

## USING PROTOTYPING METHOD FOR ANALYSIS AND DESIGN OF INFORMATION SYSTEMS FOR STUDENT REGISTRATION IN SEKOLAH MASTER

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### ABSTRACT

Master or Master's Schools is one of the schools for Education for equality of students for the less fortunate. One of the obstacles that master schools have is the absence of technology in student enrollment in schools. Many students wish to enroll and continue Education in masters schools to get an equivalency Education, so as to have the recognition of such Educational status. So far, schools are still using conventional methods in registration. Where, students and parents or families must come to school to register students or students by bringing the required documents, not to mention the requirements that cannot be completed, even queue time is needed to be served by the operator or staff on duty at the school. This shows that a technological device or system is needed to facilitate student enrollment in schools. One method that can be used to collect the required requirements and make a design is the prototyping method. The prototyping method is one of the methods used as an effort to develop a system with almost finished services and products. This method produces an analysis of functional and non-functional requirements that form the basis of the system that can be developed. This research also produced a design with a navigation structure, use case diagrams with a unified modeling language, relation tables, and interface proposals from end users and admins. This interface is used as a basis for the system to be made as a user-approved interface, so that the development of this system can be carried out properly during implementation and future trials.

**Keywords:** Analysis, Design, Master School, Prototyping, Registration, Students.

### 1. INTRODUCTION

School is an educational institution where people who have knowledge are produced. Schools can also be said to be a gathering place for people who have an interest in education [1]. Schools can be started at the age of children and become a necessity to be able to receive formal education. Schools that become places for children to learn are important, including economic development [2], shaping the personality of the young generation of a nation [3], and improving public health and promoting health equity [4]. Schools are divided into several levels, including elementary school, junior high school, and high school. Children who can go to school must register themselves with the school with the conditions imposed, as well as exams or tests, so that they can enter the school according to the appropriate level.

Children who want to study at school are called prospective new students. Every new student must meet the requirements. In Indonesia, the registration path for new students who will take education in schools is regulated by government regulations, such as zoning, affirmations, transfer of parental/guardian duties, and/or achievements [5]. In addition, registration carried out by new students must use web-based information system services. The majority of schools that already have national and international standards already have this, but not with schools that are still said to not have sufficient standardization and non-formal education equalization schools. School registration by new students is intended to facilitate filling in personal data, files or requirements documents, and written exams that are passed, as well as registration fees for schools. For children who are unable to register as new students, they cannot continue their education at school, so they must take non-formal education known as non-formal education equalization schools. This is regulated in national education standards. Non-formal education is an educational pathway outside of formal education that can be carried out in a structured and tiered manner [6]. Equality education basically aims to provide opportunities for community members, especially new students to take quality primary and secondary education and are relevant to the needs of students who do not have the opportunity to study in formal education.

In assisting the implementation of academic learning and the provision of life skills programs, these equalization schools are divided into Package A, Package B, and Package C. The Package A program is an

education program on a non-formal path equivalent to elementary school for anyone who is constrained to formal education or has equality education for completeness of education. Package B program is an education program on a non-formal pathway equivalent to junior high school for anyone who is constrained to formal education or chooses Equality education for complete education. The Package C program is an Education program on the non-formal pathway equivalent to high school for anyone who is constrained to formal education or chooses equality education for complete education. There are not many schools for equality education and are constrained by the limited capacity, quota and space. One of the factors that causes the limited quota is the number of children who want to continue their education in schools with equality education. Based on statistical data on the impact of the pandemic, the majority of Indonesian children dropped out of school because of the economy because there was no money, 74% of 938 children aged 7 to 18 years [7].

Prior to the pandemic, a large number of children attending Equality Education also wanted to register for school. One of the schools for equality education is the Depok Terminal Mosque School which is known as the "Master School" or "Sekolah Master". Depok Master School is a free school under the auspices of the Independent Bina Insan Foundation (YABIM) which is intended for disadvantaged children around the Depok terminal. Master schools consist of kindergarten (TK), elementary (SD), junior high (SMP), and high school (SMA) schools [8]. The school registration process at this school is still using the conventional concept. Children and parents must come with files or documents to register, then wait for the announcement of acceptance or not to be contacted via telephone line. According to the administrator's statement, based on the results of interviews and observations made, that many from outside the region or city applied to this school. Limited facilities and infrastructure, so that the registration process, such as recording data, student admission status, and fast new information cannot be implemented because there is no information system technology guide for school registration. Facilities such as classrooms and internet networks are available, but the school registration information system is not yet available.

The use of registration and information systems will provide information storage needs in a faster and more convenient way to store student files in computer systems stored in databases. This will make it easier for operators to save student files from time to time. This stored information can be viewed through system access without worrying about a single file being lost (unless there is a system failure). It also serves as an information database for students transferring or transferring into the school.

Master Schools will use this system, so they can enroll students in no time. It can automatically save stored data that is inputted by students or students through a system. By using this information system, data can be secured and can easily find information about students or students. This system is very helpful for operators in checking files or documents, as well as data inputted by new students or students to register.

Related research on school registration that oversees from elementary to high school levels that have successfully become references in this research include: The general features adopted from the e-registration system by schools managed by KNEC produce a formula for each individual candidate, validating various data students, enroll in levels within the school, generate test scores for candidates, and can store data securely. This research resulted in the successful adoption of the e-registration system to be implemented [9]. Subsequent research on admission and registration has been carried out annually since 1994. The university has committed to using a registration system, some great efforts have been made to create a system managed by other experts called non-Arjuna experts. The Arjuna system is used in this application to provide reliability and availability in case of possible failure of certain components [10]. Subsequent research using the registration system was carried out at universities known as (SRSU). This system as a kind of management information system can not only record student registration information every semester quickly and efficiently, but also perform statistics on basic student information, registration information, and payment information, and provide results from analysis [11]. The next research is to investigate what is done on the analysis of the computerized student registration system in the Higher Education School, the researcher formulates four research questions that have been found with four questions including, the computerized registration system makes student registration easier than the manual system, the preparation and management of the registration system Computerized students are cost-effective, staff and students cannot operate and manage a computerized student registration system, and are not ready to implement computer-based systems [12].

In this study, the prototyping method is used which is one of the methods used as an effort to develop a system with almost finished services and products. Several studies on prototyping include reviews that aim to provide resources for designers and set a trajectory for continuing innovation in research in the fields of engineering, management, design science, and architecture in making prototype designs [13]. The prototype is also used with the aim of providing a common perception and initial understanding of the basic process

of the system to be developed, so that good communication occurs between developers and system users [14].

## 2. BACKGROUND

The Master's School uses a manual process in registering student information. Students and parents must come to the master's school by filling out the registration form, file or document that is a requirement, then it will be checked first whether there are documents that are lacking during the registration transaction. This takes longer for the operator to check in to complete the registration transaction. Because currently experiencing difficulties in registration which results in student files or documents having to be inputted back into the Microsoft excel system in recording student information, the master school manager decided to propose a system that focuses on student registration.

Based on interviews with administrators and operators in the registration department, the main problem for schools is how to store and secure records and transactions of student information safely and quickly. Students and parents do not have to come and ask directly for the results of the school entrance selection, but can see directly on the system in real time and without incurring fees or costs to come to school.

Proponents create a system that can help schools register and encode student profiles and information. This makes it possible to process student registration status which is supported on the condition that the documents that must be completed can be automatically seen through the information system service, even students can print proof that they have successfully registered.

Master School is one of the equivalency education schools that has Program Packages A, B, and C. Each program package has its own requirements and must be filled in according to the appropriate applicant. This makes the need for an information system for student registration in master schools.

## 3. RESEARCH METHOD

### 3.1. Conceptual Framework

Large-scale software development is a difficult task. Developers use special tools to relieve some of the difficulties where a tool is needed to stay focused and be able to manage the software entities that will be created. A possible solution to this is a conceptual framework [15]. The conceptual framework in this research can be divided into 3 parts, namely input, process, and output (IPO). Input contains input from the user to be processed and stored in a database in the system at the processing stage, and can display the output or results desired by the user in the form of status information from the student. The conceptual framework for this research is presented in Figure 1.

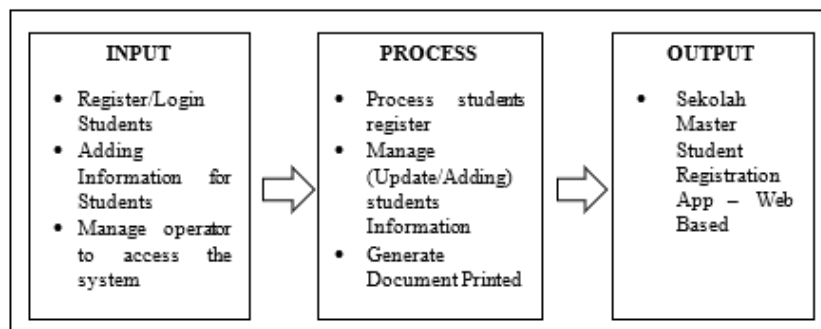


Figure 1. Conceptual Framework for Student Registration in Sekolah Master

### 3.2. Methodology Approach

In this study using a prototyping approach. Prototyping is the rapid development and testing of working models (prototypes) of new applications through interactions and iterative processes commonly used by information systems experts and business experts. Prototyping is also known as rapid application design (RAD) because it can simplify and speed up system design [16]. This method is very well used to solve the problem of misunderstanding between users and systems analysts that arise because users cannot clearly determine what needs to be made. A prototype is defined as a tool that gives potential creators and users an idea of how the system will fully function [17].

The prototyping process is interactive and an iterative process incorporating traditional development cycle steps. The prototype is evaluated several times before the end user declares that the prototype has been accepted. The following is the Prototype stage [18] as shown in Figure 2.

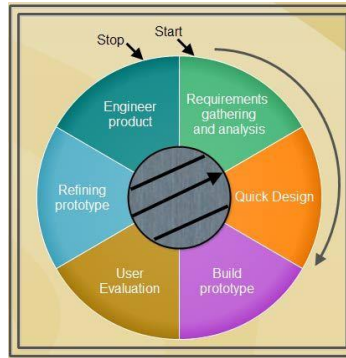


Figure 2. Prototyping Model

**a. Requirements Gathering and Analysis**

This section defines and analyzes the system requirements in detail. Interviewing Managers and Operators to find out system requirements. The analysis is carried out to see the various components used by the system that is currently running, including hardware, software, networks and human resources. The analysis also records information system activities including input, processing, output, storage and control. Analysis can be in the form of functional and non-functional analysis.

**b. Quick Design**

When the requirements have been defined and the analysis has been carried out, a preliminary or rapid design for the system is created. This quick design is not a detailed design and covers only the important aspects of the system which gives the user an overview of the system. This quick design can help in developing a prototype.

**c. Build Prototype**

If the information collected from the requirements and rapid design has been carried out, then the rapid design can be modified to form the first prototype that represents the working model of the system required and approved by the user.

**d. User Evaluation**

This part of the proposed system and presented to the end user to conduct a thorough evaluation of the prototype which is expected to identify the strengths and weaknesses, such as what to add or remove. Feedback and suggestions are collected from users and provided to developers.

**e. Refining Prototype**

This section is carried out after the user evaluates the prototype and if the requirements of the existing system cannot be met, then the prototype must be refined and developed with additional information provided by the user. The new prototype is evaluated like the previous prototype. This process continues until all the requirements and requirements specified by the user are met. After the user is satisfied with the developed prototype, the final system is developed based on the final prototype.

**f. Engineer Product**

Once the requirements are met, the user receives the final prototype. The final system is thoroughly evaluated followed by regular regular maintenance to prevent large scale failures and minimize downtime.

#### 4. RESULT AND DISCUSSION

Analysis and design for student enrollment in schools using the prototyping method was made as an early stage for implementation as the delivery and storage of data and student data information. The following is a needs analysis and application design proposal using a navigation structure, unified modeling language (UML), table design in the database, and the system interface.

Gathering requirements is the initial stage of the prototyping method. Part in the collection of functional requirements. Analysis of functional requirements in this system is needed as a service that must be provided by the system to users. In this research, the function of this system is able to display school information, registration, news, and differentiated home system for admin and end users. In this study, non-functional requirements analysis was carried out to obtain system requirements specifications, such as hardware, software requirements, an overview of users with applications. Minimum specification requirements for hardware and software proposed in the construction of this system, as shown in Table 1.

Table 1. Requirements Minimum Specifications Software and Hardware

Minimum Hardware Requirements	Minimum Software Requirements
Processor Intel @ Core i7-7500U (2.7 GHz)	Windows 10 Pro 20H2 (19042.1288)
RAM 8 GB DDR4	MySQL v8.0.27
HDD 1 TB	WordPress v5.8.1
Min. Screen 13"	Chrome v95.0.4638.69

The next stage in the design phase is the design of the navigation structure. The navigation structure is used as the flow of a program to describe the design of relationships between different areas. The navigation structure in this design is used to identify the flow of any menu or page features that will be applied to the system. The proposed navigation structure belongs to a mixed model adapted from non-linearity and hierarchies, starting from one node which is the main menu, then several branches of the next menu can be made. The proposed system starts with the landing page display (display of school website information), continued on the header and can choose the Academic, Registration, News, and About menu options. This menu is displayed in the header of the system, where when pressed it will go to the next page. When admins and end users press the Academic, News, and About options, the same page will be displayed because they are on the front-end, the difference is when logging in with Admin or end-user status. When the user presses the Registration option, they will be asked to enter the Login page, if they do not have an account, they will be directed to create an account first by filling in their email, password, and re-password, if so, they can login to the system and enter the page. dashboards. Here is Figure 3 navigation structure for admin and Figure 4 for end user.

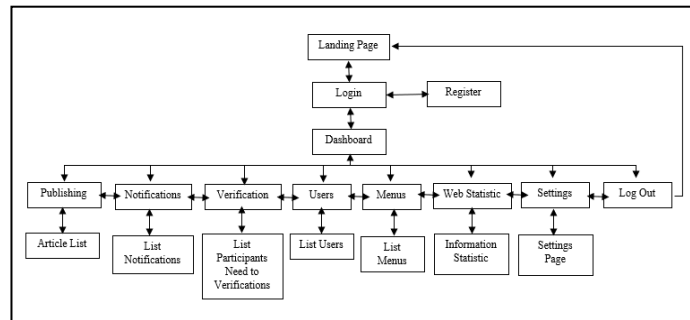


Figure 3. Navigation Structure for Admin

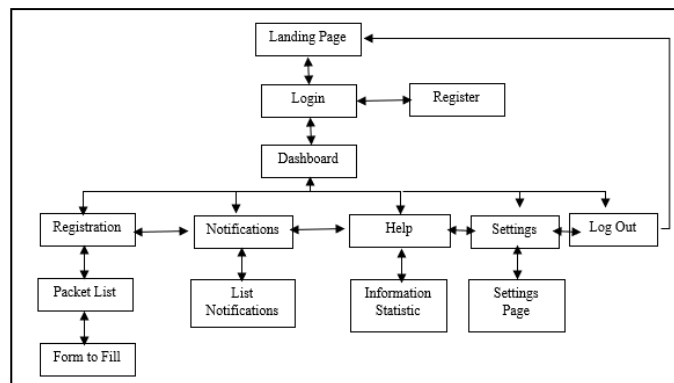


Figure 4. Navigation Structure for End User

The next design stage is to model the interaction between the user and the system or application using the unified modeling language (UML). One of the UML diagrams used is a use case diagram. Modeling is done with one actor, namely acting as a user. Users who interact with the system or systems (which are marked with boxes because they are running in the system) can provide what services to users. The use case diagram illustrates that the user visits the landing page first, then chooses to login or create an account if they don't have an account yet. The user enters the dashboard, then will be given a choice of several menus that can be selected by the user, including registration, notification, help, settings, and logout. The focus of this research is that the user chooses a service or registration menu. When the registration menu has been selected, the next package list page will be displayed, which contains package A, package B, and package C. This package contains the level of education chosen by students. If it has been selected, then the next page will

enter a form that must be filled out by the user to complete personal data and files that must be uploaded as requirements that must be met. If so, then the data will be stored in the database, and the admin will verify the data which will display the status information from the registration. The following is figure 5, the use case diagram of this system.

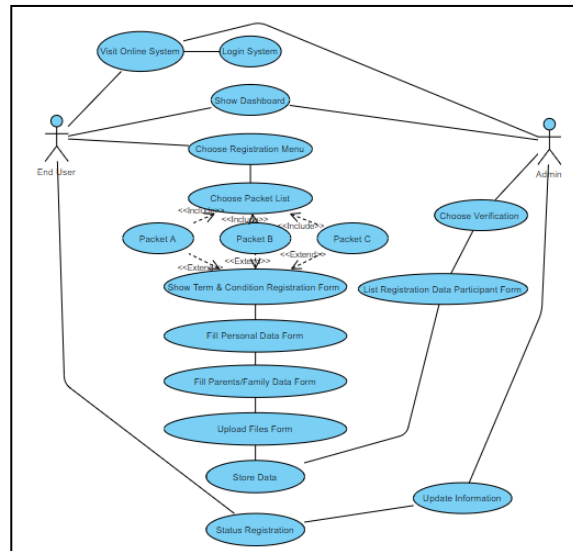


Figure 5. Use Case Diagram System

The next design stage is to create a database that is related to the form of a database table. Relationship is a term in relational database that refers to how the tables in the database can be related to each other. The relations in the tables in this system are relations or relationships between one table and another in the database. The table formed in this system is formed to store master data and transaction data, master data such as the choice of packages to choose, link for proof of registration, username, password, even for registration, as well as settings in the account. For Admins, tables are used such as user management, page content, posts and notifications that enter and are sent to users regarding the registration status of student registration. The following is a picture of the thickness of the relations in this system, as in Figure 6.

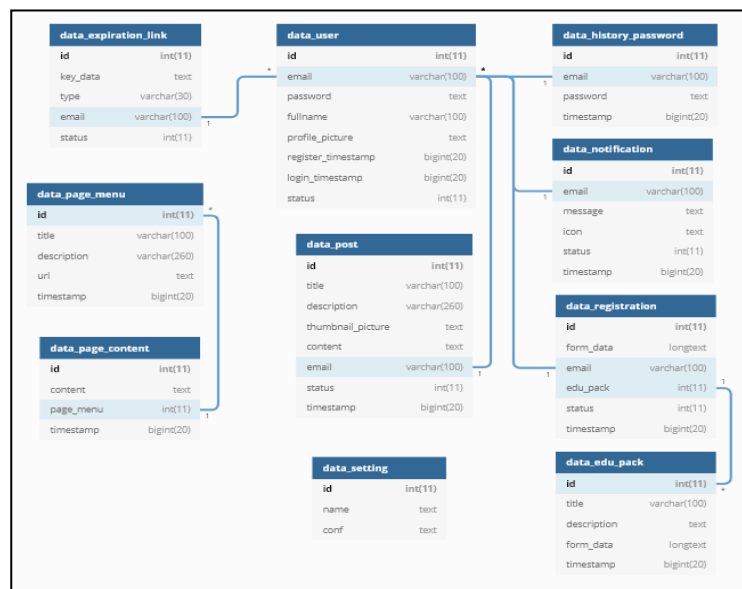


Figure 6. Relation Table on System

In the design, it is also necessary to design an interface image that is used as a reference in making the interface of the system. The first interface is the landing page. On the landing page display is used to provide

information from the master school, then in the header the system displays menus that can be selected by the user. As in Figure 7 high fidelity of the design.



Figure 7. Landing Page on System

The next screen, when the user selects registration, it will enter the registration page, if the user does not have an account or has not signed-in, it will be directed to the create account page. When the account page is displayed, the user will be asked to enter an e-mail, and give approval by checking the agreement box with terms and conditions in this registration system, then the user presses the get registration link button, as proof that the e-mail entered is a valid e-mail. and will go to the email inbox. Users are asked to press the registration link, and fill in the password, if so, they can press sign-up, as shown in Figure 8 and 9.

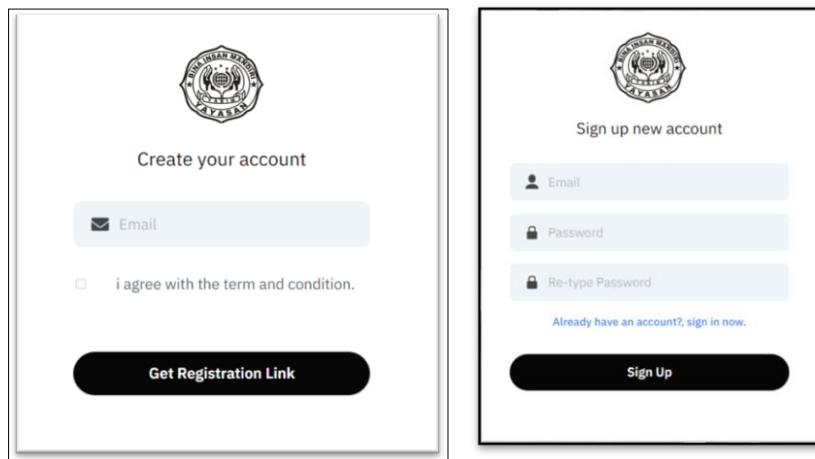


Figure 8. Create Account Form to Get Registration Link(left), Sign Up New Account to Registration(right)

If you have successfully logged in, the user will enter and select the Registration menu. When the registration menu is selected, the user selects the desired package according to the level of the registrant student. Package A for elementary school, package B for junior high school, and Package C for senior high school. After selecting the package, it will enter the terms and conditions page that must be fulfilled by the registrant. This is so that applicants, especially students, really understand what must be prepared and filled out in this registration system, as shown in Figures 9 and 10.

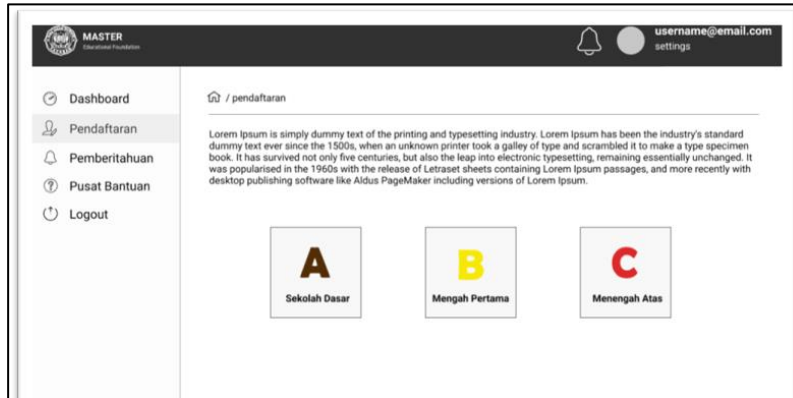


Figure 9. Registration Menu and Select the Package Leve

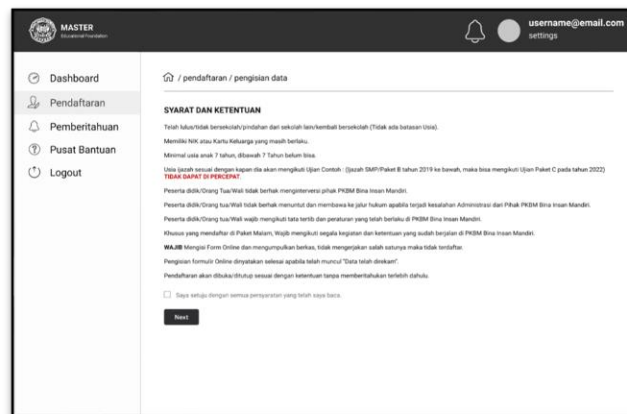


Figure 10. Term and Condition Page

The next design flow is that the user must fill in his personal biodata which is basic information that must be completed and known by the school. Personal biodata is used as the basis of a student's identity. Furthermore, the user must fill in the parent or family data in charge of this student or student, so that he can monitor the progress of this student. Furthermore, the user or student must upload a file that is a requirement for proof of identity and or education that the participant has attended. The proposed design is shown in Figure 11, 12 and 13.

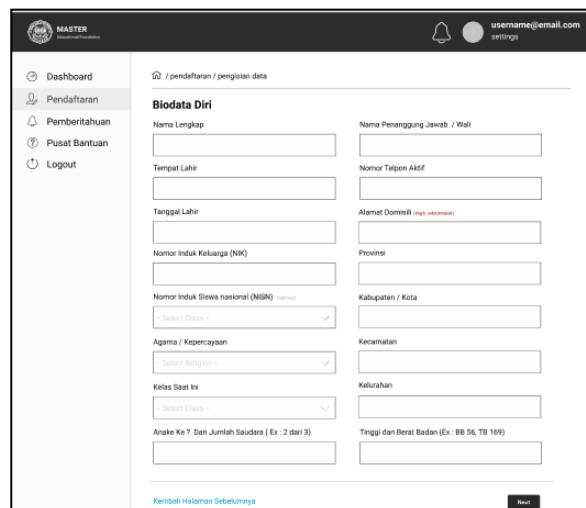


Figure 11. Personal Data Form



Figure 12. Parents or Family Data Form

Figure 13. Others or Document Support Form

The user has successfully registered on the last page which is as shown in Figure 13. After successfully saving, the display on the Admin page will enter the Verification menu. The Verification menu is one of the features in the Admin where the list of students or students who have registered for the school enters this page. In Verification, admins can check biodata, uploaded files, and make status changes, as well as provide information to students who register what to complete if something is missing. This verification will later be used as one of the requirements that new students or students who register are accepted or not. Students do not need to come to school to find out whether they have been accepted or not, just open or login to an account on the system that has been registered, and they will know the results. Verification page as in Figure 14.

Figure 14. List of Registration Student on Admin Page

If the admin makes changes to student status or provides information, then the system in the student account will enter a notification in the notification feature or menu. This notification is used as a marker of new information or news from the school regarding student registration at the school, as shown in Figure 15.

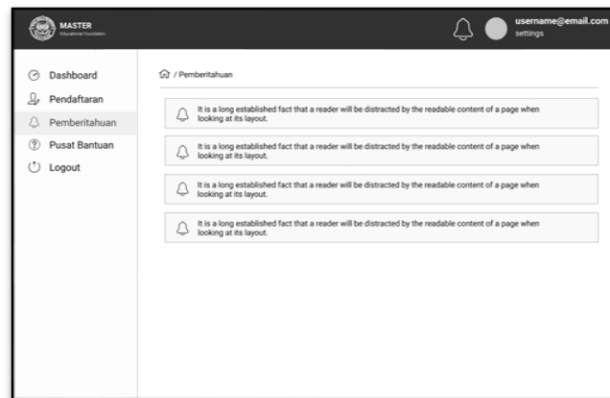


Figure 15. Notification Page on Student's Account

This research is limited to analysis and design process. This analysis and design will be applied in the next stage, namely the development and evaluation process. The next stage can be made in the development stage to implementation, as well as testing. The development stage of this system uses the WordPress framework and can be run on various types of web browsers, but it is recommended to use Chrome which is the process of this analysis. At this stage of development also uses the programming language php, html, css, and java script to make the web display system look dynamic. The next stage is evaluation, namely the trial stage. In the trial, blackbox and whitebox testing methods can be used. In addition, this system can be tested on various types of existing web browsers. The next trial was carried out using the user acceptance test (UAT) trial method. This UAT trial is the final stage of the trial run whether there is still application development that can be done in the form of questions and assessments given to users. If it has been approved by the user, then the system can be deployed and used by the user.

## 5. CONCLUSION AND SUGGESTION

### 5.1. Conclusion

Based on the results of research that has been carried out in analysis and design, it is found that the system can be built with a minimum defined hardware and software specifications. This research also produced functional and non-functional analysis requirements, also generated the flow of the system used by admins and end users. This research can model what is given by the system to the user with a use case diagram model. This research produces a database with related tables to be used as data storage in the system. Also, this research produced several interface designs for admins and end users.

### 5.2. Suggestion

This research is expected to be continued to the next stage as a student registration system in master schools to be managed by operators or staff who can support work activities in school registration, so that data can be managed properly.

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