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Transforming Early Childhood Learning by Utilizing the Android Platform at School

Ricco Herdiyan Saputra*
Bakti Nusantara Institute Lampung, Pringsewu Sub-district, Pringsewu, Lampung, INDONESIA

Winia Waziana
Bakti Nusantara Institute Lampung, Pringsewu Sub-district, Pringsewu, Lampung, INDONESIA

Satria Abadi
Universiti Pendidikan Sultan Idris, Perak, MALAYSIA

Aditya Dwi Putra
District Police, Cyber Security Division Lampung, INDONESIA

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Abstract

This research aims to explore the transformation of early childhood learning by utilizing the Android platform at PAUD Nurul Iman Tanjung Dalam using the Waterfall method. The Waterfall approach is used in designing, developing, and implementing technology-based learning systems. The research results show that the use of the Android platform has experienced a significant transformation in early childhood learning at PAUD. This approach allows teachers to use modern technology in the teaching process, enriching children's learning experience, and increasing their involvement in the learning process. Thus, the implementation of the Android platform at PAUD Nurul Iman Tanjung Dalam makes a positive contribution to improving the quality of early childhood learning.

INTRODUCTION

The development of information technology (IT) is very rapid and makes people find it easier to do their job. IT provides added value in the form of efficiency and effectiveness. The need for IT is quite high because it offers efficiency and effectiveness to support the organization in achieving its goals, which can contribute to increasing its competitiveness. Higher education goals will be achieved if IT planning and strategy are implemented following the organization's business planning and strategy [1].

Data dictionaries enable systems analysts to fully define the data flowing through a system. At the system analysis stage, the data dictionary is used as a communication tool between system analysts and system users about data entering the system, especially about data entering the system and information needed by system users. During the system design phase, you use data dictionaries to design inputs and design reports and databases. The data dictionary is created based on the data flow in the data flow diagram (DFD). The data flow in the DFD is global and only the name of the data flow is displayed. For more information about the DFD data flow structure, see Data Dictionary.

Early childhood education has a crucial role in forming the basis for children's development towards a bright future. According to the Big Indonesian Dictionary, it states that "early childhood is an individual population aged between 0-6 years" [2]. National Education System Law no. 20/2003

• **Corresponding author:**
Ricco Herdiyan Saputra, Information System, Bakti Nusantara Institute Lampung, Pringsewu Sub-district, Pringsewu, Lampung, INDONESIA. ✉ saputraherdiyanricco@gmail.com

paragraph 1, states that "early childhood are children in the age range 0-6 years [3]. Minister of Education and Culture Regulation No.1 of 2014 Article 1 concerning the 2014 Curriculum states that "early childhood education is a level of education carried out before basic education with coaching efforts aimed at children from birth to the age of six" [4].

According to the National Education System Law No. 20 of 2003, part seven of early childhood education (article 28), it is stated that,

1) Early childhood education is held before the basic education level.
2) Early childhood education can be done through formal, non-formal, and informal education channels.
3) Early childhood education in the form of formal education in the form of Kindergarten (TK), Raudatul Athfal (RA), or other equivalent forms.
4) Early childhood education in non-formal education channels takes the form of Play Groups (KB), Child Care Centers (TPA), or other equivalent forms.
5) Early childhood education through informal education takes the form of family education or social education organized by the environment.
6) Provisions regarding early childhood education as intended in paragraph (1), paragraph (2), paragraph (3), and paragraph (4) are further regulated by Government Regulation [5].

According to the Big Indonesian Dictionary (KBBI), technology is a scientific method used to achieve practical goals and is one of the applied sciences [6]. Next, there was another sociologist who defined technology. Castells (2004) states that technology is a collection of tools, rules, and procedures that are the application of scientific knowledge to a particular job under conditions that allow repetition [7].

In rapid technological developments, the approach to early childhood learning is also experiencing a significant transformation. One form of this transformation is using the Android platform as a learning aid. In this context, PAUD Nurul Iman Tanjung Dalam is present as an educational institution that adopts these innovations to improve the quality of early childhood learning.

The transformation of early childhood learning by utilizing the Android platform at PAUD Nurul Iman Tanjung Dalam is a step forward in increasing the effectiveness and relevance of learning methods. Through the integration of technology, it is hoped that children's learning experiences can become more interactive, fun, and efficient. The Android platform was chosen because of its popularity and the availability of various educational applications that can be adapted to the needs of the PAUD curriculum.

The use of technology in early childhood learning is nothing new. However, implementation still requires a deep understanding of children's needs and the role of teachers in managing learning with this technology. At PAUD Nurul Iman Tanjung Dalam, teachers act as facilitators and learning managers who ensure that the use of the Android platform is to the children's needs and development.

The decision to utilize the Android platform in early childhood learning at PAUD Nurul Iman Tanjung Dalam cannot be separated from considerations of technological developments that continue to move forward. By utilizing technology that is already familiar to children, it is hoped that learning can become more interesting and relevant to their daily lives. This is also in line with the aim of early childhood education, namely developing children's potential optimally from an early age.

However, the transformation of learning with the use of technology does not occur without challenges. One of them is the provision of adequate infrastructure and training for teachers in integrating technology into the learning process. Apart from that, it is also necessary to pay attention to security and supervision aspects in using technology in early childhood learning environments.

In the context of globalization and increasingly fierce competition, children's readiness to face future challenges is crucial. By using technology wisely from an early age, it is hoped that children can develop skills relevant to the demands of the times. The transformation of early childhood learning by utilizing the Android platform at PAUD Nurul

Iman Tanjung Dalam is the first step in this direction.

Through interesting and interactive learning experiences, at PAUD Nurul Iman Tanjung Dalam, children are invited to be active in the learning process. This not only creates a fun learning environment but also builds a strong foundation for their future progress. Thus, The development of Android-based learning media at PAUD Nurul Iman Tanjung Dalam will bring great benefits in improving the quality of learning and preparing young children for a better future and it is hoped that this learning transformation can make a positive contribution to forming a generation that is intelligent, creative, and highly competitive.

Education

Education also has a juridical definition in Law Number 20 of 2003 concerning the National Education System which states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength and control. self, personality, intelligence, noble morals, and skills needed for oneself, society, and the nation [8].

According to Kurniawan (2017: 26), education is transferring values, knowledge, experience, and skills to the younger generation as an effort for the older generation to prepare for the next generation's life functions, both physically and spiritually.[9] H. Mangun Budiyanto as quoted by Kurniawan (2017: 27), "argues that education is preparing and growing students or individual humans whose process takes place continuously from birth until they die" [10].

According to Trahati (2015: 11), education is an activity carried out by humans consciously and programmed to build a good personality and develop the abilities or talents that exist in human individuals to achieve certain goals or targets in living life [11].

Learning

According to Andi Setiawan (2017:21), learning is a process of conscious and deliberate change, referring to systemic activities to change an individual for the better. According to Sudjana (2012: 28), learning is a deliberate effort by educators to motivate students to be involved in learning activities. According to Susanto and Ahmad (2013: 18-19), learning is a combination of two learning and teaching activities.[13] Meanwhile, according to Suardi (2018: 7), learning is a process where students interact with teachers and learning resources in a learning environment [12].

As for learning, it is something a series of activities carried out between students and teachers to achieve the learning objectives themselves. According to Suardi (2018) learning is a process to help students learn effectively Good. Often in the learning process, there are obstacles to achieving goals [13].

Instructional Media

According to Cecep Kustandi (2020), learning media is a tool that can help the teaching and learning process which functions to clarify the meaning of the message conveyed so that the learning objectives are better and more perfect [14].

According to Dr. Nizwarrdi Jalinus (2016, 4), learning media is anything related to software and hardware that can be used to convey the content of teaching materials from learning sources to students (individuals or groups), which can stimulate thoughts, feelings, attention, and interest in learning. in such a way that the learning process becomes more effective [15].

According to Syaiful Bahari Djamarah and Azwan Zain (2006), learning media is any tool that can be used as a channel for messages to achieve learning goals [16].

Application

Applications are programs that people use to do things on a computer system and A mobile application system is an application that can be used even if the user moves easily from one place to another without disconnection or loss of communication [17].

According to Rachmad Hakim S, an application of software with a specific purpose, for example, managing Windows, document processing, games, and others [18].

Application according to Jogiyanto, in Bagus Windya Kusuma Wardana, is the use in a computer of instructions or statements that are arranged in such a way that the computer can process input into output [19].

According to Roni Habibi and Riki Karnovi, an application is a ready-to-use program that can be used to carry out several problem-solving commands using one of the application data processing techniques on a computer or smartphone to obtain more accurate results and by the purpose of making the application [20].

Android

According to Ir. Yuniar Supardi (2017: 1) Android is "a Linux-based mobile device operating system that includes an operating system, middleware, and applications" [21].

According to Yosef Murya (2014: 3), Android is "a Linux-based operating system used for mobile phones such as smartphones and tablet computers (PDAs)" [22].

According to Nazruddin Safaat H (2012:1), Android is an operating system for Linux-based mobile devices that includes an operating system, middleware, and applications [23].

According to Akhmad Dharma Kasman (2016:2), "Android is a Linux-based operating system for mobile phones and touchscreen tablet computers" [24].

However, as it develops, Android has turned into a platform that is very fast in innovating. This cannot be separated from the main developer behind it, namely Google. Google was the one who acquired Android and then created a platform. The Android platform consists of a Linux-based operating system, a GUI (Graphic User Interface), a web browser, and end-user applications that can be downloaded and developers can freely work and create the best and most open applications for use by various devices.

METHOD

The waterfall method is a structured and sequential software development method. According to (Sanubari et al., 2020: 41) the development of the waterfall method has several sequential stages, namely requirements (needs analysis), system design (system design), coding (coding) and testing (testing), program implementation, and maintenance [25].

The Waterfall method is a method used to develop software (software) sequentially (like a waterfall) through several stages, namely planning, design, implementation, and testing [26].

In the context of the transformation of early childhood learning by utilizing the Android platform at PAUD Nurul Iman Tanjung Dalam, the stages of the waterfall method can be explained as follows :

1) Needs Analysis:
   - Identify early childhood learning needs at PAUD Nurul Iman Tanjung Dalam.
   - Review of software and Android platforms that can support this learning
   - Identify the features and functionality required in the Android platform.
2) Designing:
   - Design an Android application layout that suits the needs and characteristics of young children.
   - Designing a user interface that is child-friendly and easy to understand.
   - Designing interactive and interesting learning features.
3) Implementation:
   - Android application development based on specifications and designs that have been designed.
   - Coding learning features and integration with the Android platform.
   - Initial testing to ensure basic functionality has been implemented properly.
4) Testing:
   - Conduct thorough testing of applications to ensure good quality and performance.
   - Testing learning functionality to ensure effectiveness in helping young children learn.
   - User testing to identify possible feedback and usage issues.
5) Submission:
   - Training of PAUD Nurul Iman Tanjung Dalam staff in the use and management of Android applications.
   - Full implementation of the application in the PAUD environment.
   - Providing technical support and maintenance of the application after delivery.

After all these stages are completed, the Android application for transforming early childhood learning at PAUD Nurul Iman Tanjung Dalam is ready for widespread and sustainable use.

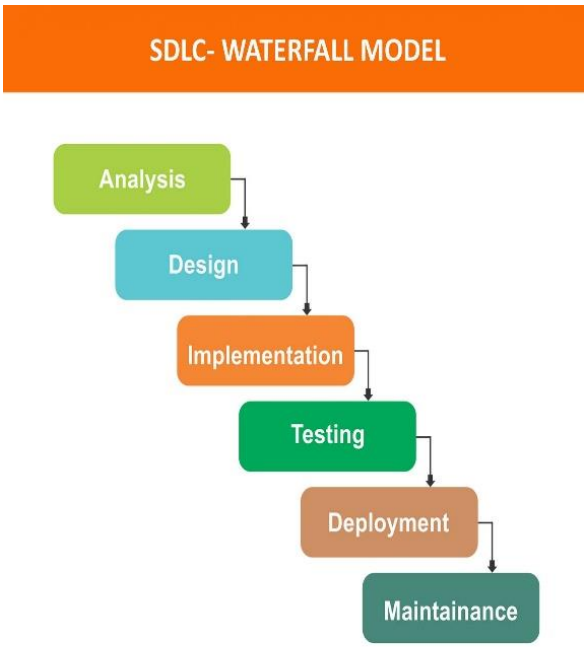


Figure 1. SDLC Waterfall Model

RESULTS AND DISCUSSION

Result

After going through a development process using the Waterfall method, PAUD Nurul Iman Tanjung Dalam succeeded in implementing an Android platform that can be used for early childhood learning. This platform provides various features that support fun interaction and learning for children, such as educational games, interactive learning materials, and evaluation of learning progress [27].

Discussion

After going through a development process using the Waterfall method, PAUD Nurul Iman Tanjung Dalam succeeded in implementing an Android platform that can be used for early childhood learning. This platform provides various features that support fun interaction and learning for children, such as educational games, interactive learning materials, and evaluation of learning progress.

- **Analysis**

  Hardware: The following is the hardware used by the author to create Android-based learning media at PAUD Nurul Iman Tanjung Dalam, namely an Intel Processor, 4GB RAM, 500GB Hard disk, Mouse, and Keyboard.

  Software: used to build Android-based learning media at PAUD Nurul Iman Tanjung Dalam such as Microsoft Windows 7/8/10, Xampp/cpanel, Notepad++, Appgeyser, and Browser.

  User Analysis: Characteristics of existing users who are parents, teachers, and students. Users must be able to operate a computer or cellphone based on mobile learning and be able to use the Internet well.

  System Risk: Every system created by humans not only has advantages and disadvantages but also impacts and risks arising from implementing the system. The Android-based Nurul Iman Tanjung Dalam PAUD learning media is currently the most popular, but this learning media is at risk of not working for the average person who doesn't understand the internet. The risks of a system like the one currently created include that PAUD Nurul Iman Tanjung Dalam requires a computer or mobile phone connected to the internet to open Android-based learning media. If PAUD Nurul Iman Tanjung Dalam does not educate the public about how to use Android-based learning media, then people in the cloud will not be able to access PAUD Nurul Iman Tanjung Dalam's Android-based learning media.

- **Design Stage**

  The design stage aims to meet the needs of system users regarding a clear picture of the system design that will be created and implemented using Context Diagrams, Data Flow Diagrams (DFD), Entity Relationship Diagrams (ERD), Data Dictionary, Flowcharts, and input and output page displays. The following symbols are used in data flow systems, including:

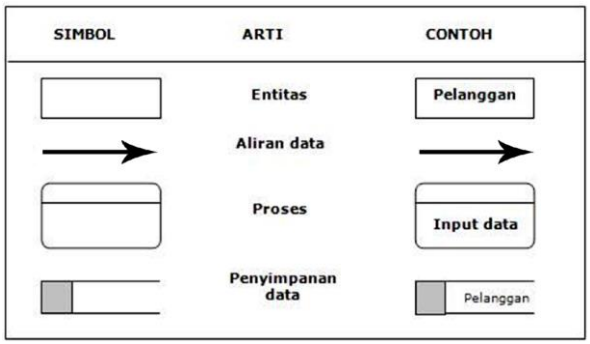


Figure 2. DFD Symbol

Information :

The double box is used to describe an external entity that can send data to or receive data from the system. Arrows show the movement of data from one point to another point with the arrowhead pointing to the data destination. A square with rounded corners is used to indicate a transformation process.

Data storage denotes manual storage, such as a file cabinet or a computerized file or database. Because data storage represents a person, place, or thing, it is named with a noun. The conditions for creating this DFD are:

a) Giving a name to each DFD component.
b) Giving numbers to process components.
c) Draw the DFD as often as possible so that it is pleasing to the eye.
d) Avoidance of complicated DFD depictions.
e) Ensure that the DFD formed is logically consistent.

1) Context Diagram

A context diagram is a diagram that consists of processes and describes the scope of a system. The context diagram is the top level of the DFD that describes all system inputs or outputs. This section provides an overview of the entire system. The system is limited by boundaries (which can be represented by dotted lines). There is only one process in the context diagram.

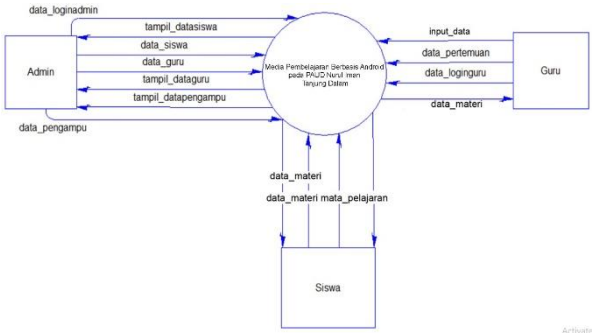


Figure 3. Context Diagram

2) DFD

Data Flow Diagrams (DFD) were first developed in 1979 by Larry Constantine and Ed Yourdon in Structured Systems Analysis and Design Methodology (SSADM). Then in the 1980s, DFD was popularized again by Edward Yourdon and Tom De Marco as a software system analysis model for software systems that will be implemented by programming structured. DFD itself is a diagram that uses notations for describes the flow of system data, the use of which is intended to help readers understand the system logically, structured, and clearly. DFD Notation has reference to graph theory which was originally used for operational research in modeling workflows in an organization with many symbols for describes a DFD, where one symbol and another symbol have the function and different uses [28].

Data Flow Diagram Level is a description of the data manipulation process contained in the DFD. Data Flow Diagram can be seen in the following image:

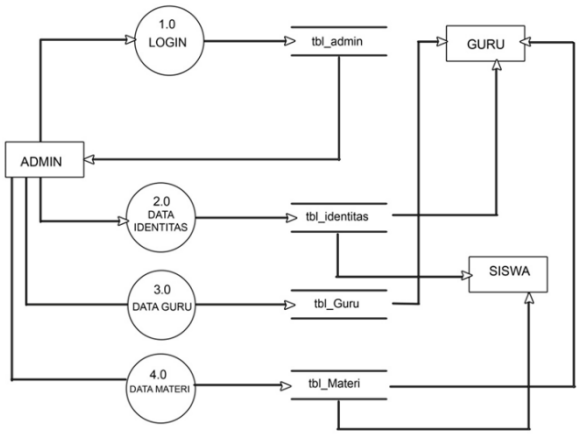


Figure 4. DFD

3) ERD

ERD or entity relationship diagram is a presentation in the form of components that have attributes as symbols of reality. ERD can be seen as shown below:

Thus, to help provide a complete picture of relationships, there are three types of relationships, namely:

- **One To One Relationship 2 Files:**

The relationship between the first file and the second file is one-to-one.

- **One To Many Relationship 2 Files**

The relationship between the first file and the second file is one to many.

- **Many To Many Relationships 2 Files**

The relationship between the first file and the second file is many to many.

- **One To One 2 Attributes In 1 File**

The relationship between one attribute and the attributes in the same file has a one-to-one relationship

- **One To Many Attributes In 1 File**

The relationship between one attribute and other attributes in the same file has a one-to-many relationship.

- **Many To Many Attributes In 1 File**

The relationship between one attribute and another attribute in the same file has many versus many relationships.

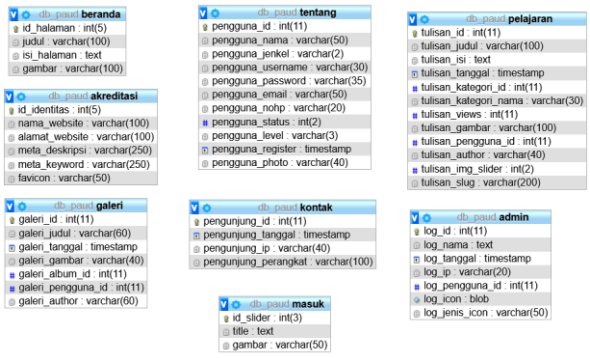


Figure 5. ERD

4) Dictionaries Data

Data dictionaries enable systems analysts to fully define the data flowing through a system. At the system analysis stage, the data dictionary is used as a communication tool between system analysts and system users about data entering the system, especially about data entering the system and information needed by system users. During the system design phase, you use data dictionaries to design inputs and design reports and databases. The data dictionary is created based on the data flow in the data flow diagram (DFD). The data flow in the DFD is global and only the name of the data flow is displayed. For more information about the DFD data flow structure, see Data Dictionary.

- **Home Page Table**

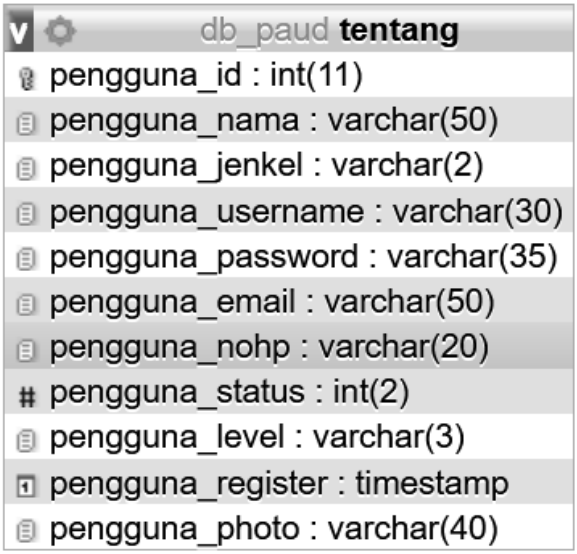
Database Name : db_mediapembelajaran
Table Name: tbl_halaman
Primary key: id_halaman
Foreign key: -

Table 1. Home Page

- **About Table**

Database Name: db_mediapembelajaran
Table Name: tbl_tentang
Primery key: id_tentang
Foreign key: -

Table 2. About



- **Learning Table**

Database Name: db_mediapembelajaran

Table Name: tbl_pelajaran
Primery key : id_ pelajaran
Foreign key :

Table 3. Learning

- **Accreditation Table**

Database Name : db_mediapembelajaran
Table Name: tbl_akreditasi
Primery key : id
Foreign key :

Table 4. Accreditation

- **Galeri Table**

Database Name : db_mediapembelajaran
Table Name: tbl_ galeri
Primery key : id_ galeri
Foreign key : -

Table 5. Galeri

- **Contact Table**

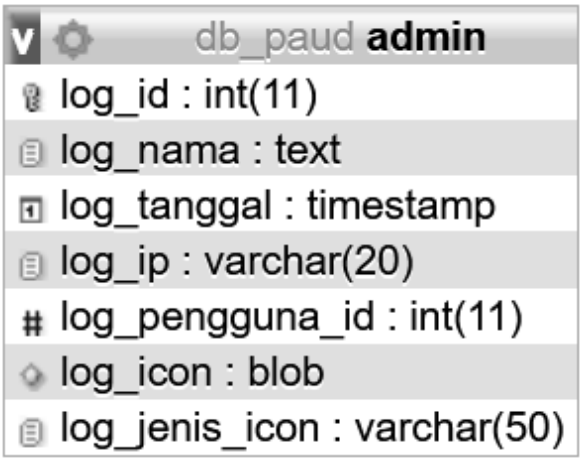
Database Name : db_mediapembelajaran
Table Name: tbl_kontak
Primery key : id_ kontak
Foreign key : -

Table 6. Contact

- **Admin Table**

Database Name : db_ mediapembelajaran
Table Name: Tabl_admin
Primary key: log_id

Table 7. Admin



- **Login Table**

Database Name : db_ mediapembelajaran
Table Name: tbl_masuk
Primery key : id_masuk
Poreign key : -

Table 8. Login

db_paud masuk
id_masuk : int(3)
title : text
gambar : varchar(50)

- **Design**

Figure 6. About Page Design

Android-based PAUD student learning media application page in the menu. Regarding this, there is a submenu, namely vision, mission, and welcome. Design of the About page for this online learning application for primary school level students based on mobile learning.

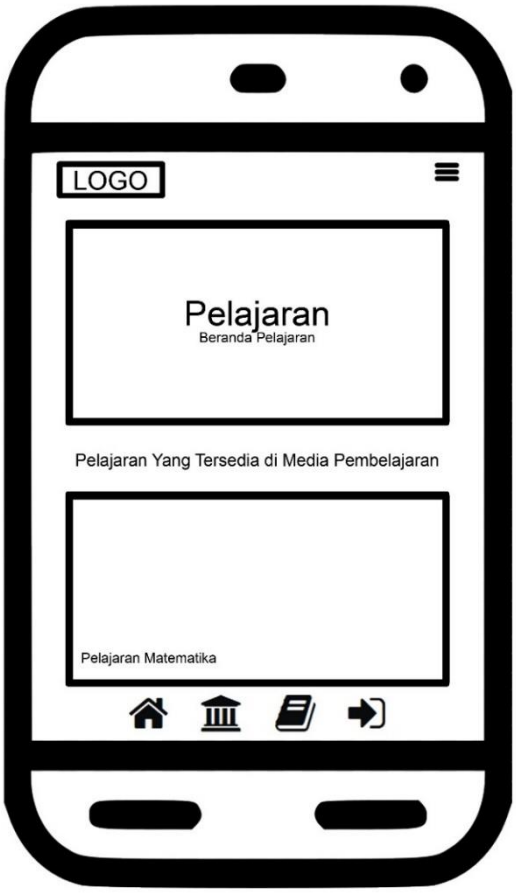


Figure 7. Lesson Page Design

The Lessons page contains lesson materials displayed in the mobile learning-based online learning application for PAUD students.

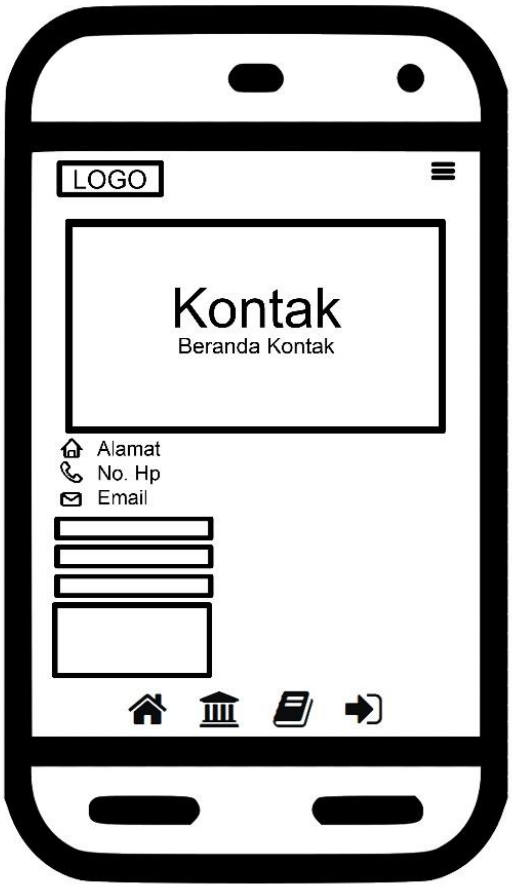


Figure 8. Lesson Page Contact

The Contact page contains the Android application form. Design the Contact page for Mobile Learning.

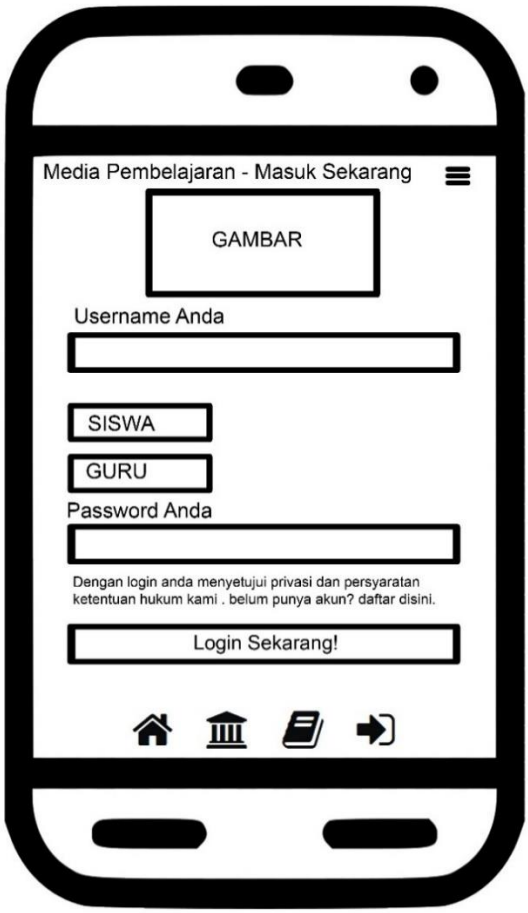


Figure 9. Login Page Design

The design of the login page on this menu gives access rights to students or teachers to be able to operate this mobile learning-based application as for the appearance of the design.

- **Implementation**

The implementation stage is the stage of putting the system in place so that it is ready to operate. To conduct trials on hardware as a means of processing data and presenting information. Activities that can be carried out at this implementation stage include the process of opening learning media programs, which can be done using the browser application on the computer and can also be opened using a smartphone which has a mobile learning-based operating system.

Figure 1. Home Page

The home page displays interesting reading lessons that are easy for students and parents to access without having to log in.

Figure 10. About Page

The About page displays the vision and mission of PAUD Nurul Iman Tanjung Dalam which can be accessed easily.

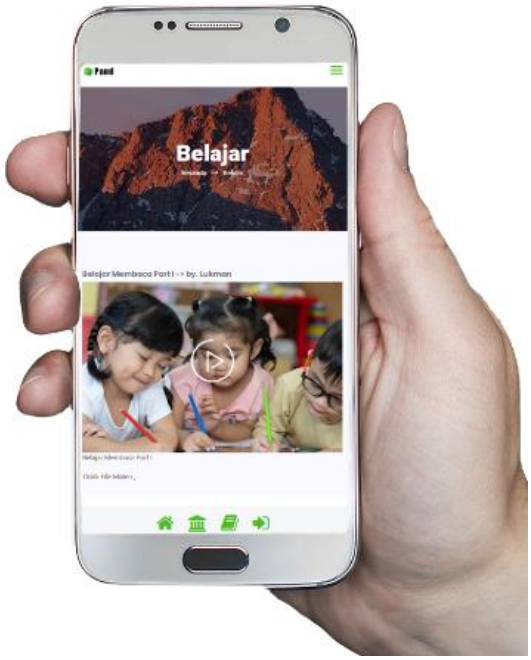


Figure 11. Lesson Page

The learning page displays learning material that is appropriate to the material at PAUD Nurul Iman Tanjung Dalam. The material is in the form of videos and PDF files that are easy to access.

Figure 12. Teacher Login Page

On the teacher login page, the username and password are displayed which must be filled in by the teacher so that they can then enter the teacher's page.

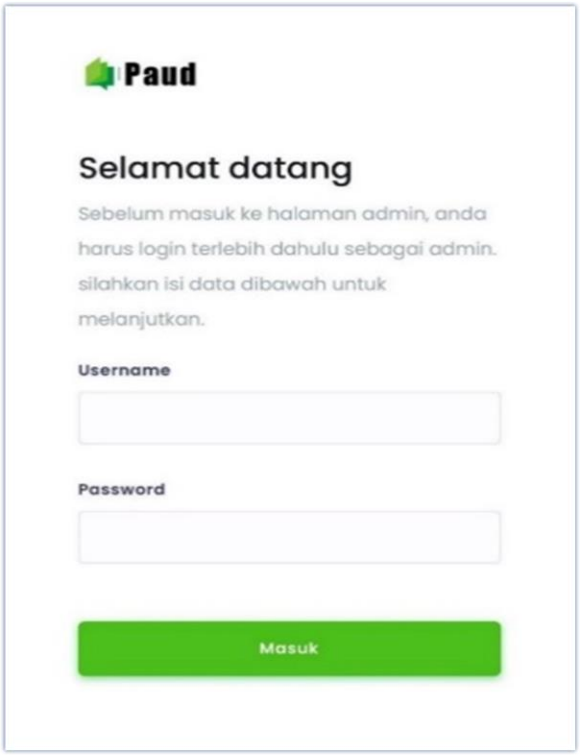


Figure 13. Admin Login Page

The admin login page also displays the username and password which the admin must fill in to enter the admin menu.

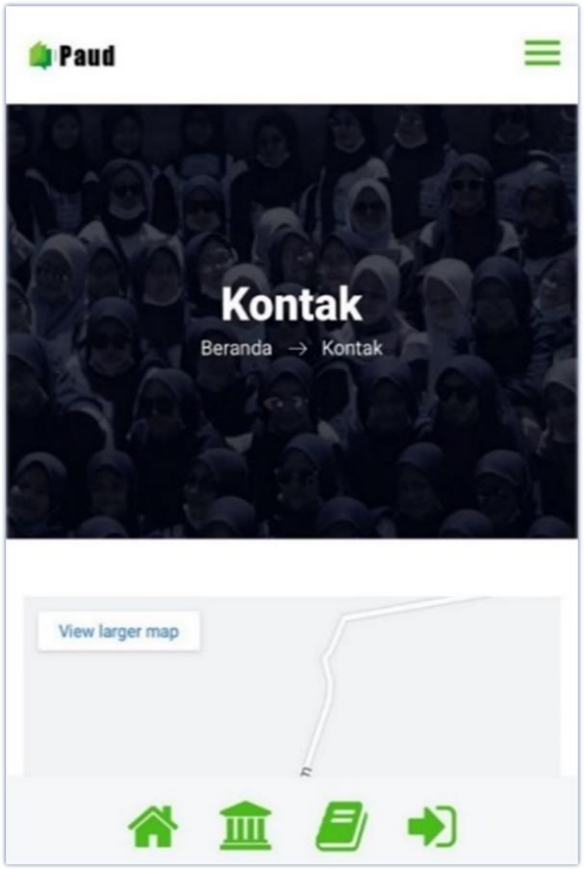


Figure 14. Contact Page

The contact page and map display the location of PAUD Nurul Iman Tanjung Dalam and there is a number that parents can contact if there is a need.

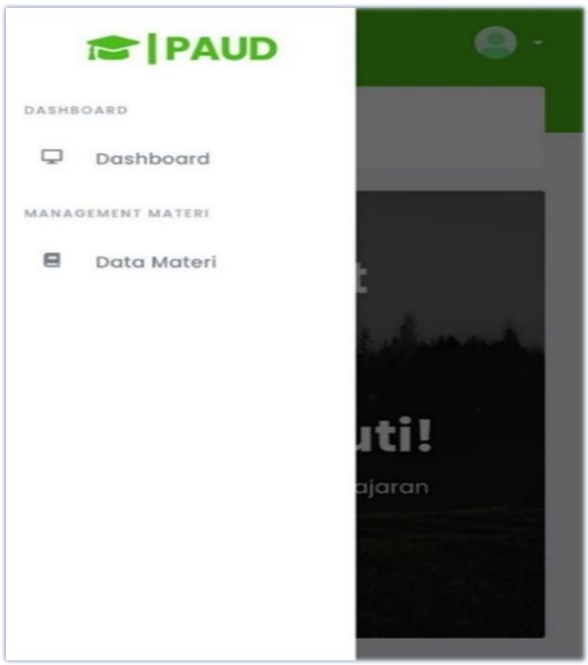


Figure 15. Teacher Page

The teacher page displays a material data menu that can be accessed by teachers to enter material that students will study.

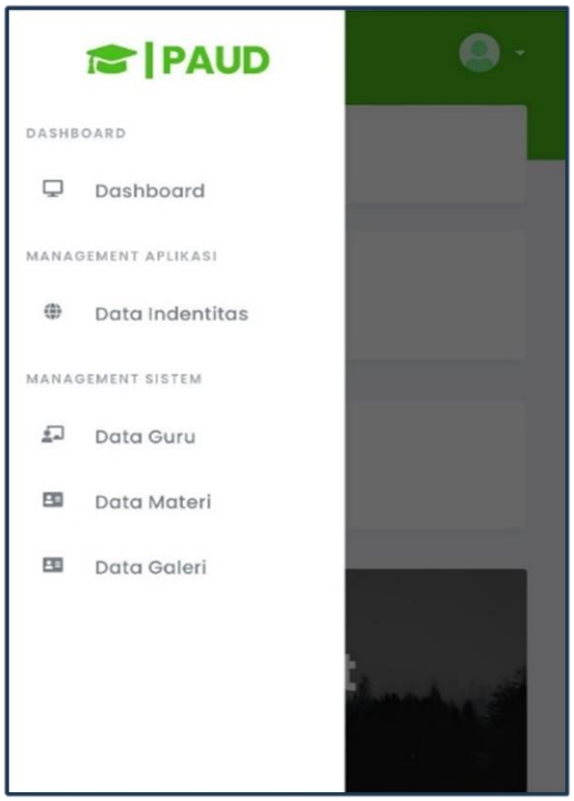


Figure 16. Admin Page

On the admin page, there is a PAUD identity menu that can be edited by the admin, a teacher data menu for deleting and adding teachers, a gallery menu for adding photos to the student's home page, as well as a material data menu for editing material data.

CONCLUSION

Based on the analysis and discussion of the problems that exist in the use of the Android platform in early childhood learning at PAUD Nurul Iman Tanjung Dalam, it can be seen that there have been major changes as follows:

1) Using Android-based learning at PAUD Nurul Iman Tanjung Dalam using responsive web design based on several stages with using the waterfall system development methodology, followed by PHP, Photoshop, MySQL, and implement it in your application using the XAMPP programming language.
2) This approach allows teachers to use modern technology in the classroom, enriching children's learning experience and increasing their participation in the learning process.
3) Apart from that, the Android platform can also help increase learning accessibility for children, such as in PAUD environments where resources are limited. This change reflects the importance of integrating technology into early childhood education to prepare ourselves for the challenges and opportunities of the digital era.

- **Suggestions**

So that the system built can be used well, the author provides several suggestions. That is,

1) Considering that this research product can provide learning benefits, further researchers are encouraged to develop this product in a wider scope in the future.
2) After studying the material provided by the teacher or presented in the learning media application, an interesting quiz feature should be added to improve students' skills.
3) The product only contains reading comprehension learning exercises and is equipped with learning videos that you can watch.

Suggestions for future researchers include the introduction of numbers, images, and quiz features.

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