



Utilization of The Qr-Code on The Santri Id-Card as The Santri's Personal Data Code

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A B S T R A C T

Data management has always been a challenge in all aspects, including the management of students' personal information. Building an information system capable of producing student Id-cards equipped with a QR-code enables the use of the QR-code on the student Id-card as a student personal data code. This study aims to build a system to make it easier to make student ID-cards, store personal data, and data on student semester scores. The QR-code on the student's ID card serves as a medium for quickly conveying information encoded with Uniform Resource Locators (URL). Santri can scan the QR-Code with a smartphone device that has a QR-code scanning app installed. The Research and Development (RnD) version of ADDIE was used in this study (Analyze, Design, Develop, Implement, Disseminate). The application was created with the sublimetext software, the codeigniter framework, and CSS bootstrap as the front end. For the validity test, Aiken's "V" formula was used, as was the Moment kappa Formula for the practicality test, and the Gain Score formula for the effectiveness test. Based on the results of the three tests, the product is valid with a score of 0.9, practical with a score of 0.94, and effective with a score of 1.

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1. Introduction

One of the authentication methods used today is quick response code, also known as QR code. This authentication method is a type of solution to overcome illegal or legal actions, such as forgery or identity theft, which is the result of increasing technological developments [1]. Qr Code is a form of horizontal data storage that was developed from or in the form of a barcode [2]. Different from barcodes, QR codes can store information in horizontal or vertical form and more than barcodes [3]. A QR code is a medium for conveying information quickly and receiving a quick response without manually typing it in [4]. So that the stored information can be conveyed quickly and the responses given are also fast. The information encoded on the QR Code is in the form of a URL, telephone number, and SMS message.

Information is data that has been processed into a more useful form [5]. Information is the result of processing data into a form that is more useful for information recipients and can later be used for decision making. The information results can be in the form of combined results, analysis results, inference results, or computerized information system processing results.

The advantages of information in education, particularly in schools, are numerous. One application is on student ID cards. The ID card stores sensitive information that can be accessed for use in a variety of ways,

such as obtaining financial services, accessing confidential information, and so on [6]. The student card can also be used in the event of an emergency or an unwelcome event, such as when something bad happens to a student, such as an accident. As a result, the presence of an ID card makes it easier for the police or the general public to identify students and provide assistance. Because the Id card contains the owner's home and school addresses.

In a previous study conducted in 2019 by Muhammad Husni and Firmansyah on the implementation of the QR Code for making Id Cards. This study employs the methods of library research, observation, and interviews. Employee information is used. According to the findings of this study, creating ID cards with QR codes and MD5 using the Delphi 7 tool can be effective [7].

Ade Zulkarnaen, Munjuat, and Herlina conducted another study in 2019 on the QR Code scheme for an illegal parking attendant reporting system. The Vigenere Chiper, a classic algorithm that uses data in the form of parking attendant identification numbers, was used in this study. The findings of this study indicate that there is a system that can reduce thuggery by parking attendants and the ease with which the public can report illegal parking attendants [8].

Every student who pursues education will undoubtedly receive a value report from the learning process. There are two types of value: intrinsic value and instrumental value. Intrinsic value is a value that has intrinsic value, whereas instrumental value is a value that can be used to achieve goals [9]. Because value is one of the outcomes of data processing, the assessment results must be properly saved. According to Sudarwan Danim, there is only one criterion in data storage: the presence of a recall factor in the data. A good storage system is one that allows data to be released quickly at specific times when needed.

MTs Sumatra Thawalib Parabek is one of the schools located in Jorong Parabek Kanagarian Ladang Laweh Kec. Banu Hampu Kab. Agam. As in most schools, MTs Sumatra Thawalib Parabek will definitely produce a final semester score. There have previously been storage media used to store students' personal data, but the media used, namely the hard disk, is prone to damage and loss. Furthermore, the QR-Code on the Id Card for students is rarely used in school absences. This school also has a large number of students who live quite far away from school, making it difficult for students to obtain personal data, particularly semester data, and if semester grades data is lost, students will find it difficult because they must go to school to request archives of students' personal data. As a result, an information system is created that can make it easier for students to obtain personal data, store personal data for students, assist schools in storing data, and easily create ID cards with QR codes.

2. Method

The method used in this study is the research and development method. Research and Development or commonly abbreviated as R&D [10]. The Research and Development (R&D) method is a research method that is used to produce results in the form of specific products, which are then tested for effectiveness [11]. R&D is more concerned with updating or upgrading existing technology, whereas the author's goal in this paper is to update and improve the function of the ID card itself.

A number of steps are used in the R&D method, and the steps used in this study are the ADDIE version. The ADDIE method is used because it is the most commonly used method in R&D research. It stands for Analyze, Design, Develop or Production, Implementation or Delivery, and Evaluate. ADDIE can be used for a variety of product development stages, including educational facilities, learning strategies, models, learning methods, teaching materials, and media.

This model's stages of development are as follows: (1) Analyze. Analyze is a stage that aims to identify the components required for the final product. Analyze is the first step in developing or manufacturing a product. Later interviews will be conducted at this stage to identify product needs; (2) Design. As the name implies, what is done at this stage is to design a system that will be worked on later. A flowchart, for example, is created on the information system to be created to provide an overview of the sequence of steps

in an information system process to be created. After conducting a needs analysis, the system design in this study will be based on user needs; (3) Develop. At this stage, it is a process of turning the system that was previously designed into reality. At this point, the development process begins from the previously created design based on needs using the development model; (4) Implement. The implementation stage is carried out in order to implement the system that is being created. That is, at this point, the created product or system is used and implemented directly in accordance with the system's target or purpose. The application is run in small groups to gather feedback from students and teachers for product improvement; and (5) Evaluate. In order to see whether a product that will be produced based on a system that has been designed is as expected or not, an evaluation stage is carried out so that the deficiencies of the product that has been made can be seen [12].

The SDLC (System Development Life Cycle) model is used for development. SDLC is the process of changing or developing a software system using the methodologies and models that were previously used to develop software systems [13][14]. In this study, the SDLC model is used because it is the most commonly used development model in the development of information systems.

The waterfall method will be used in this study as a research method. This method is a model for the development of a sequential and systematic information system [15]. The following stages of the waterfall model are depicted in Figure 1:

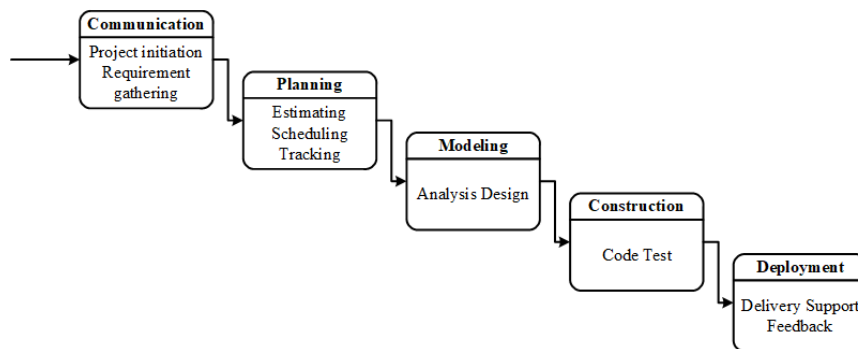


Figure 1. SDLC Waterfall Model

The stages in the waterfall model are as follows: (1) Communication. Communication is an important first stage because information about user needs will be collected and the system specifications will be defined in detail at this stage; (2) Planning. Following that is the planning process, which involves planning the work on the system in the form of technical tasks to be completed later, potential risks, data and resources required, work schedules, and results to be produced; (3) Modelling. The previously established plans will be translated into a system design prior to the manufacturing process, which is referred to as the modeling stage. This process focuses on the design of the data structure, the system architecture to be created, the appearance or interfaces, and the details of the system's procedures; (4) Construction. The coding process is completed at this stage. At this stage, computer use is maximized. When the coding process is finished, a trial phase will be performed to see if there are any errors (bugs) in the system that can be fixed later; and (5) Deployment. The waterfall model's final stage is deployment. This is the stage in which the system is being developed. After the process of creating and analyzing the system is completed, the system will be distributed and used by users. The created system will be maintained on a regular basis as needed.

3. Results and Discussion

3.1. Analyze

Following an interview with ustadz Yahdi, S.Kom, as a ustadz who is engaged in typing at MTs Sumatra Thawalib Parabek, he stated that the Id cards of students at MTs Sumatra Thawalib Parabek are still being

made manually using Microsoft Word, so data is input one by one when making id card So far, there is no online storage of students' grades at MTs Sumatra Thawalib. Reports of students' grades have been saved on the hard disk, but security is lacking because hard disk storage is prone to damage and loss. Students have trouble retrieving grade report data when it is needed because they must look for grades one by one or flip through grade report books.

3.2. Design

At this stage, an appropriate information system will be designed based on the school's needs to make it easier for student assistants and school administration to create Id Cards, store students' personal data, and make data retrieval easier for students. Output design, input design, database design, technology design, and control design are all part of the design of the ID card information system and the students' personal data. Figure 2 show rough design of the generated ID card.

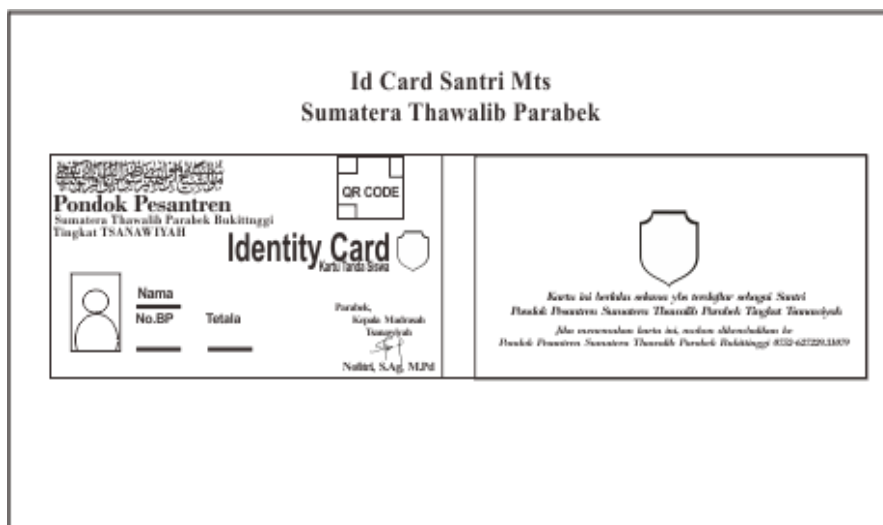


Figure 2. Rough Design of Student ID Cards

3.3. Develop

3.3.1. Communication (project initiation, requirements gathering)

An interview process is conducted prior to the system design in order to identify existing problems and ensure that the system is on target as a solution to the problem. Some of the requirements for this system are: (1) User needs; (2) System needs; (3) Technology needs.

3.3.2. Planning (estimating, scheduling, tracking)

In this case, the Super admin is in charge of entering data into the system, such as manipulating ordinary admin data (homeroom teacher), class level master, student data, and creating ID cards. Ordinary admins, namely homeroom teachers from each class, have the same responsibilities as super admins, but they cannot manipulate admin data and can only manipulate data from students in the class they are in charge of.

Scheduling that includes information about the system's processing time. The processes involved in developing this information system were completed in one month.

The author goes through several stages while working on this information system, including: (1) Create a system using the CodeIgniter backend framework and the CSS bootstrap 4 front end framework; (2) Print student Id cards so that students can use them as a linking medium that leads to the system that has been created.

3.3.3. Modelling (analysis design)

This system stores data in a database, which is managed by a file in the codeigniter framework called the database file. Data compilation in the Codeigniter 3 framework already includes the MVC (Model, View, Controller) method. These are divided into three files in the three Codeigniter sections: data (model), display (view), and process (controller). The view contains coding for displaying the system created, the model contains coding for database processes, specifically CRUD (Create, Read, Update, Delete), and the controller contains coding for bridging the view and model.

Use case diagram Information System Design Id card and student data describe the desired functionality of a system. Use cases are used to represent interactions between actors and systems. The following is a use case diagram of the Id card information system and student data in Figure 3.

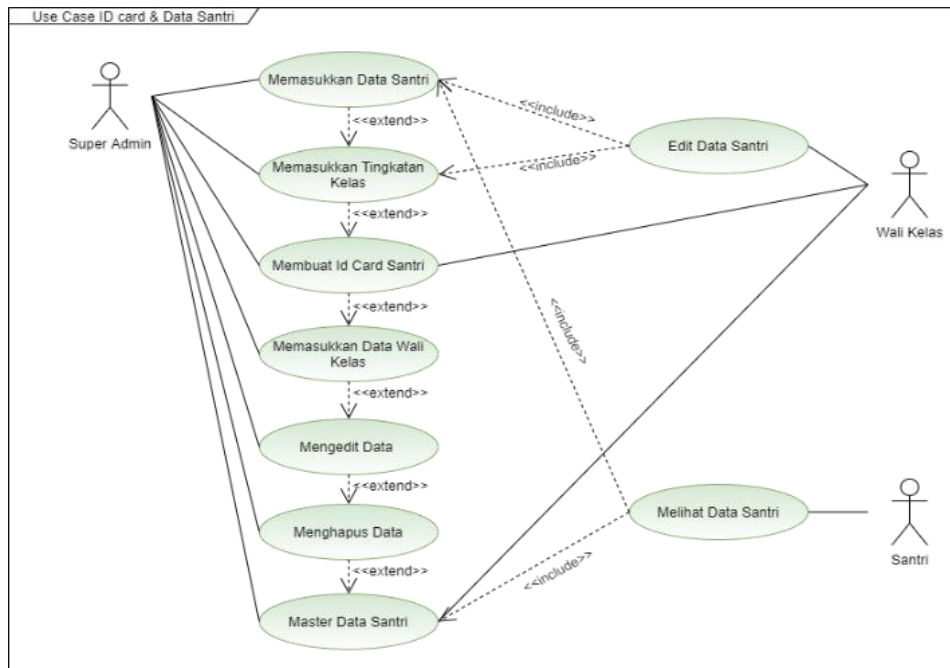


Figure 3. Use Case Id Card Information System Diagram and Santri Data

An activity diagram describes the activities in a system that is being designed. How an activity begins, decisions that may be made, and how it concludes. The following is an activity diagram of an id card information system and self-data.

Figure 4 depicts the super admin activity diagram. Figure 4 shows that if a user logs in as super admin, the activities that can be performed include entering student data, entering class levels, creating student id cards, entering homeroom data, editing data, deleting data, and entering student master data.

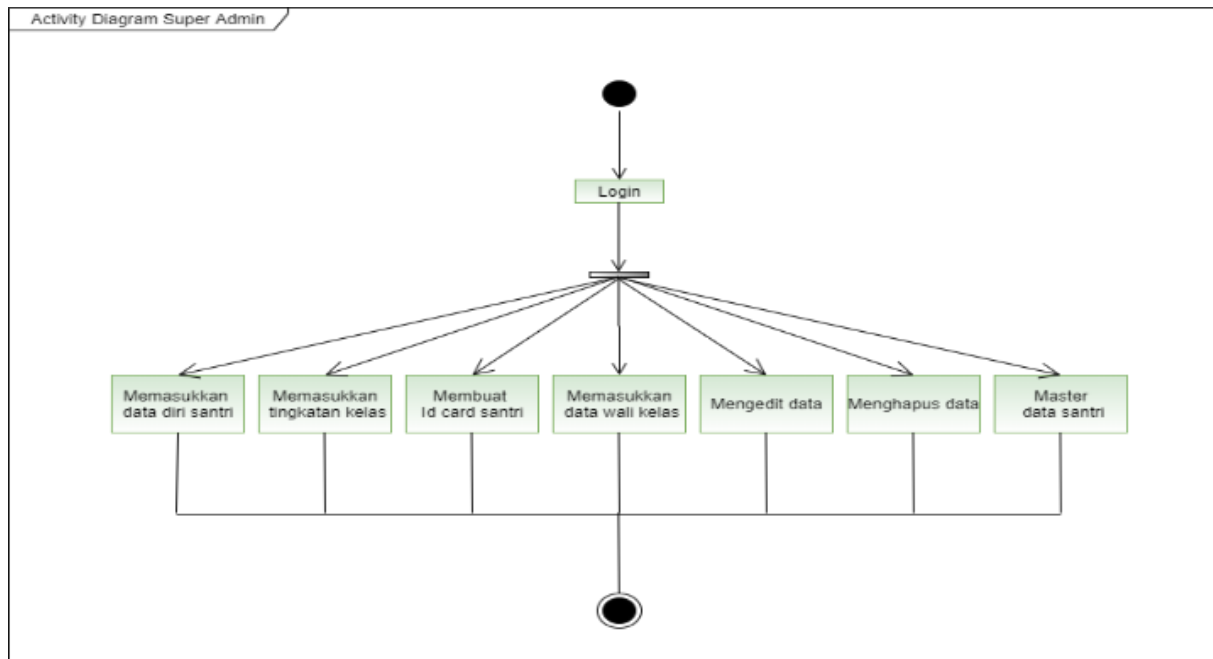


Figure 4. Super Admin Activity Diagram

Figure 5 shows that the homeroom teacher's activities include editing student data, creating student ID cards, and maintaining student master data.

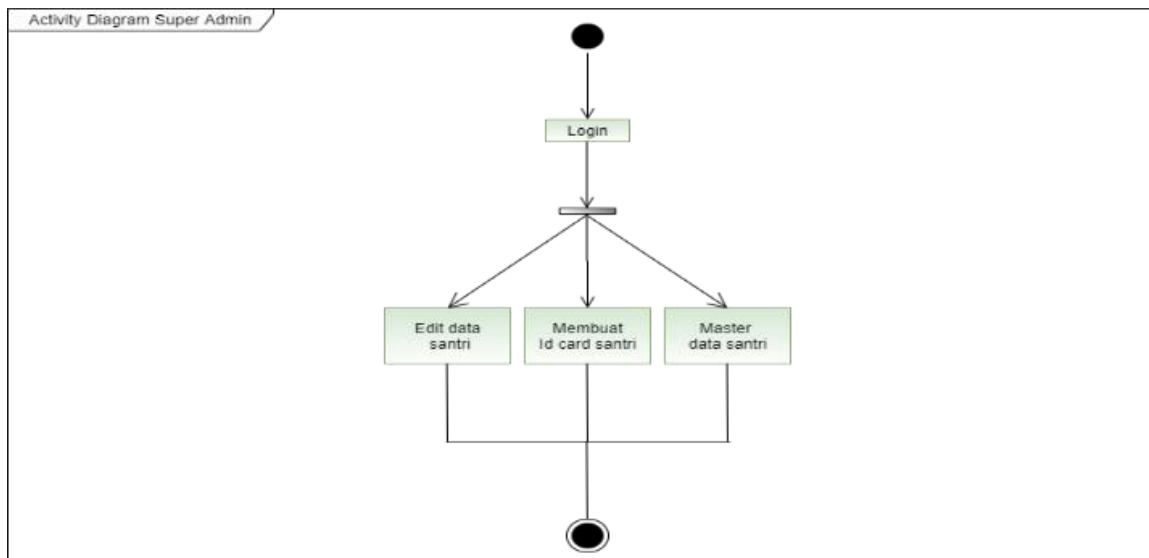


Figure 5. Ordinary Admin Activity Diagram

Figure 6 show activity diagram of the students, in Figure 6 user can understand that, if the activities carried out by the students are looking at the students' personal data.

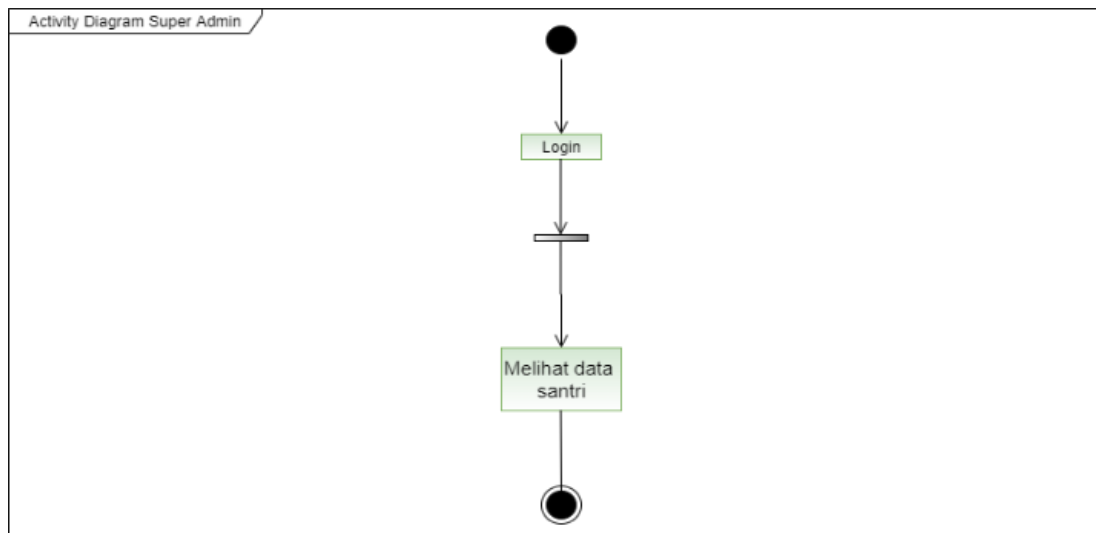


Figure 6. Student Activity Diagram

Sequence diagrams describe the interactions that occur between objects that are in the system and objects that are around the system. Sequence diagrams are usually used to draw scenarios or a series of steps that will be taken in response to an event to produce a certain output. Starting with what can trigger these activities, what internal changes and processes occur, and what outputs can be produced. Every object, including the actors, has a vertical lifeline. Messages are described as arrows on another object. Figure 7 depicts a sequence diagram of the ID card information system and data of MTs Sumatra Thawalib Parabek students.

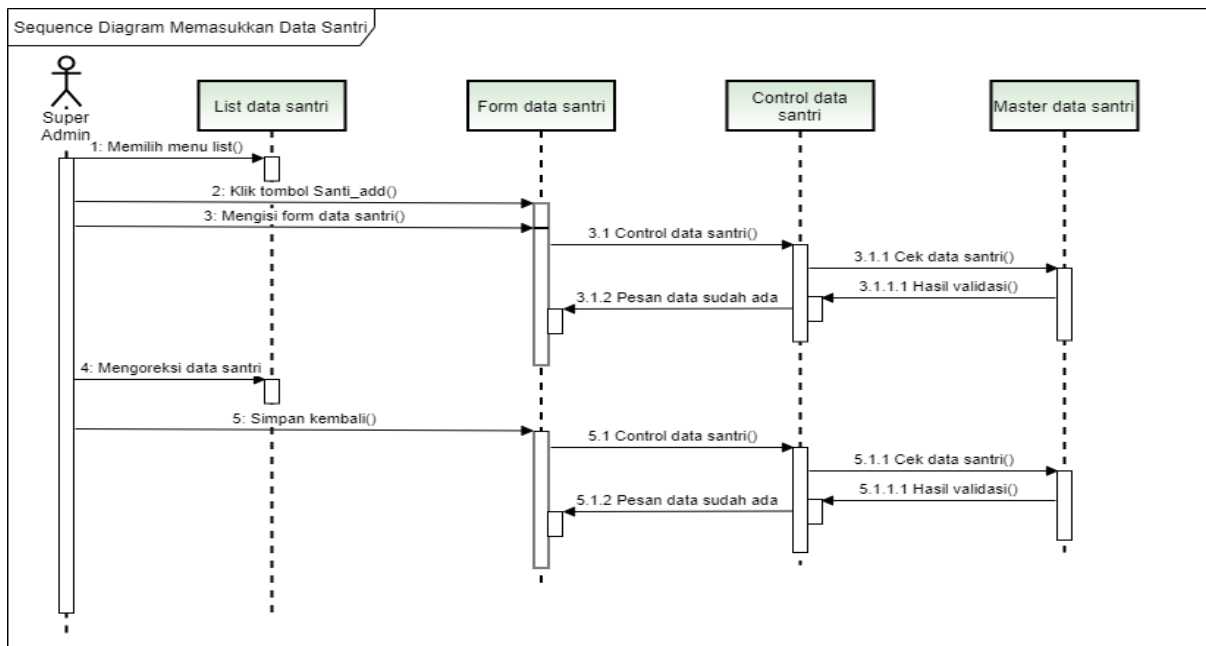


Figure 7. Sequence Diagram of Entering Student Data

In general, output is the end result of a process that can be presented in the form of a report. Typically, the capacity of the report issued is determined by the information requirements. The results of data processing will be output to output media such as diskettes, printers, or screens based on computer instructions, where the data is read from storage media such as hard disks and diskettes. The purpose of this design is to be able to comprehend and comprehend everything about the output format or anything related

to it in order to produce effective and understandable output. The following is the ID card and data output for MTs Sumatera Thawalib Parabek students.

Figure 8 show student data list design.

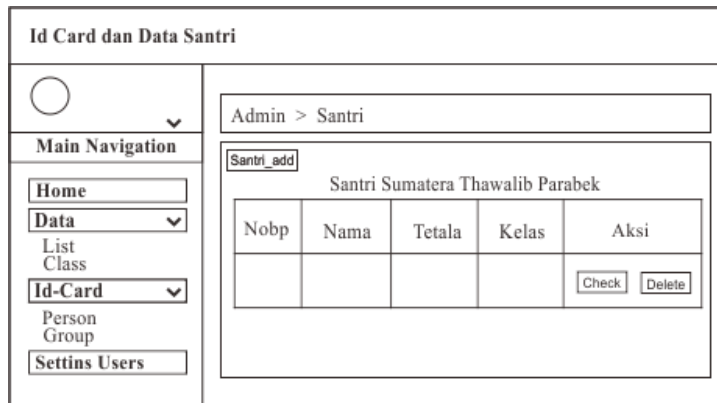


Figure 8. Design of Student Data List

Figure 9 show class level list design.

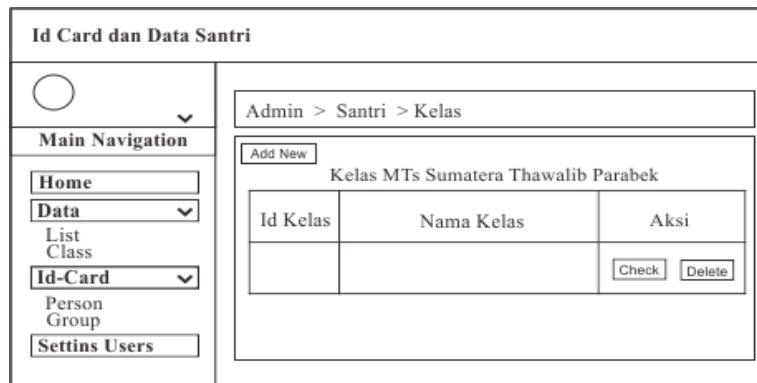


Figure 9. Class Level Data List Design

Figure 10 show user data list design.

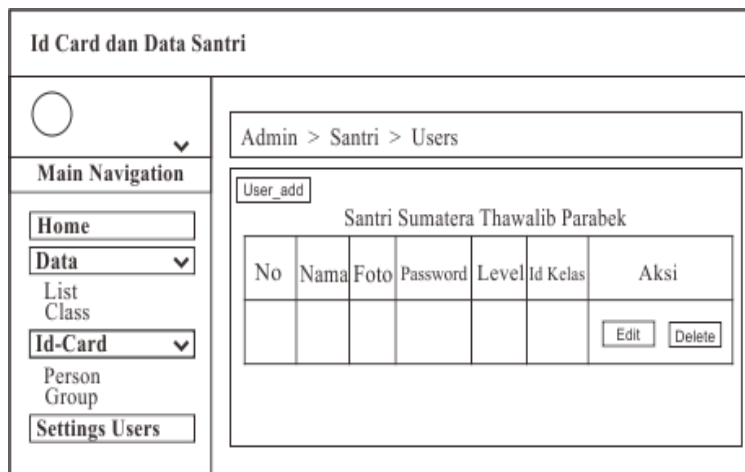


Figure 10. Databases List Design

Figure 11 show student data design.

The form is titled "Id Card dan Data Santri". On the left, there is a profile icon and a list of fields: Nama, Nobp, Tetala, and Qr Code. On the right, there is a table titled "Nilai Santri Sumatera Thawalib Parabek" with columns for "Nilai" and "Semester". The semesters listed are Semester 1 through Semester 6.

Figure 11. Student Data Design

Login page is a page that the user must fill out before they can access the ID card information system and student data. On this login page, the user must enter their username and password. If valid, the system will proceed to the page that corresponds to the access rights level set by super. If it is invalid, the user will be unable to enter the system and will be prompted to enter a valid username and password again. The login form design in Figure12 is shown below.

The form is titled "Id Card dan Data Santri". It contains two input fields: "Username" with a person icon and "Password" with a lock icon. Below the fields is a "SIGN IN" button.

Figure 12. Class Level Input Page Design

The Id card input page is a design for an id card input page; on this page, the super admin and homeroom teacher, as normal admins, can create individual student id cards, on this page, the super admin and homeroom teacher can enter the no. bp on the form and other data will appear after the no. bp is correctly entered, then press the print button to create a student id card. Figure 13 show design of the ID card input page.

The form is titled "Id Card dan Data Santri". It has a navigation menu on the left with options: Home, Data, Id-Card (selected), Person Group, and Settings Users. The main content area is titled "Id Card Print" and contains input fields for Nobp, Nama, Tempat Lahir, Tanggal Lahir, and Id Kelas. A "Print" button is located at the bottom of the form.

Figure 13. Id Card Input Page Design

Figure 14 show design input data users. This page is a user data input page design; on this page, the super admin enters user data and determines the level of access rights that the homeroom teacher will have

in accessing the id card information system and student data as an ordinary admin. The design of the user data input page is shown below.

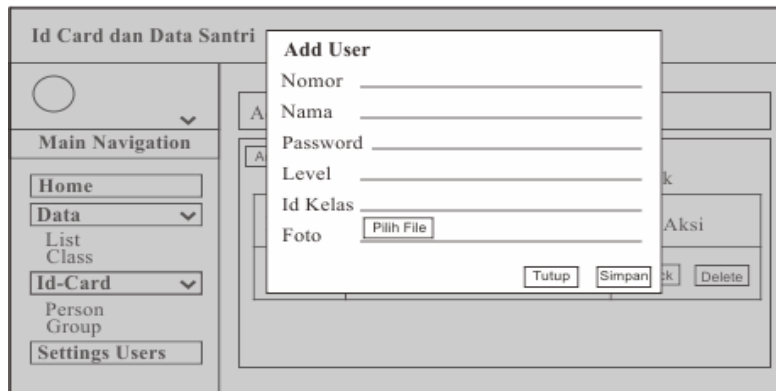


Figure 14. User Data Input Page Design

3.3.4. Construction (code test)

At this point, the translation of previously designed data into a previously determined programming language, namely PHP MySQL using the codeigniter 3 framework, is the programming language used. The completed information system will proceed to the testing or testing stage. If errors are discovered during testing, the program will be corrected; otherwise, the program will be used or tested directly.

Table 1 show result of testing with the black box method.

Table 1. Test Results with Blackbox Testing

No	Design And Process	Expected	Desc
1	Go to the login page	Display admin login page	Succeed
2	Go to the main menu	Display the main menu page	Succeed
3	Click the student master data	Display the form master data	Succeed
4	Click the student input form	Display the student input form	Succeed
5	Click the class level input form	Display class level form	Succeed
6	Click the id card input form	Display the id card input form	Succeed
7	Click generate id card	Display the student id card	Succeed
8	Click the user data input form	Display the user data input form	Succeed

3.3.5. Deployment (delivery, support, feedback)

Id cards will be distributed directly to students as users and web admins can be accessed by school administrators and homeroom teachers via the network based on the url that has been shared. The product has advantages for MTs Sumatra Thawalib Parabek because it works properly, is simple to use, efficient, attractive, and inspiring, and can be used at any time and from any location. An update to the system has been made based on the various deficiencies of the corrections that have previously gone through the system testing phase.

3.4. Implement

After a system has been successfully run and can function properly, the implementation stage is carried out. This stage will be evaluated using a questionnaire instrument distributed in the form of validity, practicability, and effectiveness tests. The validity test will be carried out with the help of an instrument in the form of a validation questionnaire, which will then be distributed to computer experts. This questionnaire has 19 items and is divided into four categories: content validity, instructional design aspects,

appearance aspects, and linguistic aspects. There are also comments and suggestions in it. Users of this application, namely students and teachers, were subjected to practicality and effectiveness tests.

3.5. *Evaluate*

The evaluation stage is a process that measures the level of success of a manufactured product, determining whether the manufactured product meets the initial goals expected or not. At this point, the author requests responses from the administration at MTs Sumatra Thawalib Parabek regarding the author's products.

3.6. *Product Test*

The validity test is performed with the goal of obtaining a high-quality, ready-to-use product. The validity test also seeks to determine the contents of the manufactured product. Calculation of validity testing using the Aikens' V formula [13]:

$$V = \frac{\sum S}{[n(c-1)]} \dots\dots(1)$$

Description :

$$s = r - lo$$

r = the score given by the appraisers

lo = lowest validity research number

n = number of appraisers

c = the highest number of research validity

Based on the validity results of several experts, a value of 0.9 was obtained with valid criteria or categories.

A practicality test is performed to determine whether or not the previously manufactured product is easy to use. Products deemed practical are evaluated based on the opinions of the parties who complete the provided practicality questionnaire. The practicality test calculation uses the moment kappa formula [16]:

$$\text{Kappa moment (K)} = (\rho_0 - \rho_e) / (1 - \rho_e) \dots\dots(2)$$

Description :

K = Kappa moment

ρ_0 = Realized proportion

ρ_e = Unrealized proportion

Based on the results of the practicality tests conducted on the deputy principal of student affairs, administration in the student affairs sector, and homeroom teachers, the results from the evaluation aspect obtained an average of 0.94 in the very practical category.

An effectiveness sheet filled out by several students of MTs Sumatra Thawalib Parabek was used to test the effectiveness of the QR code utilization system on the students' self-identity cards. The calculation of the effectiveness test uses the G-Score formula [17]:

$$G = (Sf - Si) / (100 - Si) \dots\dots(3)$$

Based on the effectiveness test table completed by several students, the results from the evaluation aspect received an average of 1 and were classified as having high effectiveness.

4. Conclusion

The author's discussion in the previous chapters is based on the findings of the research, specifically regarding the information system for using the QR code on the student's Id card as the student's personal data code using the codeigniter and bootstrap framework, and it can be concluded that the following issues exist: (1) Id card information system and student personal data can help schools create student ID cards, store student personal data, and help students obtain student data, particularly semester grades data; (2) The id card information system and personal data of students were designed to achieve a final validation value of 0.9, a final practicality value of 0.94, and a final effectiveness value of 1. It is possible to conclude that the identification card information system and student data are very valid, practical, and effective to use.

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