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User Interface Design for E-Monitoring Application of Santri Learning Development Using the User Centered Design Method

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ABSTRACT

Raudlatul Musthofa Islamic Boarding School is one of the Islamic Boarding Schools located in Tulungagung Regency, Rejotangan District, Raudlatul Musthofa Islamic Boarding School is a boarding school that is a place for students to study general and religious knowledge. There are several problems faced by the boarding school, namely parents / guardians of students do not get regular information about the activities and development of their children at the Raudlatul Musthofa boarding school related to security data, achievements, memorization, and pulan permit information. The management and Ustad / Ustadzah recorded in the book related to security data, discipline, sunnah and compulsory worship, cleanliness and extra activities of each student in the book, so there is no systematic and structured activity report regarding the activities of these students, so that the Management and Ustad / Ustadzah When going to search or use the data must take a long time and have to search one by one because of the large amount of student data in the daily activity book. This research uses the user centered design (UCD) method with stages, namely Specify the context of use, specify user and organization requirements, produce design solutions, and Evaluate design against user requirements. The results of the questionnaire calculation using the system usability scale, with 10 questions asked to 10 respondents, it can be concluded that the design of the Website-based Santri Learning Development E-Monitoring application is 88 with the "Acceptable" category and an "Excellent" rating with a grade scale B in other words, this design can be accepted by users.

I. Introduction

Islamic boarding school is an educational institution in which there are various sciences such as religious and general lessons [1]. Raudlatul Musthofa Islamic Boarding School is one of the Islamic Boarding Schools located in Tulungagung Regency, Rejotangan District, Raudlatul Musthofa Islamic Boarding School is a boarding school that is a place for students to study general and religious knowledge. Misbahul Hidayah Islamic Boarding School has a total of 747 students, which are divided into 476 junior high school students, 214 high school students, and 57 college students. The facilities at Pesantren Raudlatul Musthofa include dormitories, mosques, madrasah rooms, offices, canteens, libraries, computer laboratories, school buildings, and others. Pesantren Tahfidhul Qur'an Ma'unah Sari annually admits students who not only come from the Tulungagung Kabutpaten area, but there are also those who come from outside the Kediri City area such as Blitar, Kediri, Trenggelaek and many more.

Pondok Raudlatul Musthofa is a pesantren education that requires its students to stay at the pesantren, so there are periodic records regarding the data of these students, such as the security, discipline, sunnah and compulsory worship, cleanliness, and extracurricular. However, the recording of Santri data still uses books, so there is no systematic and structured activity report regarding the Santri's activities, so that the Management and Ustad/Ustadzah when looking for or using the data

must take a long time and must search one by one because of the large amount of Santri data in the daily activity book. Another problem is that it consumes a lot of books and stationery to record it, data notebooks that have been stored for a long time are sometimes lost / eaten by termites.

The time given by the boarding school for parents/guardians to visit their children is given a time limit of once a month and that time is only 2 hours, the boarding school students are also given permission to return home 1 year and 2 times. On this basis, sometimes time and distance are usually the main obstacles for parents in obtaining information about their children's activities such as activities carried out during the boarding school, and achievements that have been achieved. The Santri's guardians/parents only get the Diniyah report card (Ngaji Kitab) every semester. Another obstacle is that the Islamic Boarding School still uses a manual method to provide information to parents of students, namely by distributing letters to parents of students, so that it will cause delays in the Islamic Boarding School in providing information to parents of students related to the development of students. Another problem in the Raudlatul Musthofa Islamic boarding school is related to the storage of data on ustad/ustadzah, students, and parents/guardians of students using excel, and the data to be used must take a long time and have to search one by one because of the large amount of student data in excel.

User interface is a science that studies how the relationship between humans and computers so that needs can be met. User interface includes a series of graphical displays that can be understood by computer users and programmed in such a way that it can be read by the computer operating system and operate properly [2]. User Centered Design is a method used to design software where the end user determines the design of the interface [3]. If the design is closer to what the user wants, the higher the chance that the application will be accepted by the market.

Based on the background explanation, in this research activity, an interface design for the E_Monitoring application of Santri development at the Raudlatul Musthofa cottage will be made using the User Centered Design (UCD) method which will later be used as a recommendation for the next project, namely the creation of a website.

II. Method

Research methodology is a discussion of the theoretical concepts of various methods, advantages and disadvantages, which in scientific work is followed by the selection of the method used. [4]. The research on the design of the user interface for e-monitoring the learning progress of students uses the User Centered Design (UCD) method, which in its stages has covered the process of analyzing and designing user interfaces. There are five stages in User Centered Design (UCD), namely: Plan the User Centered Design, Specify the context of use, specify user and organization requirements, Produce design solutions, and Evaluate design against user requirements [5]. In Fig. 1. this is a picture of the stages of User Centered Design (UCD).

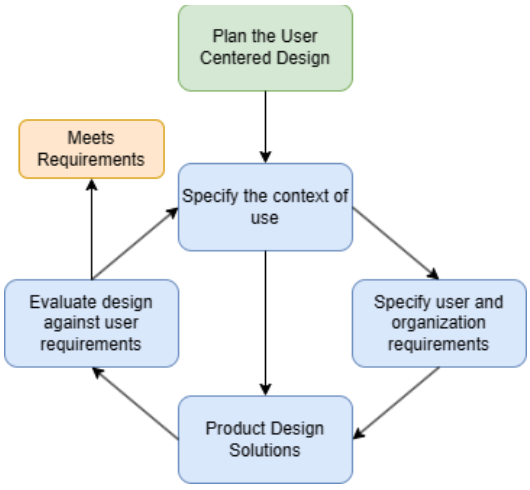

Fig. 1. User Centered Design Phase

A. Plan the User Centered Design

At this planning stage using research instruments which are tools used in research to collect and obtain data easily. The instruments used by the author in this study are interview sheets and literature studies.

Interviews are a method carried out by means of mutual questions and answers between the questioner and the source to explore information and collect data [6]. Interviews were conducted with ustadz/ustadzah and waliSantri to collect information about existing problems, and to get an overview in solving a problem. Interviews were conducted directly asking the sources. The number of interviewees included 13 ustadz/ustadzah and 3 waliSantri. Researchers came directly to the Raudlatul Mustofa cottage which is located in Rejotangan, Tulungagung. There will be 3 users in the system, namely ustadz / custadzah who act as cottage administrators and admins and waliSantri. The following list of interview questions with ustadz/ustadzah and waliSantri can be seen in table 1.

Table 1. Interview Questions

For Ustadz/Ustadzah	
No.	**Questions**
1	Biodata (name, age, employment status, and education)
2	How long have you been at Raudlatul Musthofa?
3	How is the process of documenting Santri data regarding security data, tarbiyah data, ubudiyah data, hygiene data, memorization data, Santri achievement data, and Santri biodata?
4	Were there any difficulties when you recapitulated the data?
5	How is the process of making reports on student data? Are there any obstacles during the process of making reports from the student data?
6	According to a score of 1 to 5, what is your skill score in using websites, and mobile?
7	Do you agree to make a design of the Santri data monitoring application, which will later be used as reference material for making the application?
8	What are your goals or expectations regarding the design of the Santri e-monitoring application?
For WaliSantri	
No.	**Questions**
1	Biodata (name, age, employment status, and education)
2	When do you usually visit your child/sibling at the boarding school?
3	Is the information you get about your students complete?
4	Do you have any difficulties when you want to ask questions to the boarding school?
5	Are you getting up to date information about your child's data?
6	According to a score of 1 to 5, what is your skill score in using websites, and mobile?
7	Do you agree to make a design of the Santri data monitoring application, which will later be used as reference material for making the application?
8	What are your goals or expectations regarding the design of the Santri e-monitoring application?

Literature study is a method used to collect data or sources related to the topic raised in a study [7]. In this study, researchers collected data by collecting data or looking for information from books, journals, internet media, and previous research results related to the e-monitoring system for students and the user centered design (UCD) method.

B. Specify the context of use

At this stage, researchers identify the people who will use the product. This activity will explain what they will use the product for and under what conditions. At this stage the researcher creates a user persona of the user who has been interviewed. Researchers create user personas to identify user needs. The user persona method can be used by developers in building software. This persona uses a method of approaching the target user (user) during the development process until the software is ready for use [8]. User personas have the aim of analyzing and exploring the needs of users who have diversity. So that in this case it can be used as a reference in software development. Each user who has their own different persona will certainly be involved in helping software development [9]. Based on the results of the interview, then analyze user characteristics by compiling user personas. User personas are divided based on the description of the user group consisting of ustadz (as administrators and admins) and waliSantri.

Fig. 1.User Persona (Ustadz)

Fig. 2. User Persona (Ustadzah)

C. Specify user and organization requirements

This stage will identify user needs. User needs will be identified as part of the continuation of the interview results. Identification of user needs is obtained based on several questions that have been asked through interviews to several respondents. The interview was conducted directly asking the source. The number of interviewees included 13 ustadz/ustadzah and 3 waliSantri. Researchers came

directly to the Raudlatul Mustofa cottage which is located in Rejotangan, Tulungagung. There will be 3 users in the system, namely ustadz/ustadzah who act as cottage administrators and admins and waliSantri. Conclusions were drawn from user needs regarding the features designed, namely:

Table 2. User Requirements

Users	Requirements
Ustadz /Ustadzah	a. Security feature which includes an offense menu, leave menu. b. Tarbiyah feature which includes a school attendance menu, Koran attendance menu, uniform suitability menu. c. Ubudiyah feature in which there is a sunnah worship menu, compulsory worship menu. d. Cleanliness feature in which there is a cleaning data menu. e. Santri memorization menu
Admin	a. Menu manage ustadz data b. Student data management menu c. Student report management menu d. Return permit history menu e. Cottage information update menu f. Chat menu (for chatting with waliSantri)
WaliSantri	a. Children's offense information menu b. Achievement information menu c. Memorization information menu d. Information menu for their child's permission to return home e. Chat menu with admin f. Cottage up to date information page

D. Design process

In designing the system, the author uses UML (Unified Modeling language) diagrams. UML modeling is a visualization of object-based system flow [10]. The diagrams that the author uses are Use Case Diagrams and Activity Diagrams. The following is a process modeling using UML diagrams:

Use case diagram describes how activities in the software to be built, what data will be inputted by the actor [11]. Use case diagram in this study has 3 actors, namely ustadz / custadzah as administrators and admins and waliSantri. The use case diagram in this study can be seen in Figure 3 below:

Fig. 3. Use case Diagram of Santri E-Monitoring Application

An Activity Diagram shows a sequence of process activities on the system that helps understand the overall process [12]. Activity Diagrams are created based on one or more use cases. Activity

diagrams can be seen from the usecase that has been created. The following is an Activity diagram of Ustadz / Ustadzah, WaliSantri and admin:

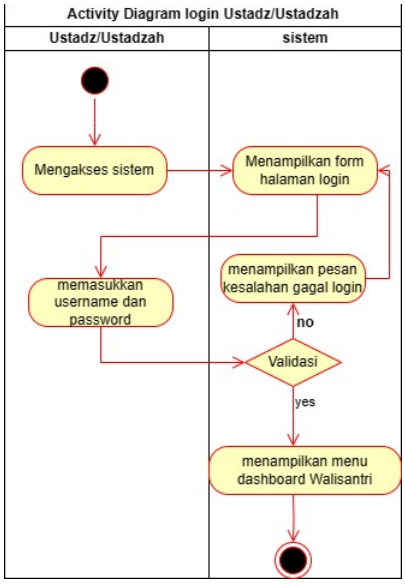

Fig. 4. Activity digram of Ustadz/Ustadzah Login

Figure 4 is an activity for ustadz/ustadzah login, this activity starts with ustadz/ustadzah accessing the system, the system will display the login form page, then the ustadz/ustadzah is asked to enter the username and password then click the login button, if the data entered is incorrect then the system will display an error message and the ustadz/ustadzah is asked to enter the username and password again, but the data entered is correct then the system will respond to display on the dashboard page..

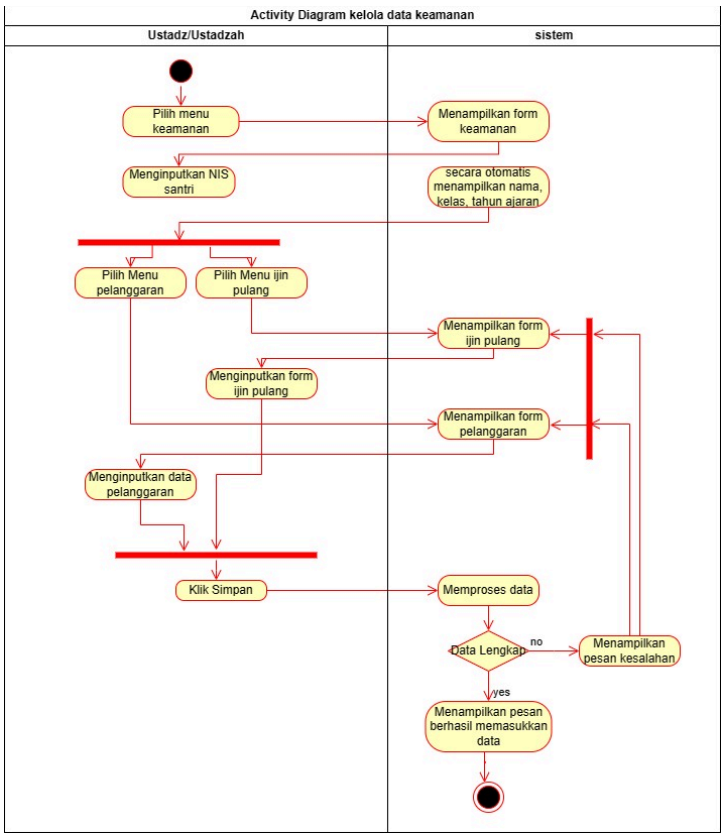

Fig. 5. Activity Diagram of Manage Security Data (Ustads/Ustadzah)

Figure 5 is an activity diagram for managing security data. Starting from the ustadz / custadzah choosing the security menu then the system will respond by displaying the security form, the ustadz / custadzah will input the student's NIS, from the system the name, class, school year of the student will automatically appear, then the student will select the menu on the security page, namely the violation menu or the permission to go home menu. If you choose the return permit menu, the system will display the return permit form and the form will be filled in by the ustadz / custadzah, click save and the system will process the data, if the data entered is complete then the data is successfully saved, otherwise if the data entered is incomplete an error message will appear and must be refilled. If the ustadz/ustadzah fills in the violation menu, the system will display the violation form and the form will be filled in by the ustadz/ustadzah, click save and the system will process the data, if the data entered is complete then the data is successfully saved, otherwise if the data entered is incomplete an error message will appear and must be refilled.

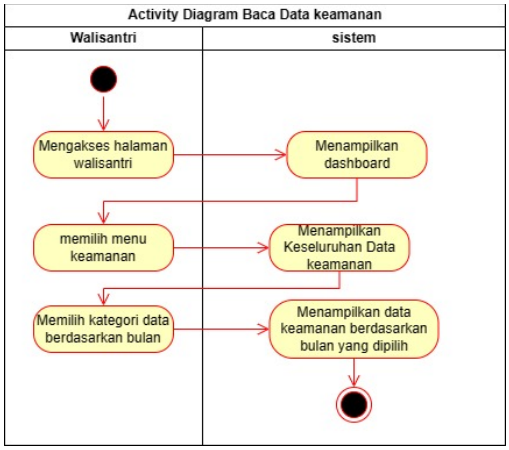

Fig. 6. Activity Diagram of Read Security Data (WaliSantri)

Figure 6 is an activity diagram of security data. Starting with the waliSantri accessing the waliSantri page then the system will display the dashboard menu, the waliSantri will select the security menu, the system will display all security data by his child. The owner can choose the category to be displayed, for example, it can be date month or year, and the system will display the results of the security data category that has been selected by the waliSantri.

E. Wireframe

Wireframe is a skeleton or rough scribble for the arrangement of items on a website page before the actual design process begins or commonly referred to as low-fidelity design. The following below is a wireframe:

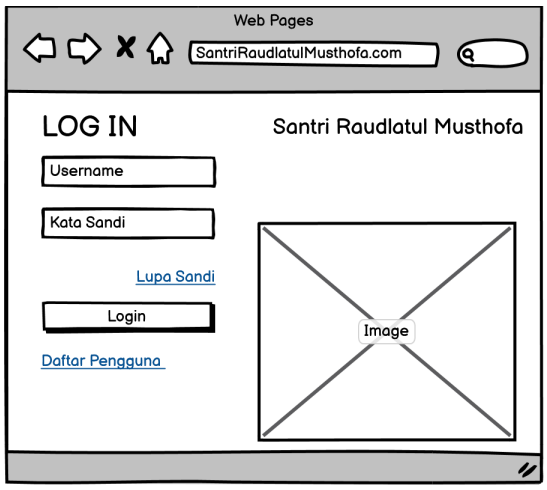

Fig. 7. Login Wireframe

Figure 7 is a wireframe of the login page. Users who access this login page are ustadz/ustadzah, admin, and waliSantri. The layout of the username, password, and login button input text is on the left side, while the right side of the page has an image and the words "Santri Raudlatul Musthofa".

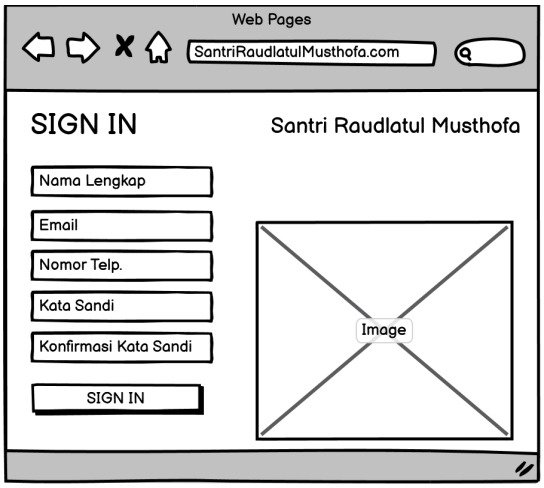

Fig. 8. Registration Wireframe

Figure 8 is a wireframe of the sign in page. This page is accessed when the user enters the login page and clicks the user list. The layout of this page is that the words "sign in" and the input text of full name, email etc. are located on the left, while on the right side of the page there is an image and the words "Santri Raudlatul Musthofa".

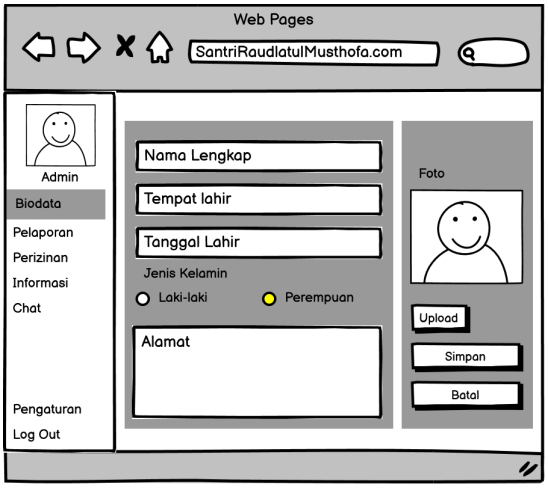

Fig. 9. Add Biodata Wireframe

Figure 9 is a wireframe of the add biodata page. This biodata add page is the first page when the admin clicks add on the biodata list. The layout on this biodata page is in the middle there are some data that must be filled in, namely name, place of birth etc., while on the left is a page for uploading photos.

III. Results and Discussion

Based on the user centered design method, this stage is a continuation of the user centered design method stage. In the previous stage, the author has done UI design which starts from sketching each page or can be called a wireframe. While at this stage the author designs the final result of the design interface or high-fidelity design. The following process of making the final result of the design interface is as follows:

A. Product design solution

Product design solution is the final result of the design that the author did. In this design there are 3 actors, namely ustad/ustadzah, waliSantri and admin, each actor or user has a difference in the appearance of the design. Beriku the results of the interface design of 3 actors can be seen below:

Fig. 10. Login Page

Figure 10 illustrates the login page. This login page can be accessed by ustadz/ustadzah, admin, and waliSantri. On the login page there is filling in the username and password, each user has a different username and password. There is a login button to process the username and password that was filled in earlier. On the login page there is also a list of users, this user list is used for users who have just accessed this Santri e-monitoring website, when the user list is clicked it will go to the registration form.

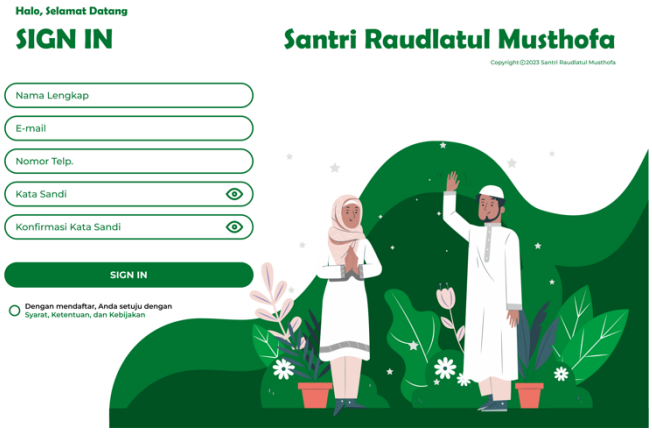

Fig. 11. Sign In Page

Figure 11 is the new user registration page; this page is a continuation page of the login. On this registration page there are several forms that need to be filled in, namely full name, email, telephone number, password and password confirmation. After the user fills in the registration form, the system will send the username and password to the user's respective email address.

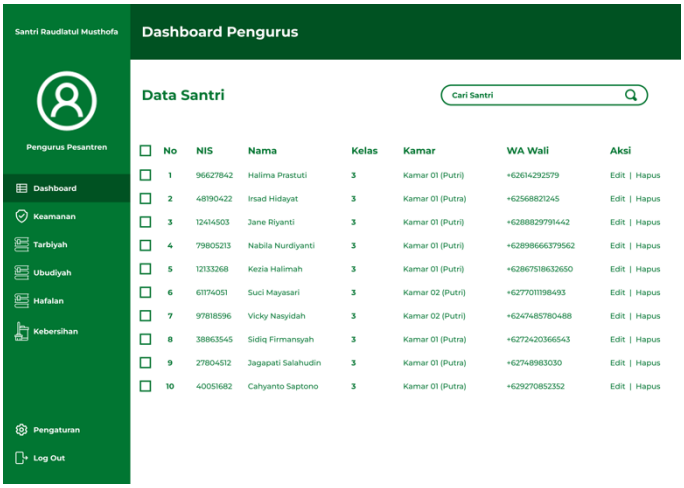

Fig. 12. Dashboard Ustadz/Ustadzah Page

Figure 12 describes the administrator dashboard, where this page is the main page when the ustadz and ustadzah have successfully logged in. On this dashboard page there is student data, from no, NIS, name, class, room, WA guardian, and there are also edit and delete actions. This edit action function is used to edit student biodata, while delete is used to delete student data.

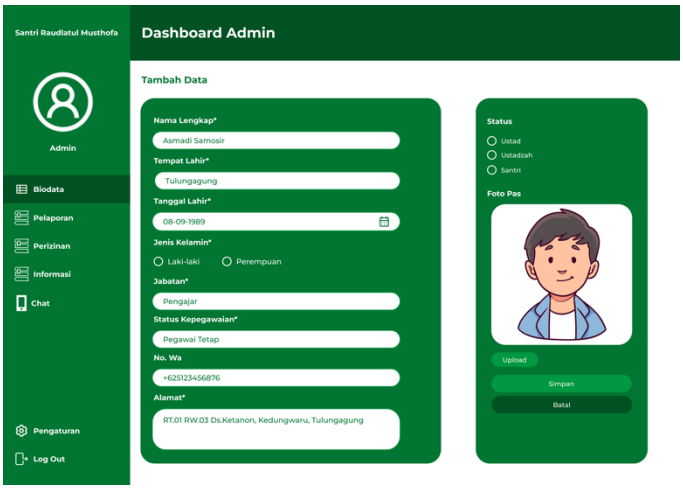

Fig. 13. Biodata Add Page

Figure 13 is a page for adding ustadz, ustadzah, and Santri data. This page is a continuation page of fig. 12 This add data page consists of several data that must be entered, namely name, place of birth, date of birth, and so on. In the right column there is a photo upload button which is used to add a photo, and the last is the save menu, used to save data.

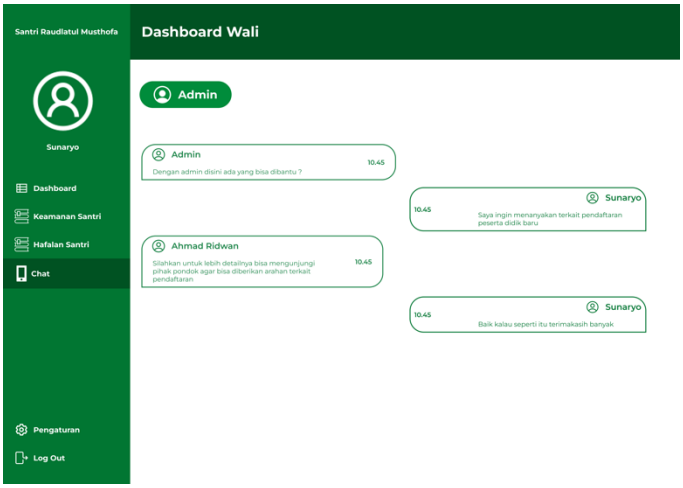

Fig. 14. WaliSantri Chat with Admin Page

Figure 14 describes the waliSantri chat page with the admin. This chat page is used to send messages containing questions submitted to the admin to obtain information from the cottage.

B. design test made

Regarding the findings obtained by the author, the author takes a thought or solution, namely with the first step of designing the e-Monitoring application for WaliSantri Development by applying the UI / UX concept using the User Centered Design method which can overcome problems in business processes that occur in Raudlatul Musthofa, with the use of this design the author hopes to help the cottage as a reference developer to create a website. To find out the results of the response to the quality of the design of the website-based application design based on the respondents' answers as measured using the Usability Scale System to 10 respondents, the data results are made and then the combination of all the data is made into 1 recap. The following below is the result of the questionnaire recap:

Table 3. Respondent Questionnaire Results

No.	Responden	Original Score from Respondents									
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
1	Responden 1	5	2	5	1	5	2	5	1	5	2
2	Responden 2	5	2	5	2	5	1	5	1	5	1
3	Responden 3	5	2	5	2	5	1	5	2	5	2
4	Responden 4	4	2	5	3	4	2	4	2	4	2
5	Responden 5	4	1	5	2	5	1	5	2	5	1
6	Responden 6	5	1	5	2	5	1	5	1	5	2
7	Responden 7	4	1	4	2	5	2	5	1	5	2
8	Responden 8	5	2	5	1	5	1	4	2	5	2
9	Responden 9	4	2	4	1	4	1	5	2	5	2
10	Responden 10	4	3	4	1	4	2	4	2	5	2

Based on the results of the respondent's score in table 4.1. weighting is carried out on each statement result to determine the calculated score that has used the System Usability Scale measurement. SUS (System Usability Scale) which is a testing tool developed by John Brooke by applying ten questions that provide a subjective global view of usability with 10 questions and 5 rating scales namely "Strongly Disagree", "Disagree", "Undecided", "Agree", and "Strongly Agree".

John Brooke defines the System Usability Scale can be used in a quick measurement of how users can feel the usefulness of a computer system [13]. The following are the rules when weighting scores on the original respondent data:

1. Every odd numbered statement (1,3,5,7,9) will have its final score deducted by 1.
2. Each even number statement (2,4,6,8,10) the final score obtained from the score will be reduced by 5.
3. The Usability Scale System score is obtained from the score of the sum of the scores of each statement which is then multiplied by 2,5.

The rule above is a rule for 1 respondent. The calculation of the results of all respondents will be summed up, the total number of values will be obtained and divided by the number of respondents, the average results of the System Usability Scale will be found. Table 4 is a calculation table of the Usability Scale System:

Table 4. Score of System Usability Scale Calculation results

Responden	**Original Score from Respondents**										**SUM**	**Score**
	Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**		
Responden 1	4	3	4	4	4	3	4	4	4	3	37	92.5
Responden 2	4	3	4	3	4	4	4	4	4	4	38	95
Responden 3	4	3	4	3	4	4	4	3	4	3	36	90
Responden 4	3	3	4	2	3	3	3	3	3	3	30	75
Responden 5	3	4	4	3	4	4	4	3	4	4	37	92.5
Responden 6	4	4	4	3	4	4	4	4	4	3	38	95
Responden 7	3	4	3	3	4	3	4	4	4	3	35	87.5
Responden 8	4	3	4	4	4	4	3	3	4	3	36	90
Responden 9	3	3	3	4	3	4	4	3	4	3	34	85
Responden10	3	2	3	4	3	3	3	3	4	3	31	77.5
Total Score												**880**
Average System Usability Scale Score Results												**88**

Based on the calculation results in table 3, the results obtained are the average score for the design of the Website-based E-Monitoring Santri Learning Development application of 88 with the "Acceptable" category and an "Excellent" rating with a grade scale B.

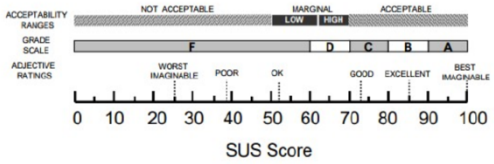

Fig. 15. Calculation results according to SUS Score

IV. Conclusion

Based on the results of the research discussed previously, the researcher draws conclusions, namely Based on the results of questionnaire calculations using the system usability scale, with 10 questions submitted to 10 respondents, it can be concluded that the design of the Website-based Santri Learning Development E-Monitoring application is 88 with the "Acceptable" category and a

rating of "Excellent" with a grade scale B in other words, this design can be accepted by users. The design of the interface design of the Website-based E-Monitoring of Santri Learning Progress application using the User Centered Design (UCD) method is in accordance with the needs of users, namely admin, ustadz / custadzah, and waliSantri. In the system modeling technique using the Unified Modeling Language (UML) diagram which consists of a usecase diagram and activity diagram.

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