use the 4-D (four D) development model to create practical applications in the learning process. Apart from that, Purwanti and Prastio (2021) also developed an Android-based vocational school information application in Depok using Android Studio [2]. This shows that using Android Studio as an application development platform can provide optimal results in an educational context. Android-based applications have also been implemented in various contexts, such as the Aripin & Suryaningsih (2019) student score monitoring system and application development for monitoring student learning outcomes [3]. In developing educational applications, the development methods used are also diverse. Several studies use the Research and Development (R&D) method with the ADDIE (Analyze *et al.*, Evaluation) model [4]. This shows that there is a systematic approach to developing Android-based educational applications. Thus, based on previous research, implementing an Android-based mobile application for real-time student learning reports at IDN Jonggol Middle School, West Java, can be an innovative step in supporting a more interactive, efficient, and transparent learning process.

2. Research Method

This study employs the Research and Development (R&D) methodology, which is used to produce a specific product and evaluate its effectiveness. The development model adopted in this research is the 4D model, consisting of the following stages: define, design, develop, and disseminate. The primary objective of this research is to explore the implementation of an Android-based application to help parents monitor their child's progress in school while also creating a Simple Academic Information System (SAIS) for SMP IDN.

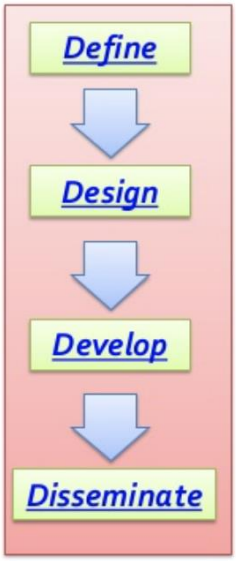

Figure 1. 4D Model Development

The design phase of this application involves creating a comprehensive flow map to outline the proposed functionalities and user interactions. Agile methodology is employed for the development of this application. Agile methodology is a flexible approach commonly used in technology-related projects, emphasizing adaptability and collaboration over rigid planning. It consists of several frameworks, each with its own rules and procedures, but sharing common characteristics such as prioritizing communication and teamwork over exhaustive documentation, using short development iterations or "sprints" to produce usable versions of the product continuously, and providing flexibility to accommodate changes during the development process. The Agile methodology is well-suited for this application development, as it necessitates constant adaptation to uncertain or rapidly changing user needs. This approach enables the development team to respond quickly and effectively to such changes while emphasizing quality and efficiency to ensure the resulting product meets user requirements.

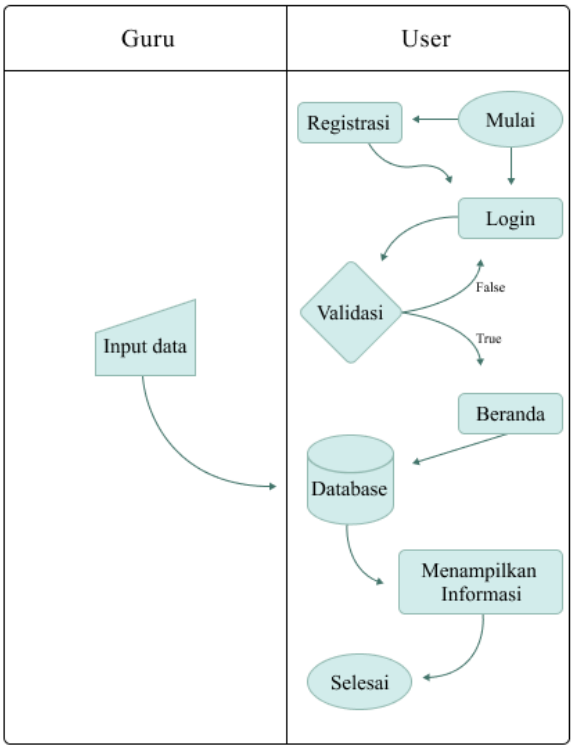

Figure 2. Proposed Flowmap

In the dissemination or testing phase, the application is handed over to the school authorities to validate its efficiency before being deployed to every parent of the students. This systematic approach to research methodology ensures a structured and efficient development process, ultimately creating a user-friendly and practical application for parents to monitor their child's academic progress in real time. Adopting Agile methodology mainly enhances the application's responsiveness to evolving user needs and fosters collaboration among development team members, contributing to successfully realizing the research objectives.

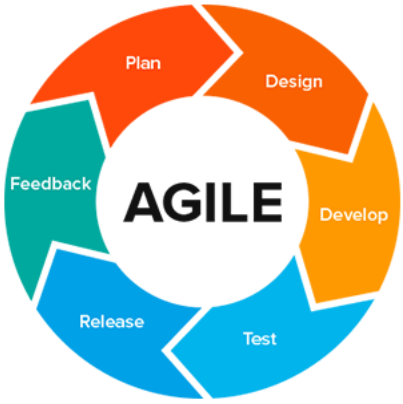

Figure 3. Agile Method

3. Result and Discussion

3.1 Results

3.1.1 Use Case Design

Use case diagrams are a type of UML (Unified Modeling Language) diagram used to describe interactions between the system and external actors that interact with the system. Using case diagrams helps detail the system's functionality and how external actors interact with the system. This diagram is often used in the system analysis and design phase.

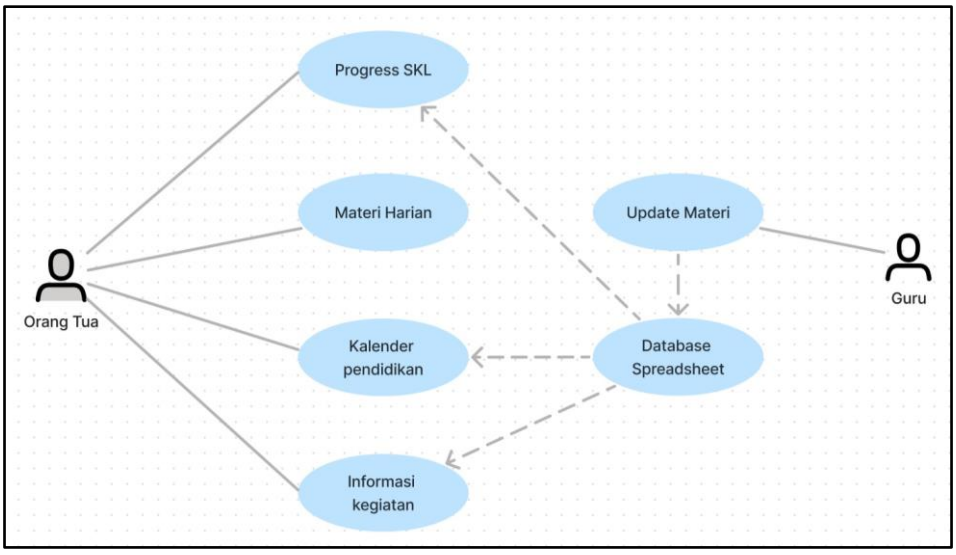

Figure 4. Use Case Design

3.1.2 Program Implementation

After the design stage is complete, the next step in application development is program implementation. This implementation includes creating various pre-planned features and user interfaces. Below are details of each feature implemented:

Figure 5. Splash Screen Display

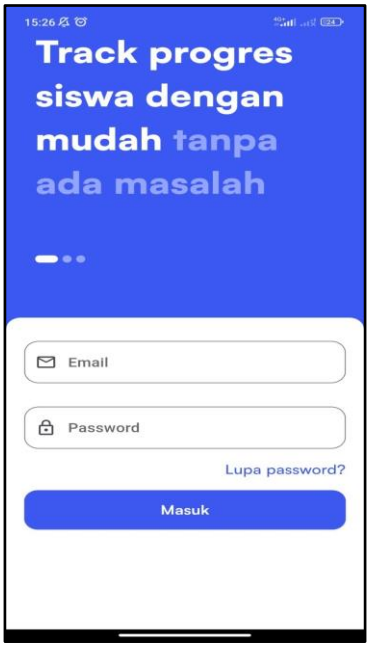

Figure 6. Login Page Display

Figure 7. Home Page Display

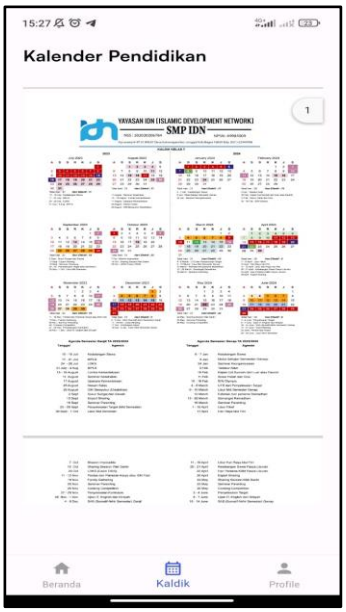

Figure 7. Kaldik Page Display

Figure 8. Profile Page Display

Figure 9. SKL Page Display

Figure 10. About display

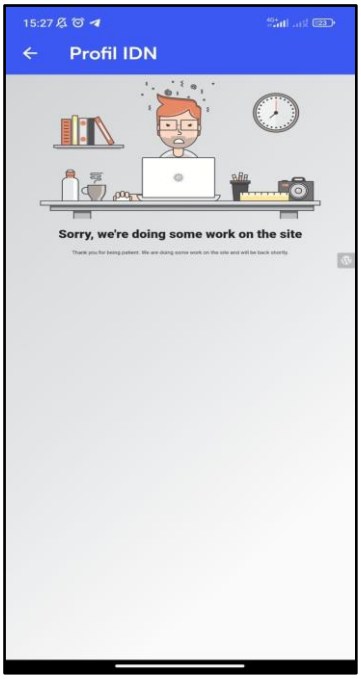

Figure 11. IDN Profile Page Display

The splash screen page appears first after the user opens the application. This splash screen provides an attractive initial impression and visually represents the application. After passing the splash screen, the user (parent) will be directed to the login page. They are asked to enter the email and password that the school admin previously registered. This is a required authentication step before accessing other features in the app. After successful login, the user will be directed to the main page or home page. This page displays essential information, including banners for activities currently or will occur at the school. Apart from that, there is also a display of students' SKL (Graduation Criteria) progress, which provides an overview of their academic progress. Finally, there is also a daily journal display that contains records of student activities and achievements. The Kaldik (Education Calendar) feature allows users (parents) to see essential agendas that will be held at school. This page provides information about activity schedules, including extracurricular events, exams, and school holidays.

The profile page presents complete student personal data from the National Student Identification Number (NISN), date of birth (TTL), parents' names, and home address. This information is essential for administrative and communication purposes between schools and parents. The SKL feature or Graduation Criteria Requirements provides an overview of student learning progress. This page covers progress in various subjects such as IT, Diniyah, and English. This information allows parents to monitor their child's academic progress in detail. The About page contains information about the IDN Track application, including the goals, vision, and mission of developing this application. This helps users to understand the applications they use more deeply. The IDN Profile feature uses the WebView feature to allow users (parents) to access further information about IDN schools. This page describes the school, academic programs, facilities, and relevant contact information. The entire implementation of this feature is based on a pre-planned design. Developers work hard to ensure every feature runs well and meets user needs. A careful testing process is also carried out to ensure the quality and stability of the application before it is released to end users. Thus, the IDN Track application is ready to provide maximum benefits for parents monitoring and supporting their children's academic development at school.

3.2 Discussion

Implementing the IDN Track application results from careful use case design in developing educational information systems. Use case diagrams, as a typical modeling tool in the Unified Modeling Language (UML), to describe interactions between users, who in this context are student parents, with various features offered by the application. Using these use case diagrams facilitates a better understanding of the system functionality and helps design efficient interactions between the user and the system. The first step in implementation is creating a splash screen display. The implemented splash screen becomes an impressive starting point for users before they enter the login page. The login page then allows users to access the application with the required authentication, namely entering the email and password the school admin registered. This confirms

the security and reliability of the system in protecting sensitive data. After successfully logging in, users are directed to the home page, which presents essential information such as school activity banners, student SKL (Graduation Requirements) progress, and daily journals. It aims to provide users with a comprehensive overview of relevant educational activities and developments. Furthermore, the Kaldik (Education Calendar) page feature is available, which allows users to plan upcoming agendas and events at school.

Other features include a profile page, which gives users access to view and manage student personal data in detail, and an SKL (Graduation Criteria) page, which provides information about student learning progress in various subjects. On the other hand, IDN's about and profile pages provide additional information about the IDN Track app and the IDN school as a whole, integrating users more deeply into the educational environment. Thus, the implementation of the IDN Track application has combined use case design principles well, resulting in an application that is functional, intuitive, and useful for users. This application will significantly contribute to improving and enhancing the education system in Indonesia and providing a satisfying experience for users in monitoring their children's education.

4. Related Work

In recent years, Android-based mobile applications have become a significant trend in developing information systems for various purposes, including education. Several studies have explored the potential and benefits of applying this technology in the educational context in Indonesia. One relevant research was conducted by Ni Putu Risma Suantari *et al*. (2021), who proposed an Android-based goods inventory information system model using a QR Code at Tumbakbayuh Elementary School 1. This research shows that using QR Code technology can simplify the inventory management process in elementary schools. Besides that, Ali Mushoffan *et al*. (2019) have developed a Safe School Safe Route Information System (SIRASS) using an Android-based mobile application in Kediri City. This research highlights the importance of using mobile technology to improve the security and safety of students on their way to school [5]. Mobile application development has also been carried out to increase the efficiency of school administration, as carried out by Ahmad Habib and Berlian Al Kindhi (2018) in an analysis of the design and development of an Android-based school fee payment information system. This research highlights the potential of using mobile applications to facilitate school administration processes and fee payments [6].

On the other hand, several studies have also explored using Android applications to improve the quality of school services. For example, Fadhlillah *et al*. (2021) conducted research on the role of Android applications in improving the quality of school services at the Persis Islamic Boarding School, Tasikmalaya City. This research shows that Android applications can effectively increase interaction between schools, teachers, students, and parents in the context of Islamic boarding schools [7]. Apart from that, research by Dwi Yuny Sylvania *et al*. (2019) regarding the implementation of an Android-based academic information system at SMA Negeri 1 Tempilang also highlights the importance of using mobile technology in facilitating the learning process and academic management in senior high schools [8]. Furthermore, the development of Android-based applications has also been carried out to monitor student activities in various areas, as carried out by Niswana Hendrastuty and Yusril Ihza (2021) in designing an Android-based student monitoring application and Jovi Ryan Yuanga and Rini Agustina (2021) in designing build an Android-based student academic monitoring system at SDN 01 Tlogosari [9][10].

Apart from that, research explores the use of social media platforms, such as WhatsApp, in an educational context, such as that done by Moh. Anshori Aris Widya and Mushthofa Abdullah Faqih (2022) developed a WhatsApp auto-response-based student learning achievement monitoring system [4]. Furthermore, research by Ayu Amalia and Suhendi (2021) regarding the analysis and design of mobile applications for online-based mentoring activities also shows that mobile technology can effectively facilitate interaction between mentors and mentees in an educational context [11]. Apart from that, Fajar Masya *et al*. (2021) have developed an Android-based e-learning information system for the elementary school level at SDI Al-Hadiriyyah, showing that mobile applications can also be used to facilitate the online learning process at the elementary level [12]. Research by Febri Ramadhana and John Friadi (2019) on an Android-based information system for student grades in high school schools and Gedmi Sari Melati Rambe (2023) on the introduction of an Android-based Bina Taruna Medan junior high school (SMP) information system using the REST API (Application Programming) method Interface) also highlights the importance of using mobile technology in facilitating the academic management process at the secondary school level [13][14].

Through these various studies, using Android-based mobile applications has become a significant solution in improving education in Indonesia, starting from school administration management to the learning process

and interaction between all education stakeholders. The discussion of related studies in developing an Android-based information system for education includes several important aspects to pay attention to. First of all, the use of Android-based mobile applications has significantly impacted the efficiency and effectiveness of the education process in Indonesia. One positive impact that can be observed is an improvement in school administrative management. Various studies, such as those conducted by Ahmad Habib and Berlian Al Kindhi (2018) in an analysis of the design and development of an Android-based school fee payment information system, show that mobile applications can facilitate the school administration process, including the school fee payment process [6]. This can reduce school administration officers' workload and increase data recording accuracy.

Apart from that, the use of mobile applications has also changed how schools, teachers, students, and parents interact. An example is research by Fadhlillah *et al*. (2021), which shows that Android applications can effectively increase interaction between schools and parents and between teachers and students. This can strengthen relationships between education stakeholders and improve the quality of school services. Apart from that, using Android-based mobile applications has also changed the learning process. Various studies, such as those conducted by Dwi Yuny Sylvania *et al*. (2019) regarding the implementation of an Android-based academic information system at SMA Negeri 1 Tempilang, show that mobile technology can facilitate the learning process in the classroom by providing easy access to academic information and learning materials. This can increase student involvement in the learning process and help teachers deliver learning material more effectively. Apart from that, the development of mobile applications has also brought changes in monitoring and evaluating student learning outcomes.

Research by Moh Anshori Aris Widya and Mushthofa Abdullah Faqih (2022) discussed the development of a student learning achievement monitoring system based on WhatsApp auto response. By using a WhatsApp-based mobile application, teachers can automatically monitor and evaluate student learning achievements more efficiently. This can help teachers provide faster feedback to students and parents about student learning progress. Apart from that, the use of mobile applications also changes how education is accessed and participated in by the public. Fajar Masya *et al*. (2021) regarding the development of an Android-based e-learning information system for the elementary school level at SDI Al-Hadiriyyah. Using mobile applications, students can access learning materials online anywhere and at any time, enabling more flexible access to education for the community. Thus, the use of Android-based mobile applications has brought significant changes to the education process in Indonesia. Using this technology can increase the efficiency and effectiveness of the education process and expand access to education for the community. However, it is essential to remember that the use of this technology must also be supported by adequate infrastructure and continuous guidance to education stakeholders so that it can have maximum impact.

5. Conclusion

This application was built using the Flutter framework for the front end and Firebase and AppScript for the back end. From the results of this application, it is concluded that it has succeeded in increasing parents' accessibility to children's real-time learning reports, overcoming the traditional limitations of only providing information on Saturdays or weekends using PDF. Parents and students responded positively to the application's success in providing faster and more accurate learning information. This application encourages parental involvement in supporting their child's learning. Parents feel more connected to their child's daily learning process and can respond more quickly to their academic needs. This application opens up more effective lines of communication between schools, teachers, students, and parents.

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