DESIGNING ACADEMIC INFORMATION SYSTEM OF MADRASAH DINIYAH AL-IKHLAS WITH DESIGN THINGKING METHOD

Rakhma Yuli Affiyanti[1], Annisaa Utami[2], Sena Wijayanto[3]

[1,2,3]*Faculty Informatics, Institut Teknologi Telkom Purwokerto*
[1,2,3]*Jl. DI Panjaitan No.128 Purwokerto*
Email: [1]19102034@ittelkom-pwt.ac.id , [2]annisaa@ittelkom-pwt.ac.id , [3]sena@ittelkom-pwt.ac.id

Abstract

Information technology is a very important requirement for organizations and businesses. Technology can be utilized by many educational institutions as a force to face increasingly fierce competition in the modern era. So far, there are still many academic systems that still use conventional methods, that is, every data processing is recorded in a ledger, which often complicates the data search process. it requires more space and time, one of which is in madrasah diniyah al-ikhlas. Madrasah Diniyah Al-Ikhlas is a non-formal education which takes place in Brebes district which is usually used as a companion school for public schools. In the daily activities of Madrasah Diniyah Al-Ikhlas, in processing academic data, they still use manual recording. The learning activities of Madrasah Diniyah Al-Ikhlas are carried out during the day. In teacher learning activities, they still use large books such as class student data which are still written manually, absenteeism is still manually using attendance reports. The lesson schedule is still written on the wall and grades are still in the ledger kept in the classroom cupboard. while academic information is needed by students and parents. Currently Madrasah diniyah al-Ikhlas has not implemented an information system that can provide convenience in the process of managing academic data. Based on the problems found in Madrasah Diniyah Al-Ikhlas the authors designed a website-based academic information system, the method used in the design used the design thinking method. The Design Thinking method has a series of processes including Empathize, Define, Ideate, Prototype. System implementation uses the Laravel framework. This study aims to produce an Academic Information System that is able to overcome the difficulties experienced by madrasa teachers in managing academic data which is still manual at this time, so that it is useful to help Madrasah Diniyah al-Ikhlas actors in data processing in a relatively shorter time. User satisfaction testing was carried out using the System Usability Scale (SUS) method with a total of 31 respondents. The calculation results produce a value of 72.98387097 where it can be concluded that the system is in a good and acceptable category.

Keyword: : information system, academic, Website, Madrasah, Design thinking.

1. INTRODUCING

Information technology is experiencing rapid development. The lack of optimal use of technology in schools, especially in remote areas, makes it difficult for schools to compete with urban schools both in terms of quality of education and administrative problems. An information system is a system in an organization that regulates data management needs, supports operations, and strategically manages organizational activities. An organization or institution that produces reports for specific stakeholders [1]. Information technology plays an important role in improving work efficiency quickly. Schools need to utilize and implement a system to be able to manage academic data well. With the academic information system, schools can be more optimal and practical because they can be accessed more easily and maintained data is safer and minimizes existing errors [2].

Madrasah Diniyah Al-Ikhlas located in Brebes district is a non-formal education as an additional school for students studying in public schools. Madrasah was formed by the regulation of the Minister of Religious Affairs in 1964, the main madrasah curriculum is religious sciences such as Fiqh, Tafsir, Tawhid, and others [3]. Activities in Madrasah Diniyah Al-Ikhlas in processing academic data still use manual recording. Madrasah diniyah al-ikhlas learning activities are carried out during the day in teacher learning activities still using ledgers such as class student data that is still written manually, attendance that is still manual using attendance reports. Lesson schedules are still written on the wall and grade management is still in a ledger that is stored in the classroom cabinet. Meanwhile, the demand for school academic information from students, parents, and the wider community is increasing. As a result, there is a delay in information because the work done is less efficient, besides that it is prone to damage and duplication of data so that the information obtained is not appropriate [4].

To realize a good academic information system and in accordance with user needs, information system design methods that focus on user needs are needed such as Design thinking methods. The design thinking method can be used to design information systems on the basis of a method that focuses on solving problems by adjusting to user needs that produce an idea in the form of a solution idea of the problem that the user faces and then implemented into the academic

information system [5]. In research conducted by Hananda Ilham, Bangun Wijayanto, and Swahesti Puspita Rahayu entitled "Analisis dan Perancangan User Interface/User Experience dengan Metode Design Thinking pada Sistem Informasi Akademik Universitas Jendral Soedirman" The research was conducted to overcome the problems experienced by students of Universitas Jendral Soedirman when using SIA. System testing is carried out by making goals and scenarios The results of this research are able to help produce product prototype designs that suit the needs of students [6]. In research conducted by Yugha Nanda Mukhandi, Karya Suhada, and Rahmat Gunawan entitled "Perancangan Aplikasi Penerimaan Calon Peserta Didik Baru Dengan Menggunakan Desain Thinking Pada SMK Perbankan Indonesia" The research was conducted to process new student admission data at SMK TBanking Indonesia. This information system is built using HTML, PHP programming languages and utilizing MySQL databases. The results of this study make it easy for prospective new students to obtain information about new student admissions and online registration [7]. In a study conducted by Rana Wijdan Naim, Hadziq Fabroyir, and Rizky Januar Akbar entitled "Desain dan Evaluasi Antarmuka Pengguna Aplikasi Web Responsif myITS Marketplace Berdasarkan Design Thinking" The research was conducted as an integrated platform to integrate all existing services at ITS. The languages used in this study are, HTML5, CSS and Javascript languages. The results of usability testing from this study are that the myITS Dorm application is good in ease and meets user needs [8]. The research focuses on creating a website-based academic information system using design thinking methods and system implementation using the Laravel framework. This research is expected to facilitate the processing of academic data effectively and efficiently.

2. RESEARCH METHODS

This research focuses on an academic information system design in madrasah diniyah al-ikhlas with design thinking methods. The design thinking approach is a method needed to solve problems to present solutions needed based on users through processes such as empathize, define, ideate, prototype and testing[9]–[11]. With this design thinking method, it can produce solutions that can maximize the potential to succeed in academic information system design. Here are the stages in design thinking, namely:
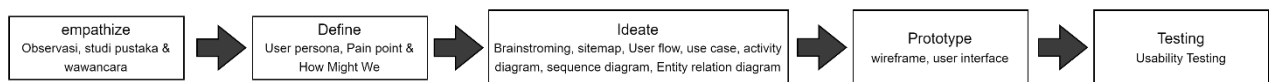

Figure 1. Design thinking stage

2.1 Empathize

At this stage, the thing discussed is data collection. Researchers conduct observations, literature studies and interviews as part of the data collection stage. At this stage, the author focuses on finding problems experienced by users and also finding out more about user needs [12]. Emphatize aims to make the problems experienced by users understandable and can be found ways to solve them. hearing, thinking and feeling, seeing, speaking and doing, frustration, and desire. At this stage hear, think and feel, see, speak, do, know frustrations, and desires [13].

2.2 Define

At the define stage, the results obtained from the interview process with respondents are then defined more clearly in order to focus on the core of the problem. Every problem found in the empathize stage will be found a solution by defining. From the data of respondents who have been interviewed, a user persona is created. Problems obtained from the data will be created pain points. Problems obtained in the data collection stage will be classified which will later be sought solutions as objectives in system design [14] .

2.3 Ideate

Ideate is a collection of ideas related to solutions to problems that have been defined at the define stage. This stage is a process from problem formulation to problem solving, in this ideate process will concentrate on generating ideas or ideas as a foundation in making a design system to be made [12]. In order for the features to become a complete system, the preparation of sitemaps, user flows, use cases, activity diagrams, sequence diagrams, and create Entity Relationship diagrams to model data needs for the design of relational databases that underlie information systems.

2.4 Prototype

At this stage the system that has been developed will be the result of the implementation of a website-based system. This stage the author makes a wireframe of the academic information system as an illustration of the design of the web display and after that the author builds a system that is easy to use by users, both the features to be used and the business processes that take place on the website [15].

2.5 Testing

Testing in the form of validation of solutions based on problems that have been determined in the Define stage. This testing stage is carried out by testing the prototype to get feedback. This stage is carried out to validate the design solution that has been created [14]. Researchers conducted testing using the usablitiy scale (SUS) system method.

3. RESULT AND DISCUSSIONS

3.1 Empathize

At this stage, it was carried out by making observations and direct interviews with the principal of the madrasah diniyah al-ikhlas. Table 1 is the result of an interview conducted with the principal of Madrasah Diniyah al-Ikhlas.

Table 1. Interview results

Question	Answer
1. Does Madrasah already have a webiste-based academic system?	Do not have an academic information system
2. How many classes and classes are there in madrasas?	There are 4 classes and 5 teachers consisting of the principal and 4 homeroom teachers
3. What is the teaching and learning process system in madrasah?	The teaching and learning process is carried out in class only.
4. How many days do students a week do the teaching and learning process at school?	Students study 6 days a week, Monday, Tuesday, Wednesday, Thursday, Saturday and Sunday
5. What is the grading system in madrasas?	Students do daily test 1, daily test 2, daily test 3, in 1 subject. Students also do midterm tests and end-of-semester tests.
6. How do I communicate grades to students? Are there any obstacles in conveying grade results to students?	The method of receiving grade results is done by being read by the teacher and written on the student's report card. The obstacles faced are the difficulty of conveying information to parents directly because there is no service to see children's development in a structured manner.
7. How about storing the grades of students in each class, Using what in their storage? Are there any constraints when storing value data?	Value storage still uses a ledger, problems often occur errors in writing grades and miscalculating grades so that the ledger has a lot of scribbles and when teachers write grades it takes a long time.
8. How is the student report card, what problems often occur when teachers enter report card scores?	Teachers must look for each student's report card one by one so that it is less effective when they want to enter grades.
9. What is the process at the time of student attendance? What obstacles are often faced?	The attendance process is carried out by recording in the attendance book of each class, the obstacles faced are when needed, they must first find an attendance recap and it takes a long time to make an attendance recap.

10. Do schools need to use web-based information systems that can later be the solution?	There needs to be an academic information system that can make it easier for teachers and students to monitor students' academic progress regularly
11. What services should be available in the web-based academic information system?	Services that help class teachers manage grades, attendance and other information such as lesson schedules, student data, teachers and support two-way information between students and teachers.

3.2 Define
At this define stage, the author identifies the results obtained from the interview process with the principal contained in the empathize stage.

3.3 Ideate
At this stage the author determines the idea that will be used to solve the problem obtained from the define stage. Problem solving carried out by the author uses brainstorming, namely collecting various ideas to design solutions according to needs.

3.3.1. Use case
Use case diagrams can show sequential activities within a system and can serve as a bridge for users to describe a system. The use case in this system can be seen in figure 2.
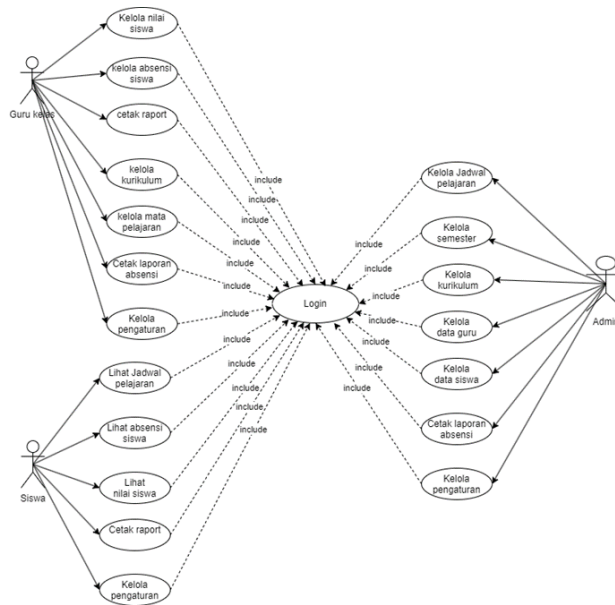

Figure 2. Use Case

3.3.2. Entity Relationship Diagram
At this stage the Entity Relationship Diagram is useful for analyzing and identifying each entity or object, as well as the relationships that exist in a database. ERD components contain entities, attributes, and relationships. Figure 3 is an Entity relationship diagram of the academic information system of madrasah diniyah al-ikhlas.
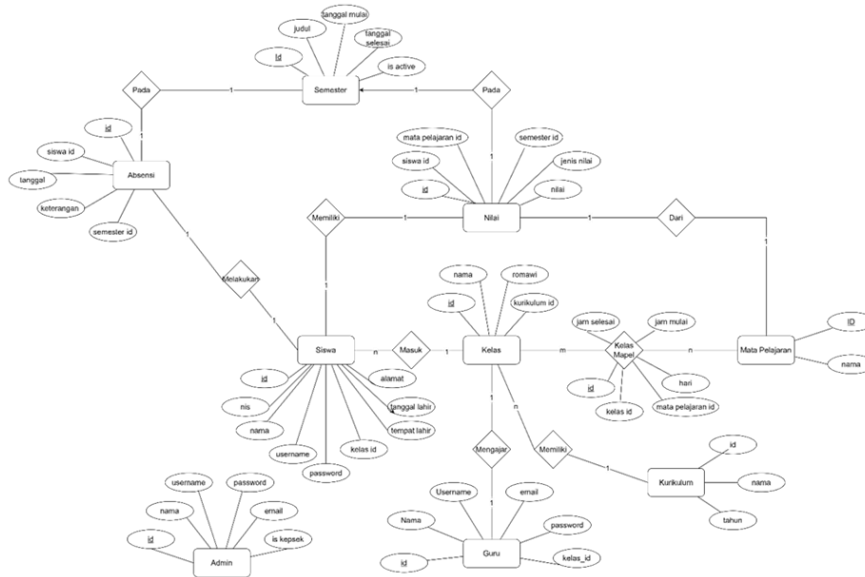
Gambar 3. Entity Relationship Diagram (ERD)

3.4 Prototype

At the prototype stage, the author implements the ideas obtained in the previous process.

3.4.1 System Implementation

The following is the implementation of the academic information system of madrasah diniyah al-ikhlas, there are three users who use the website, namely admin, teacher and student. The picture below is an implementation from the teacher and student side.

3.4.1.1 Teacher User Page
   a. Student Grades Page
   The student grade page is used to manage student grades according to subjects. The main page on the student grade menu displays a list of subjects. The main page of student grades can be shown in figure 4 below:
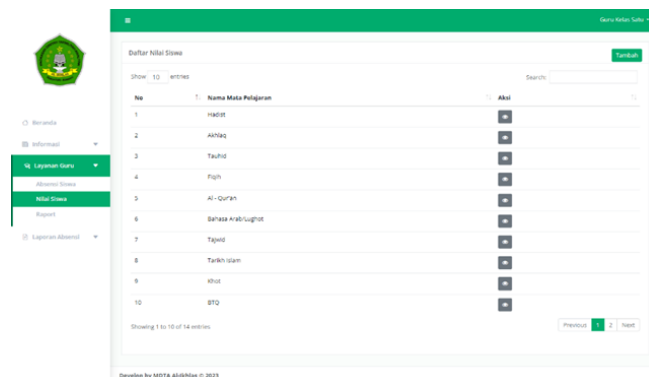

Figure 4. Student Grades Page

   b. Raport Page
   The student report card page is used to print student report cards. This page is accessible to both teachers and students. There are tables that display nis, class, student name, subject, grade and semester. The report card page is shown in figure 5 as follows:
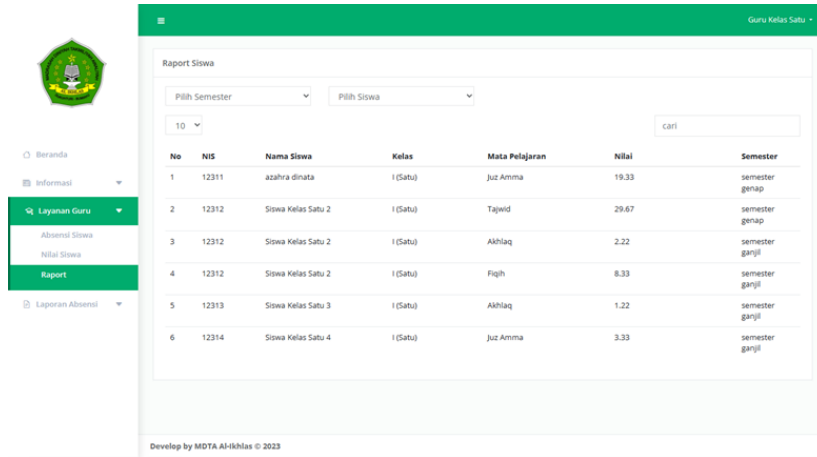
Figure 5. Raport Page

3.4.1.2 Student User Page

a. View Student Attendance Page
The student attendance view page is the page accessed by students. When students want to see a recap of attendance, the view student attendance page is shown in figure 6.
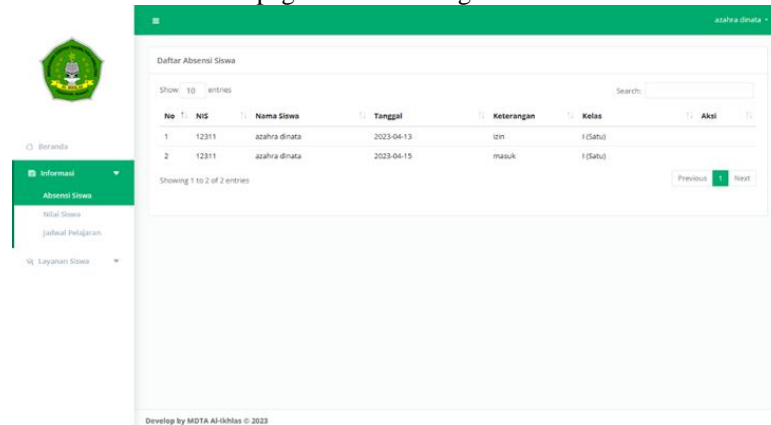

Figure 6. View Student Attendance Page

b. View Student Grades Page
The view student grades page is the page that students access. When students want to see a list of grades, students can select the information menu and then select student grades. The View student grades page is shown in figure 7 as follows:
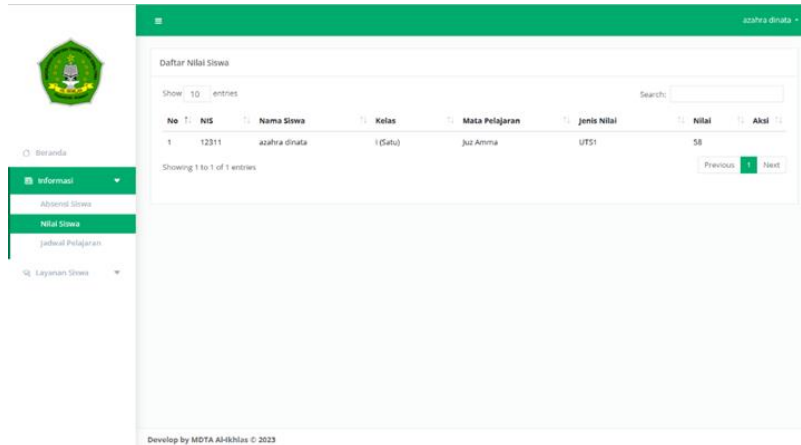
Figure 7. View Student Grades Page

c. Page View Report Card

The report card view page is a page accessed by students. When students want to see a recap of grades, students can select the student services menu and then select report card. There is a table to see subject information, calculated grades and semesters. Students can also print report cards according to the semester. The report card page is shown in figure 8.
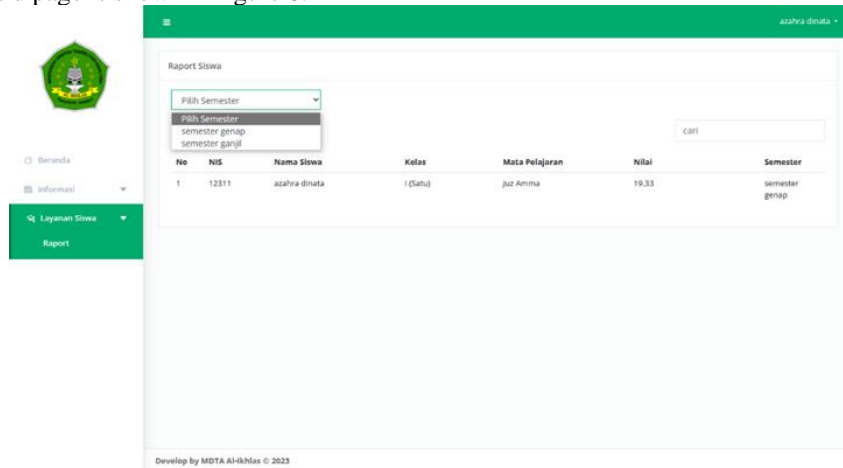

Figure 8. Page View Report Card

3.5 Testing

At this stage, researchers test the system that has been made to teachers and students. Researchers conducted testing using the usablitiy scale (SUS) system method. This website was given to 31 respondents. The measurement of website satisfaction is done by filling out a google form, a questionnaire is made with a total of 10 questions. Each question has an answer linearly between 1 and 5. The results of the SUS value based on the collected data have an average value of 72.983871 which is included in grade C and is considered acceptable in the acceptability range as shown in figure 9.
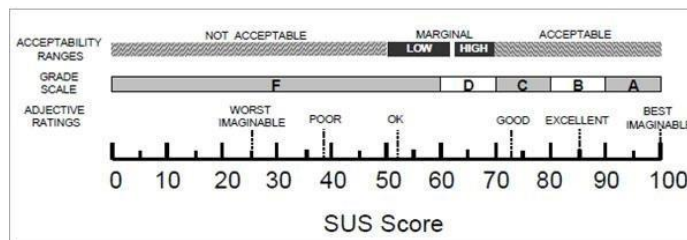

Figure 9. Range of SUS values

3.5.1 Validity Testing

In this study, a validity test was carried out to determine the accuracy of each question instrument. In the test, there were 31 respondents, a significant value of 5% for the table of 0.355. If the value is rcalculated>rtable then the statement is valid.

Table 2. Validity Test Result

Question	Rtable	RCount	Information
1	0.355	0,553	Valid
2	0.355	0,741	Valid
3	0.355	0,359	Valid
4	0.355	0,607	Valid
5	0.355	0,489	Valid
6	0.355	0,384	Valid
7	0.355	0,404	Valid
8	0.355	0,575	Valid
9	0.355	0,483	Valid
10	0.355	0,547	Valid

3.5.2 Reliability Testing

Reliability calculations are only carried out if the variables on the questionnaire are valid. Testing can be said to be reliable or cannot be seen from Cronbach's alpha value. If Cronbach's alpha value > 0.60 then it can be considered reliable. In this study, reliability testing results were obtained with Cronbach's alpha value of 0.696. This means that it can be considered reliable because it has a value of > 60.

Table 3. Reliability Test Result

Cronbach's alpha	N of items
0,696	10

4. CONCLUSION

Conclusions that can be drawn from the discussion of academic information systems in Madrasah diniyah al-ikhlas, among others, using this website help find information easily and make it easier for schools to manage academic data. Testing user satisfaction in academic information systems using a system usability scale (SUS) from questionnaire data resulted in a score of 72.983871, From the average score of the test results it can be concluded that the system is included in the good category.

REFERENCES

[1] M. A. Insani, "Perancangan Desain pada Aplikasi My School Menggunakan Metode Lean UX Designing The My School Application Using The Lean UX Method," 2022.

[2] H. M. Saputro, L. Ariyani, and A. Irawan, "Rancangan aplikasi sistem informasi akademik sekolah pada smp muttaqien jakarta berbasis java," vol. 01, no. 04, pp. 483–489, 2020.

[3] A. Syafiq, "Manajemen sistem informasi sebagai penyelenggaraan Akademik Madrasah Diniyah (Studi di Madrasah Diniyah Al-Hikam Malang)," 2022.

[4] E. Nurelasari, "Perancangan Sistem Informasi Akademik Pada Sekolah Menengah Pertama Berbasis Web," *Komputika J. Sist. Komput.*, vol. 9, no. 1, pp. 67–73, 2020, doi: 10.34010/komputika.v9i1.2243.

[5] F. Wiryandhani, S. Widodo, and R. Andrian, "Perancangan Purwarupa Dashboard Digital Untuk Pengukuran Produktivitas Kerja Dengan Metode Design Thiniking," *J. Teknoinfo*, vol. 17, no. 1, p. 351, 2023, doi: 10.33365/jti.v17i1.2074.

[6] H. Ilham, B. Wijayanto, and S. P. Rahayu, "Analysis and Design of User Interface/User Experience With the Design Thinking Method in the Academic Information System of Jenderal Soedirman University," *J. Tek. Inform.*, vol. 2, no. 1, pp. 17–26, 2021, doi: 10.20884/1.jutif.2021.2.1.30.

[7]   Y. N. Mukhandi, K. Suhada, and R. Gunawan, "Perancangan Aplikasi Penerimaan Calon Peserta Didik Baru Dengan Menggunakan Desain Thinking Pada SMK Perbankan Indonesia," *Pros. Semin. Nas. Inov. dan Adopsi Teknol.*, vol. 2, no. 1, pp. 170–181, 2022, doi: 10.35969/inotek.v2i1.248.

[8]   R. W. Naim and H. Fabroyir, "Desain dan Evaluasi Antarmuka Pengguna Aplikasi Web Responsif myITS Marketplace Berdasarkan Design Thinking," vol. 10, no. 2, 2021.

[9]   S. Setiawansyah, Q. J. Adrian, and R. N. Devija, "Penerapan Sistem Informasi Administrasi Perpustakaan Menggunakan Model Desain User Experience," *J. Manaj. Inform.*, vol. 11, no. 1, pp. 24–36, 2021.

[10]   N. F. Fahrudin and A. D. Wahyudi, "Modeling Inventory Systems Using The User Experience Design Model Method," *J. Data Sci. Inf. Syst.*, vol. 1, no. 1, pp. 9–16, 2023.

[11]   M. D. Ariawan, A. Triayudi, and I. D. Sholihati, "Perancangan User Interface Design dan User Experience Mobile Responsive Pada Website Perusahaan," *J. Media Inform. Budidarma*, vol. 4, no. 1, p. 161, 2020, doi: 10.30865/mib.v4i1.1896.

[12]   F. A. Firdausi, "MARKETPLACE UMKM DIGIDESA MENGGUNAKAN METODE DESIGN THINKING," 2021.

[13]   D. D. Maharani, *Perancangan User Experience Menggunakan Metode Design Thinking Pada Prototype Website Sedekah Jumat Barokah*. 2022.

[14]   E. C. Shirvanadi and M. Idris, "Perancangan ulang UI/UX situs e-learning aminkom center metode design thinking (studi kasus: amikom center)," *Automata*, vol. 2, pp. 1–8, 2021.

[15]   M. Y. N. Putra, "SISTEM INFORMASI MANAJEMEN PEMBAYARAN SPP MENGGUNAKAN PENDEKATAN DESIGN THINKING (STUDI KASUS SD MUHAMMADIYAH 1 NGAGLIK)," 2022.