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Designing UI/UX for Academic Module of Education Management System Using Design Thinking

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ABSTRACT

Learning is the process of altering behavior through the acquisition of knowledge, useful skills, and moral precepts from a variety of sources. The role of media in education is becoming more and more important in the current digital era to improve human resources. By improving resource management, openness, and information exchange, education management systems raise academic standards. The COVID-19 pandemic has sped up digital learning, but issues with accessibility and flexibility still exist and require creative solutions. The digitalization of education is getting closer to reality thanks to growing internet usage, improved infrastructure, and greater technology literacy. The Education Management System (EMS) website at SMPN 1 Magetan was created using a Design Thinking methodology, which is examined in this paper. The goal of the academic module design is to improve user experience and management effectiveness. Key system features were defined by analyzing the user needs that were discovered through interviews. Low-fidelity wireframes were the first step in the design process, which continued to high-resolution prototypes. The prototype, when tested using the Maze tool, received a pleasant and user-friendly experience, with an average System Usability Score (SUS) of B and a Single Ease Question (SEQ) score of 5.5 to 6.0 out of 7 from all role like Student, Teacher, Parent, and Administrative Staff.

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1. INTRODUCTION

Learning is a dynamic process with the aim of improving student performance through knowledge, skills, and positive reinforcement from various sources [1] . In the digital age, utilizing technology in education is crucial to raising the standard of human capital [2]. The Education Management System enhances transparency and the caliber of education while effectively managing the distribution of educational materials and information [3]. Despite obstacles to access and adaptation, the COVID-19 epidemic hastened the digital transformation of education [4]. As of 2021, Indonesia had 210.02 million internet users out of a total population of 272.68 million, indicating a penetration rate of 77.02% —has made the digitalization of education more feasible [5]. Leading school SMPN 1 Magetan is dedicated to creative and high-quality education management. A noteworthy innovation is the utilisation of a website to streamline academic administration, given the substantial influence of information technology on daily existence [6]. This study is centered on the development and execution of a website using a UX Design methodology to enhance usability [7], drawing from in-depth interviews conducted with teachers, students, parents, and administrative staff. When issues are found in the academic module, a more effective and transparent remedy is required. Therefore, the goal of this project is to improve user experience as SMPN 1 Magetan's education becomes more digital by tracking attendance and grades and addressing other issues related to the academic module.

2. RESEARCH METHOD

In order to create effective and efficient solutions, Design Thinking is an integrative process that integrates ideas from multiple disciplines [8]. It is a non-linear method that may be modified and applied again based on the needs of the user to recognize and comprehend current or foreseeable issues. The five stages of Design Thinking are empathy, define, ideate, prototype, and test [9].

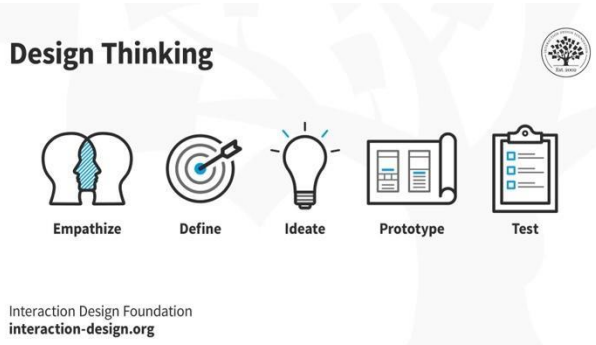

Figure 1. Design Thinking Process

The image illustrates the Design Thinking process, which consists of five key stages: Empathize, Define, Ideate, Prototype, and Test. Empathize involves understanding user needs and challenges. Define focuses on clearly identifying the problem. Ideate is the stage where creative solutions are generated. Prototype involves developing tangible representations of ideas. Finally, Test ensures that the solution meets user expectations. This iterative approach helps in designing effective and user-centered solutions.

Creating interfaces that put style and interaction first is the primary objective of user interface (UI) design. This has to do with how a computer or other gadget that enables user interaction looks [10]. A user-friendly application design must incorporate the following components: layout, text, color, hierarchy, consistency, personality, and images [11]. A viewpoint and other elements pertaining to how users engage with goods, services, or apps are together referred to as user experience (UX) [12]. To illustrate it, researchers employ the Honeycomb UX technique as one paradigm [13]. The Honeycomb UX technique by Peter Morville defines seven key aspects of user experience: useful, usable, desirable, accessible, credible, findable, and valuable. A good UX ensures meaningful content, ease of use, engagement, accessibility, trust, and easy navigation. Balancing these elements creates a satisfying user experience.

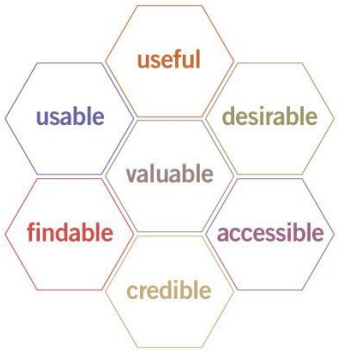

Figure 2. UX Honeycomb

This approach comprises asking a straightforward question to gauge visitors' happiness and effectiveness after using the website [14]. A website or system must meet a minimum criterion of 5.5 for ease of use. This evaluation is conducted following the user's completion of the provided scenario. The total user experience of the system or website under test will be reflected in the SEQ score that is obtained [15]. The Single Ease Question (SEQ) score measures task difficulty based on user feedback, ranging from 1 (very difficult) to 7 (very easy). Higher scores indicate better usability, with task completion rates and times improving as scores increase. This percentile-based ranking helps assess user experience efficiency and identify usability issues.

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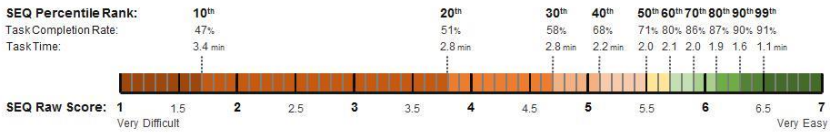

Figure 3. SEQ Scoring Scale

A survey tool called the System Usability Scale (SUS) is used to gauge how users feel about a piece of software's usability. The SUS approach is used for testing once the software has been developed [16]. Using SUS has several benefits, such as being simple to use with a rating scale of 0 to 100, having a straightforward assessment method, being freely available, and having reliability and validity that have been proven even with small sample sizes [17].

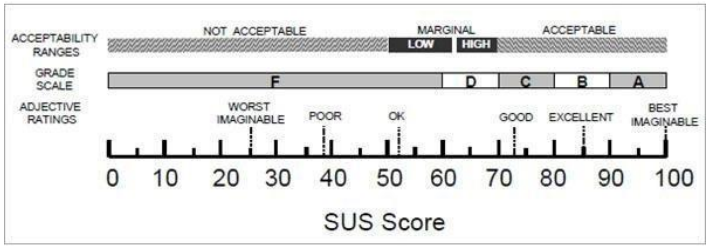

Figure 4. SUS Scoring Scale

3. RESULTS AND DISCUSSION

The results of the Education Management System design process in SMPN 1 Magetan will be revealed at this point. As explained below, a design thinking methodology is applied in the application of these findings.

3.1. Empathize

During this phase, the researcher conducted in-depth interviews with users, open-ended questions and responses that don't follow pre-planned formats to make the conversation more engaging and repeatable [18]. In in-depth interviews including teachers, students, parents, and administrative staff to gather information for the SMPN 1 Magetan Education Management System (EMS) Design. The conclusions drawn from the process of conducting in-depth interviews are listed below.

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Table 1. Finding During the In Depth Interview Process

Objective	Findings
Gain an understanding of the traits and everyday activities of the school's teachers.	Teachers have worked at the institution for five to ten years, and they teach a variety of disciplines.
Assess instructional activities in the classroom to acquire a greater understanding of the school's academic procedures.	Teachers love what they do, but they have trouble coming up with creative lesson plans and handling a wide range of comprehension levels in their students.
Analyze how academic settings handle assessments.	Assignments, tests, and participation in class are used to determine assessment. There are recommendations on how to increase openness and give more thorough feedback.
Gain an understanding of how teachers deliver content in class.	Textbooks, films, and presentations are used to convey the material. Videos and practical experience are thought to be the most effective, but obtaining the required materials might be challenging.
Evaluate the literacy initiative carried out in the classroom under the separate curriculum.	The literacy program improves students' writing and reading abilities, but it still has trouble inspiring pupils to participate.

After conducting in-depth interviews with users, the results were organized into an Empathy Map. A user empathy map is a tool that helps understand users' thoughts, feelings, actions, and needs, enabling better design solutions.

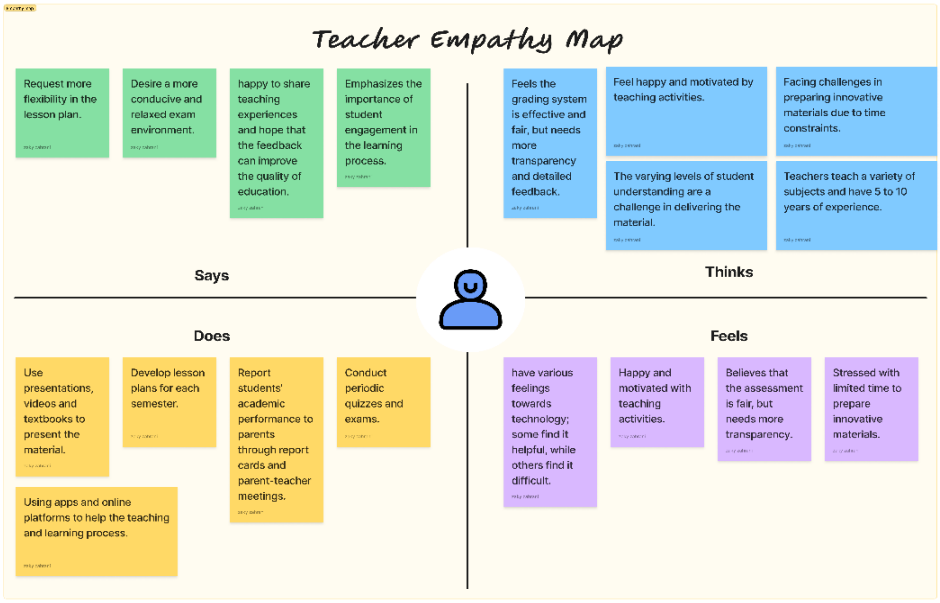

Figure 5. User Empathy Map of Teacher

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This teacher empathy map highlights key insights about educators. Teachers seek flexibility in lesson planning, a conducive exam environment, and value student engagement. They feel motivated by teaching but struggle with time constraints and varied student understanding. Their tasks include lesson planning, using technology, and assessing students. While some find technology helpful, others struggle with it. Overall, teachers aim for effective learning despite challenges in innovation and assessment transparency.

3.2. Define

After classifying and identifying the problems, the researcher created user personas and a customer journey map. In this phase, the user pain and gain analysis was used to compare the problems that were discovered with the mapped solutions. In order to depict user profiles based on made-up characters that accurately represent the demands and traits of actual users, user personas were created.

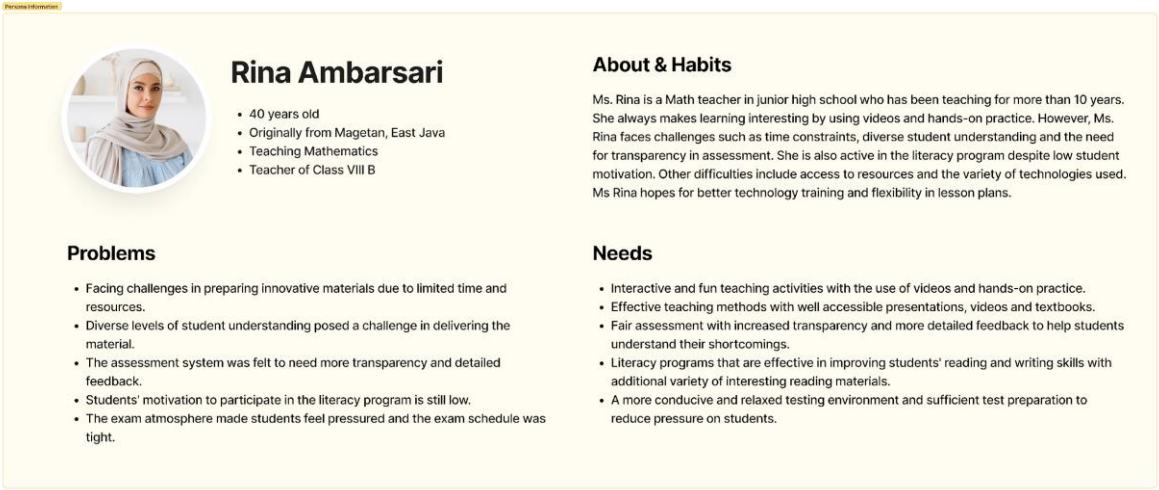

Figure 6. User Persona

A customer journey map is a tool that visually represents the user's journey and interactions with the services from the beginning to the end. This map outlines students' experiences in learning, assignments, exams, performance reporting, and feedback. Students feel positive in classes but frustrated with assessments and exams due to a lack of transparency and flexibility. Reporting and feedback processes are neutral to positive. Suggested improvements include interactive learning, better assessment transparency, flexible exams, faster reporting, and dedicated feedback forums.

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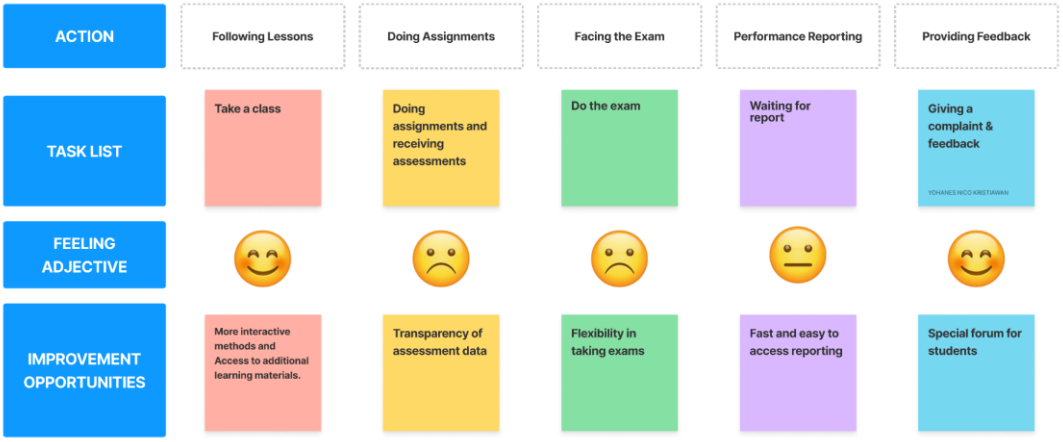

Figure 7. Customer Journey Map

Researchers also do a problem analysis using the problem statement and analysis (problem analysis). A problem statement defines the core issue faced by users, helping guide solution development.

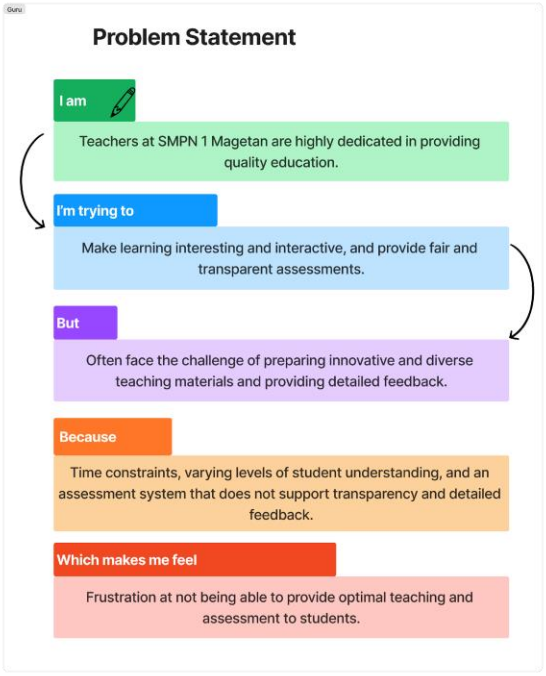

Figure 8. Problem Statement

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This problem statement highlights that teachers at SMPN 1 Magetan strive to make learning engaging and assessments fair but struggle with time constraints, diverse student needs, and a lack of transparency in assessment systems. As a result, they feel frustrated about not providing optimal teaching and feedback.

3.3. Ideate

The next step is ideation. The purpose of this step is to formulate a solution based on the problem that was defined in the previous step. This phase consists of formulating ideas and solutions, refining the structure of the solution, and creating a matrix based on the available features' shortcomings. Here are the results of brainstorming.

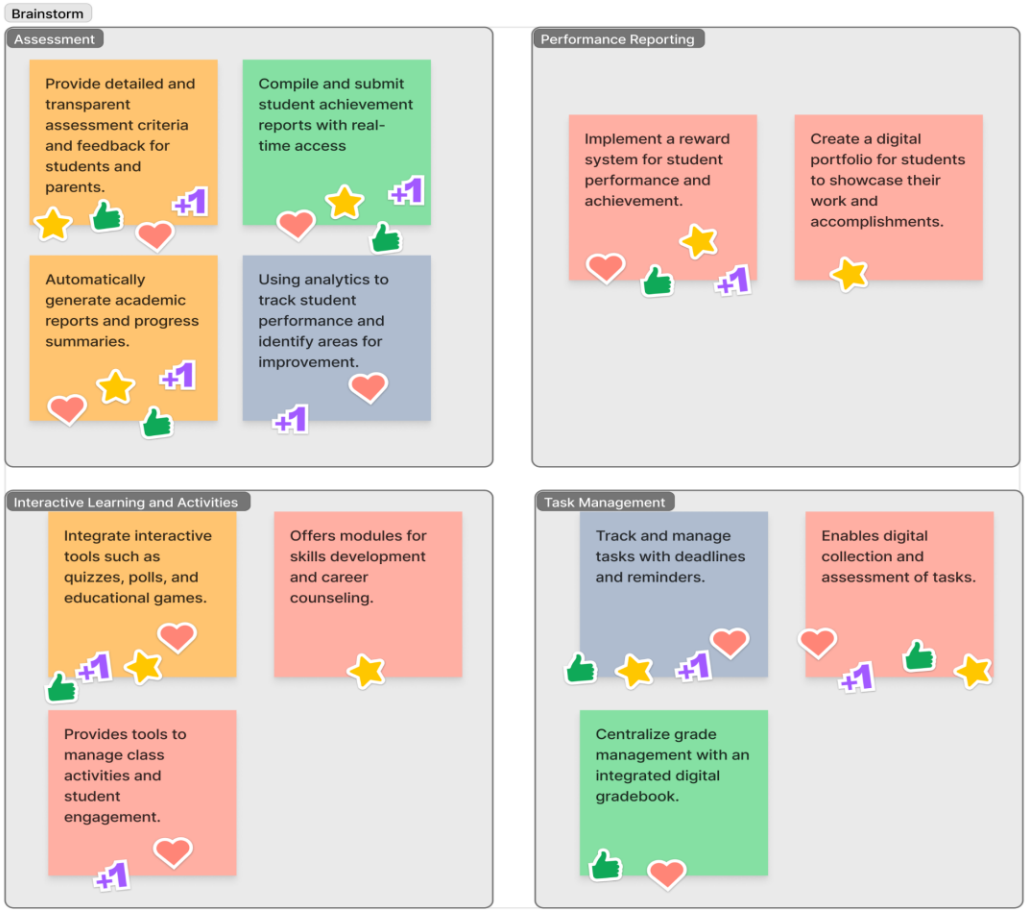

Figure 9. Brainstorming

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An interactive learning process is one of the outcomes of brainstorming. Supporting all other forms of media in the learning process, including text, photos, videos, animations, music, and graphics, is interactive learning media [19]

3.4. Prototype

After refining the idea phase, the next step is to create a prototype. The process begins with creating a wireframe or low-fidelity prototype.

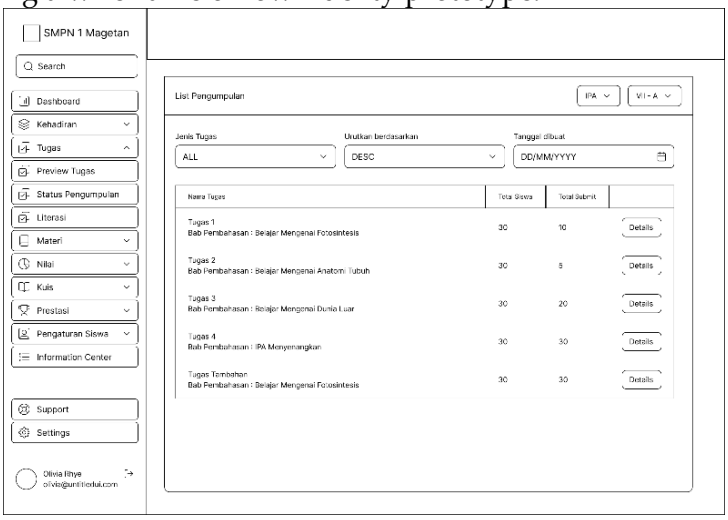

Figure 10. Wireframe EMS SMPN 1 Magetan

Next, apply the UI Style Guide to ensure design consistency. This makes the process of collaboration between designers and tech more straightforward.

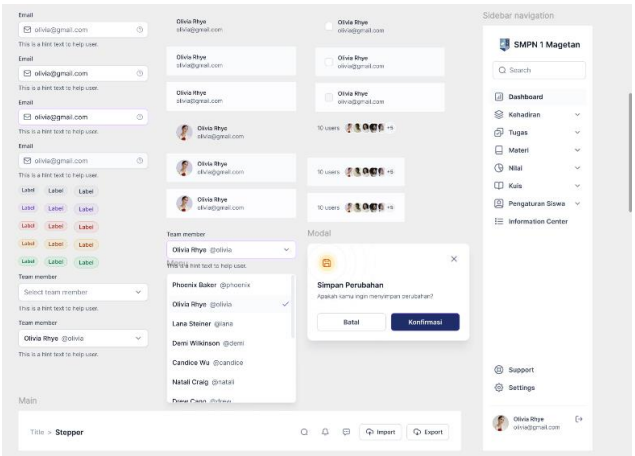

Figure 11. UI Style Guide EMS SMPN 1 Magetan

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The last step in the prototyping process is to create a high-fidelity prototype that will serve as the final design that is implemented on the slicing tab for front-end development.

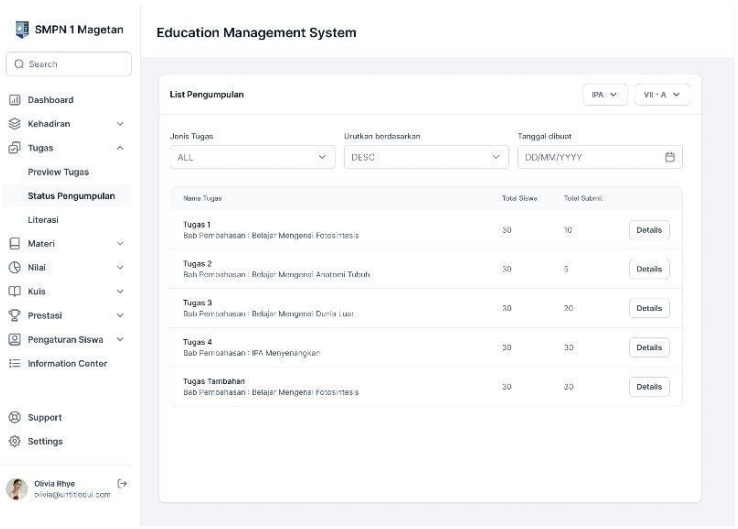

Figure 12. High Fidelity EMS SMPN 1 Magetan

The process of implementing communication to an interface in order to evaluate the user experience and obtain input from users on prototypes is known as interface implementation [20].

3.5. Testing

Using the System Usability Scale (SUS) and Single Ease Question (SEQ) methods, the testing phase is carried out by the researcher. Below is a summary of the SUS from the fitness assessment for teachers.

Table 2. System Usability Scale Result for Teacher Role

Participant	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Result
P1	4	3	4	3	4	3	4	3	4	3	62,5
P2	5	2	5	2	4	2	5	2	4	3	80
P3	4	3	4	3	4	3	4	3	4	3	62,5
										Average	68,33
										Grade Scale	C-
										Adjective Ratings	OK
										Acceptability Ranges	*Marginal*

The average score for the SUS is 68.33, with a grade of C- because it is below 80.3. This indicates that users of the Education Management System SMPN 1 Magetan website still need to make a few corrections, mainly to the Quiz and Report features.

Table 3. System Usability Scale Result for Teacher Role

Task	Participant			SEQ Score Average
	P1	P2	P3	
Create and give assignment/literacy assessments.	6	5	6	5,67
Creating materials for students.	7	6	6	6,33
Assigning grades to students	5	4	5	4,67
Create quizzes and view student results.	6	5	6	5,67
Conducting reviews and approvals on student achievement reporting	6	6	5	5,67
View class schedule	7	7	6	6,67

As can be seen from the above table, there are a few scenarios that can affect the participant's perception when using the education management system. However, based on all of the scenarios that are run, there are a few significant evaluations, such as the Quiz and Report features, after analyzing the results and determining the participants' earnings.

4. CONCLUSION

This study evaluates the user interface (UI) and user experience (UX) for the Education Management System (EMS) at SMPN 1 Magetan using the Design Thinking methodology, which consists of five stages: empathize, define, ideate, prototype, and test. Design implementation is done based on user issues, mostly in the arithmetic module. The EMS has proven to be effective in assisting students, teachers, parents, and administrative staff in addressing academic standards, such as grading assignments and notes, providing students with a private way to turn in assignments, providing tutoring, and evaluating student performance. The purpose of these features is to increase the efficiency and effectiveness of academic writing. Testing is conducted with each user in a quantitative and qualitative manner. Qualitative research uses a maze to get user recommendations, while quantitative research uses SUS and SEQ questioners. Results display the grading scheme average. SUS received a B for the entire testing website's role, passing the appropriate category, and being able to be viewed. SEQ Score, which ranges from 5,5 to 6,0 out of 7, indicates user friendliness. Important feedback from users has been revalidated in the evaluation phase.

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