khazanah informatika

Jurnal Ilmu Komputer dan Informatika

Approach Integration Design Sprints to Design Thinking in Learning Management System Sakattaku

Siti Nabilah Nida[1], R. Reza El Akbar[1*], Alam Rahmatulloh[1]
[1]Informatics Department, Faculty of Engineering
Siliwangi University
Tasikmalaya, Indonesia
*reza@unsil.ac.id

Abstract-The Ministry of Education and Culture introduces a new phase of the Merdeka Belajar policy named the Organization Movement Program (POP). As a participant in the POP, the Sakata Innovation Center Foundation provides the Saung Coding training through hybrid learning, incorporating the Sakattaku Learning Management System (LMS) platform, developed by the Sakata team since 2021. However, feedback from 20 out of 45 POP respondents (45%) indicated difficulties while using the LMS. Therefore, this research aims to analyze and formulate a plan for the implementation of UI/UX improvements for the Sakattaku LMS through the Design Thinking process. Additionally, this study introduces the Design Sprint methodology, which will be compared and explored for compatibility with Design Thinking, to be further investigated in subsequent research. Final findings reveal that 9 of 15 IT expert users accomplished scenario-based tests. A User Experience Questionnaire (UEQ) for 45 POP participants exhibited positive impressions in all aspects, particularly perspicuity. Previously below average, perspicuity now ranks as excellent. Notably, the novelty aspect demonstrated the highest positive difference, scoring 75.6%. Furthermore, based on the review of related research methodologies, there is a potential for compatibility between the use of Design Thinking and Design Sprint.

Keywords: Design Sprint, Design Thinking, User Experience, User Interface

Article info: *submitted May 16, 2023, revised September 26, 2023, accepted October 28, 2023*

1. Introduction

Education reform policies through independent learning continue to be inflamed by the Ministry of Education and Culture to improve the quality of education in Indonesia, one of which is the Movement Organization Program, the fourth episode of the independent learning policy [1], [2]. The Movement Organization Program (POP) is a community empowerment program that is carried out massively through government support to improve the quality of teachers and principals based on training models [2]. Sakata Innovation Center Foundation (YSIC) is a driving organization under the auspices of the Ministry of Education and Culture that carries out a work program, namely Saung Coding training for elementary school teachers and principals spread across five regions in West Java with the aim of improving skills and understanding related to education and technology. In this regard, each participant who comes from various regions needs to strive for hybrid learning, namely directly and remotely so that the POP work program can be carried out. So, to support the continuity of distance learning, the Sakata Innovation Center Foundation uses a tool used as a learning medium for POP participants, namely the Learning Management System (LMS).

Learning Management System (LMS) is a system that supports and manages teaching for users who productively provide types of learning and provide information for users [3]–[5]. There are several examples of LMS, such as Moodle, Sakai, Blackboard, Edmodo, Google Classroom, to Quizziz [6], [7] . Of all the popular LMS platforms that have been mentioned, Sakattaku LMS is a platform built by the Sakata team itself since 2021 with the aim of being a distance learning medium and meeting POP learning needs that can be customized and developed more flexibly so that Sakattaku LMS has its own uniqueness compared to other LMS.

The development of Learning Management System (LMS) in the context of Human Computer Interaction (HCI) has made significant progress over the past few years [8]. HCI plays a central role in designing more intuitive, efficient, and satisfying user interfaces in LMSs that contribute to a better learning experience [9]. One of the main trends is the development of responsive and adaptive interfaces [9], [10]. This allows the LMS to customize its appearance and functionality according to the device being used, such as a smart phone, laptop, or desktop computer. In addition, LMS development is increasingly focusing on personalization [11]. This means that the LMS can present learning materials, assignments, and quizzes tailored to the user's level of knowledge and preferences. This was reinforced after interviews were conducted with three Education experts who are lecturers at one of the universities. They stated that through the LMS, students' interests and learning experiences can become more relevant and effective. In fact, one of the experts revealed that the development of LMS in the context of HCI in the future will continue to increase both in terms of appearance and functionality. Thus, the development of LMS trends in the context of HCI makes us more prepared to face a more innovative and directed future in education.

The use of the Sakattaku LMS has been ongoing for three years along with the implementation of the Organizing Drive Program. However, the use of this LMS has provided unsatisfactory feedback. Based on the results of interviews obtained from Sakattaku LMS users, it is known that 20 out of 45 respondents (45%) said that they experienced problems that caused discomfort in using the LMS. Meanwhile, one of the supports for an application product platform is the User Interface (UI) and User Experience (UX).The User Interface (UI) acts as a form of visualization of application products that focus on appearance [12], [13], [14]. Meanwhile, User Experience (UX) plays a role in functionality, convenience, satisfaction, and user experience when interacting with application products [15]. These two components are essential because in creating an application or website, the main goal is to help users complete a job, then this goal can be realized if all of the UI and UX components are integrated [16], [17].

Within Human-Computer Interaction (HCI), design thinking and user-centered design approaches have become popular in building interface designs [14], [18]. The design thinking approach is an approach that began in 1969 with the concept of design science [19]. This approach focuses on creative approaches to innovation and problem-solving through the stages of empathize, define, ideate, prototype, and test [20]. Meanwhile Design Sprint is a user centered design method designed to create a prototype at a fast pace [21], [22]. The design sprint starts with an agile framework which Google Venture then develops to solve critical problems through prototyping in a short time [22]. Design sprints usually involve five days of work, but that's understandable if done over five days. As cited by Banfield, Lombardo, and Wax that the design sprint they run is around 4-6 weeks because the team and client do not have the facilities to gather together for five days continuously [23]. However, working together on a design sprint shortens endless debate cycles and compresses time that previously took months and could be shortened to a week [24].

Design Thinking has the advantage of placing the user as the main focus, encouraging a deep understanding of user needs and expectations, and the empathetic aspect of Design Thinking allows teams to understand more deeply the feelings and challenges of users, and leads to more sensitive and humane solutions[25], [27]. On the other hand, Design Sprints have the advantage of providing a structured and time-constrained approach, enabling teams to efficiently solve design challenges[26], [28].

However, there is currently no research that integrates the Design Thinking and Design Sprint methods comprehensively in one integrated approach. The majority of studies are more inclined to compare these two methods or apply them separately. Therefore, this integration is considered as something new and innovative.

Based on the research review related to the method, there are several component parts of the integration of the design thinking and design sprint methods that need to be developed in further research, so that this research theme has 2 main objectives. The first objective is to introduce and differentiate the design thinking and design sprint methods as well as the application of the design thinking method to the UI/UX development of Sakattaku LMS. The second objective is the application of the design sprint method in previous research and then a comparison of the effectiveness between the use of the design thinking method, design sprint, and a combination of design thinking and design sprint methods is carried out.

The implementation of the Sakattaku LMS design development in this study is limited to the application of the design thinking method. This research flow is divided into five stages: empathize, define, ideate, prototype, and test. The research process involved several stakeholders, including participants of the Activator Organization Program, the Sakata Foundation team, and experts in the field of education and technology who acted as evaluators. The output of this research is a high-fidelity prototype of the Sakattaku LMS.

The results of the prototype output were then tested using User Testing using the Maze application and User Experience Questionnaire (UEQ). UEQ is an evaluation method for measuring user experience using a questionnaire that was created by Laugwitz, Schrepp, and Held [29]. This UEQ has 6 (six) measurement scales consisting of 26 question elements which are categorized based on the measurement scales contained in the UEQ, including attractiveness, efficiency, perspicuity, dependability, stimulation, and novelty [30]. The results

of using UEQ are expected to help in identifying aspects that require specific improvements, thus enabling the improvement of user interface quality.

2. Methods

Method research on analysis and design of the user interface and user experience at LMS Sakattaku Uses method *design thinking* and methods *design sprints*. Method *design thinking* is used to direct the design development product based on innovation[31]. Temporary method *design sprints* are used to emphasize cyclical processes Work fast. Stages study This is shown in Figure 1.

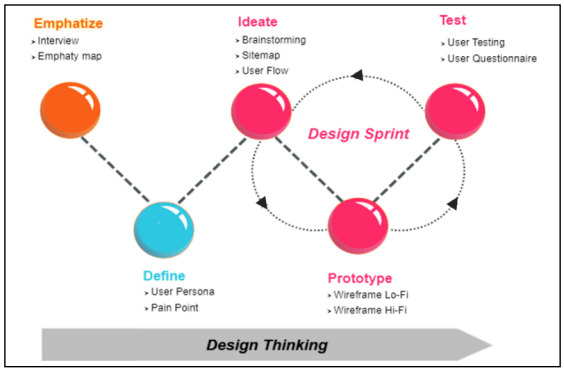


Figure 1. Stages Study

a. Empathize

The empathizing process is a stage of understanding the user's needs and emotions when using a service or product [11]. In this study, the emphatization process was carried out through the user research method approach, namely by interviewing and questionnaire techniques using the User Experience Questionnaire (UEQ) to find out problems, needs, and assessments related to user experience in using the Sakattaku LMS. The User Experience Questionnaire (UEQ), an evaluation method for measuring user experience, consists of 26 elements categorized based on six scales: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty [12]. The output at this stage is to produce an empathy map and UEQ assessment results.

b. Define

This stage aims to define the problem and determine the user's context by looking back at the data obtained at the empathize stage, then making the essence so that the output is obtained as a user persona and pain points. The user persona describes the user's description, goals, interests, and needs of the user. While Pain Point describes the main problem of the user that must be handled and resolved so that the objectives to be achieved are obtained.

c. Ideate

This stage specifies user needs based on the results defined through brainstorming so that output in the form of ideas is carried out. Brainstorming prioritizes data on user needs related to features in LMS Sakattaku and is poured into a hierarchical menu structure (sitemap) and usage flow (user flow).

d. Prototype

In this stage, the user interface design process starts with sketching for each part of the website, namely in the form of a low-fidelity wireframe, and the final design of the interface, namely a prototype design in the form of a high-fidelity wireframe.

e. Test

This stage is an evaluation process to determine the level of use and the suitability of the design results to user needs. This process becomes a determining process for the end of the design stage, or an iterative process is carried out and repeats the previous stage. This evaluation process uses user testing and the User Experience Questionnaire (UEQ) after testing a prototype that directly involves sakattaku.com web users.

3. Results

In this study, a literature review analysis was conducted and the results showed some important findings. First, this research revealed the similarities and differences between the two methods. Second, it was found that no previous research has comprehensively combined design thinking and design sprint methods. This opens up new opportunities in integrating these two methods to achieve much more optimal results.

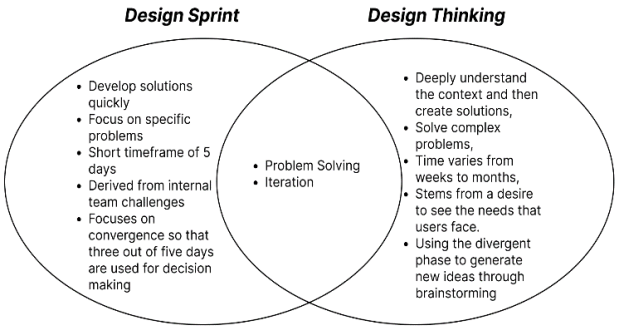


Figure 2. Similarities and Differences between Design Sprint and Design Thinking Methods [25], [26], [28]

Table 1. Previous Research

Researcher	Design Sprint	Design Thinking	Agile Software Development
Pereira and Russo [32]		✓	✓
Kharisma et al [13]	✓		
Aziz, Harlili, and Satya [33]	✓		
Lourensia, Setiawan, and Restiawan [15]		✓	
Nasution and Nusa [34]		✓	
Khoirunisa and Ramadhani [22]	✓		
Muzayyana Agustin [21]	✓		

Based on the analysis of some of the literature described in Figure 2 and Table 1, the Design Sprint and Design Thinking approaches have their advantages, similarities, and differences. The design thinking method is considered to be more directed towards designing and developing products based on innovative ideas, while the design sprint method refers to a rapid work cycle in the design process. However, there is currently no research that integrates the Design Thinking and Design Sprint methods comprehensively in one integrated approach. The majority of studies are more likely to compare the two methods or apply them separately. Therefore, this integration is considered new and innovative. In addition, the compatibility of the design sprint and design thinking methods is expected to result in faster design, lower budget utilization, and in accordance with user needs.

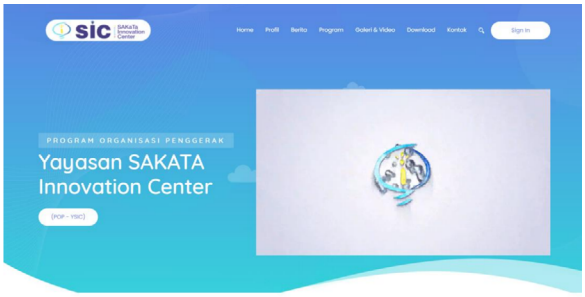
Based on the literature related to the method, there are several components of the integration of design thinking and design sprint methods that need to be developed in further research. One of the key components is the development of workflows that combine the creativity and innovation principles of design thinking with the speed of execution and solution focus of design sprints. In addition, it is worth considering the formation of a team consisting of members who have a deep understanding of the design thinking and sprint processes, as well as the ability to collaborate effectively.

It is also important to establish clear guidelines on how to efficiently integrate these two methods in the context of a particular project. This will help avoid potential conflicts between the different approaches and ensure that the advantages of each method can be fully utilized in achieving optimal design outcomes.

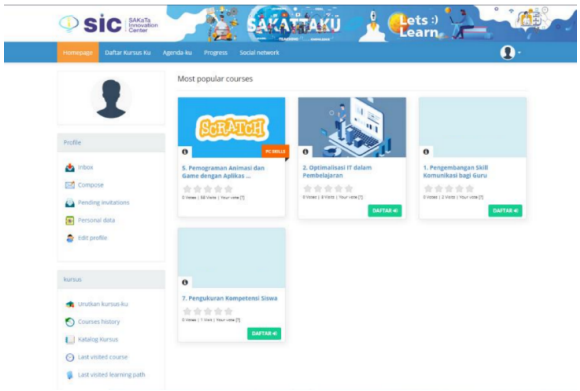
In this first research, the focus limit is related to explaining the results of the user interface and user experience modeling stages using the design thinking method. This includes the stages of empathize, define, ideate, prototype, and test.

a. Empathize

Figure 3 is the condition of the existing LMS display (As-Is) used by LMS users, namely principals and teachers participating in POP. At this stage, the empathy process is carried out, which is the stage of understanding the needs and emotions of users when using the LMS for the last 3 years. Based on the results of interviews with teachers and school principals spread across 5 (five) regions in West Java, the results of an empathy map were obtained, which showed a mapping of the problems experienced by users based on what was said, thought, done, and felt. The results of the empathy map show that respondents' responses to the Sakattaku LMS look less attractive and tend to be monotonous, the colors are less varied, the features are incomplete, and some still feel confused about accessing the LMS.



(a)



(b)

Figure 3. User Interface LMS As -Is: (a) Landing Page, (b) Dashboard LMS

Then at this stage, filling out the UEQ online questionnaire was also completed to assess user perceptions of the Sakattaku LMS. Completing the questionnaire comprising 26 question elements produces evaluation values grouped into six scales. The meaning of the values generated by each UEQ scale will then be adjusted based on the predicate in the excellent, good, above average, below average, and bad categories, as shown in Table 2.

Table 2. Benchmark Each Scale

	Attractiveness	Perspicuity	Efficiency	Dependability	Stimulation	Novelty
Excellent	≥ 1.75	≥ 1.9	≥ 1.78	≥ 1.65	≥ 1.55	≥ 1.4
good	≥ 1.52	≥ 1.56	≥ 1.47	≥ 1.48	≥ 1.31	≥ 1.05
	< 1.75	< 1.9	< 1.78	< 1.65	< 1.55	< 1.4
Above Average	≥ 1.17	≥ 1.08	≥ 0.98	≥ 1.14	≥ 0.99	≥ 0.71
	< 1.52	< 1.56	< 1.47	< 1.48	< 1.31	< 1.05
Below Average	≥ 0.7	≥ 0.64	≥ 0.54	≥ 0.78	≥ 0.5	≥ 0.3
	< 1.17	< 1.08	< 0.98	< 1.14	< 0.99	< 0.71
Bad	< 0.7	< 0.64	< 0.54	< 0.78	< 0.5	< 0.3

Table 3. Average Impressions and Scale Variants (*As-Is*)

UEQ Scales (Mean and Variance)		
Attractiveness	↑1,770	1.06
Perspicuity	↑1,567	1.02
Efficiency	↑1,722	1,13
Dependability	↑1,644	1.20
Stimulation	↑1,650	1.32
Novelty	↑1,311	1.46

The results of distributing questionnaires using the User Experience Questionnaire (UEQ) method to Sakattaku LMS users obtained 45 responses from participating POP teachers and principals. The UEQ results are shown in Table 3.

Table 3 shows the average value (mean) and variance (variance) for each UEQ scale: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. The average evaluation value of user impressions can be known if the average value < -0.8 is included in a negative evaluation (red arrow down). The average value is in the range of -0.8 and 0.8. It is included in a regular evaluation (yellow arrow to the side). The average value of> 0.8 is included in a positive evaluation (green arrow up). Figure 2 shows that the attractiveness scale produces an average value of 1.77. Then on the perspicuity scale, it produces an average value of 1.57. The efficiency scale gets an average value of 1.72. Furthermore, the dependability scale produces a value of 1.64. The stimulation scale produces a value of 1.65, and the novelty scale produces a value of 1.31.

These average results are then benchmarked, which is shown in Figure 4 that it is necessary to improve the user interface and user experience to get an increase in the value of the user experience, especially on the novelty scale, which has the lowest value and the perspicuity scale which has the above average predicate. Then, this average result also becomes a benchmark for further analysis to compare UEQ values after the UI and UX LMS Sakattaku redesign (To-Be).

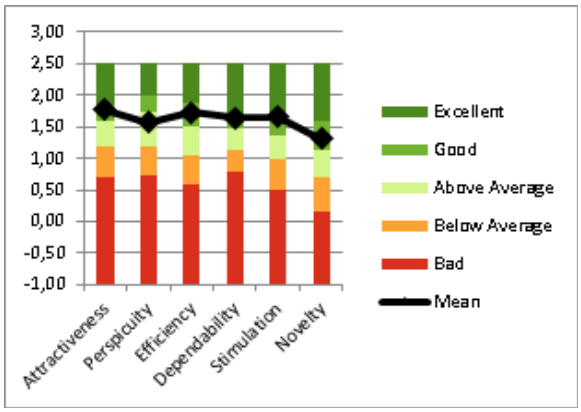


Figure 4. Chart *Benckmark* Sakattaku LMS Evaluation (*As-Is*)

b. Define

Based on the results of interviews, Sakattaku LMS users ranged in age from 24-60 years with a background of teachers and school principals. So, at this stage, user personas are identified with a target user of four people with different age ranges. In Figure 5 is one of the user personas in this study.

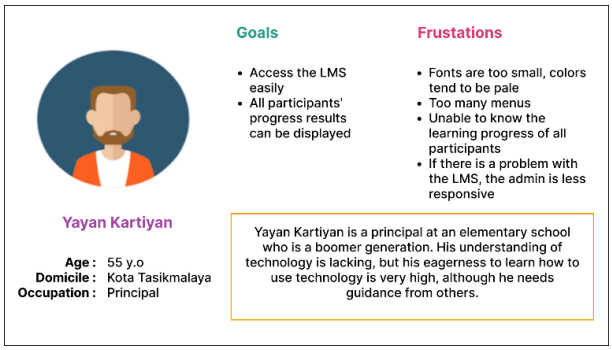


Figure 5. User Persona

Figure 5 is one of the user personas with the characteristics of a teacher aged 55 years who has a goal that users can use the LMS easily and the results of participant progress can be displayed. So what needs to be addressed is the functionality of the LMS and the participant progress feature.

Then from the identification results, the core problem (pain point) is obtained, which is shown in Table 4.

Table 4. Pain Points

	Pain Points
1	Respondents want to register easily and display Interesting.
2	Respondents want to log in via a Google Account.
3	Respondents had difficulty finding online class information.
4	Respondents had difficulty interacting to discuss with other participants.
5	Respondents want to know the progress of individual learning and all participants.
6	The task and exam features are incomplete.
7	Respondents want to access certificates after completing Learning.

c. Ideate

At this stage, the problem data obtained is then developed by generating as many ideas as possible through brainstorming. Then the results of the brainstorming produce a sitemap. The resulting sitemap is in the form of a menu structure and visual hierarchy of the Sakattaku LMS layout shown in Figure 6.

The sitemap or application framework in Figure 6 has main features and sub features. The main features consist of a home page, about page, program, others, and login to the LMS. The sub features on the home page consist of hero, partner, latest program, testimonial, and footer. The about page sub feature consists of YSIC description, YSIC vision and mission, and YSIC Team. The program page sub-features consist of a description of POP and the POP tutor team. Then on the others there is a blog. While the login feature directs to the LMS with sub features consisting of overview, list of my courses, discussion forums, and online classes.

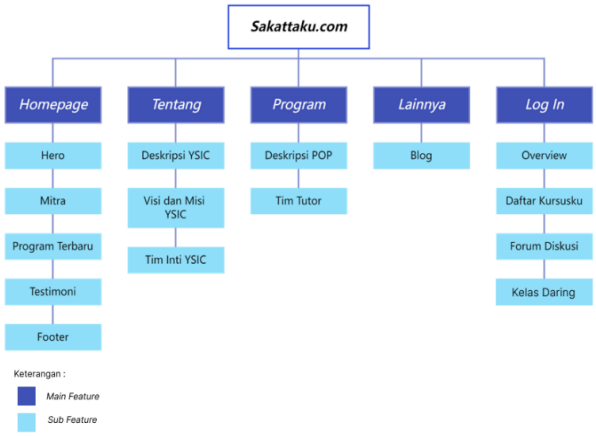
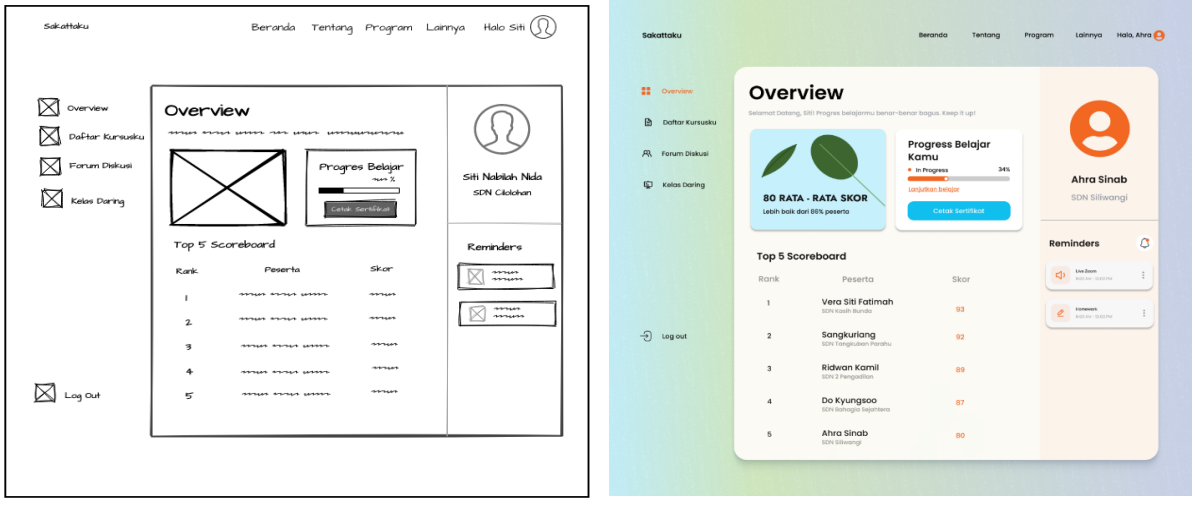


Figure 6. Sitemap

d. Prototype

After determining the ideas and concepts defined in the previous stage, the next step is to create an application wireframe consisting of low-fidelity and high-fidelity wireframes. In low-fidelity wireframes it is made in the form of an initial design framework that has added elements that will be displayed on the page but still uses placeholders for images and does not yet have specific typography and colors. Meanwhile, a high-fidelity wireframe is a final design containing pages with specific colors, typography, and more precise element shapes.



(a) (b)

Figure 7. *Wireframe:* (a) *Low-Fidelity* LMS Wireframe, (b) High-Fidelity LMS *Wireframe*

Figures 7 (a) and (b) are LMS overview pages or dashboards that summarize account user information, including learning achievement progress, account profiles and notifications, top 5 scoreboards, and certificate printing features. Other menus, including my course list, discussion forums, and online classes, can be accessed.

e. Test

This stage is an evaluation process to determine the level of use and the suitability of the design results to user needs. This process becomes a determining process for the end of the design stage, or an iterative process is carried out and repeats the previous stage. This evaluation process uses user testing and the User Experience Questionnaire (UEQ) after testing a prototype involving Sakattaku web users.

1) Evaluator

At this stage, user testing and a user experience questionnaire (UEQ) were carried out. User Testing involved 15 expert users consisting of Sakata internal parties, namely the web development team and POP facilitators. Meanwhile, external parties include lecturers and practitioners, who have qualified expertise in the fields of education and technology.

Then after user testing was carried out, then a user experience questionnaire (UEQ) was carried out which was aimed at LMS end users by 45 respondents. Respondents to the test were teachers and school principals who participated in POP consisting of 25 women and 20 men. Respondent qualifications in the UEQ test are participants who already have an LMS account and have used LMS at least once.

2) *User Testing*

In user testing, testing is carried out on expert users by simulating steps in the form of task scenarios made in Table 5.

Table 5. Scenario Task

Scenario Task (T)	Objective
T1	Create an Account
T2	Login LMS (Log in)
T3	Attend Online Class
T4	Access the Discussion Forum
T5	Learning Module
T6	Do Assignments and Exams
T7	Print Certificate

After creating a task scenario, user testing uses the Maze tools. In Maze testing, several aspects are measured: the usability breakdown and the heatmap screen. The usability breakdown shows the value of each usability, average time spent on each task (average duration), page click errors (misclick rate), percentage of task success, and bounce rate.

Table 6. User Testing Results

Scenario Task (T)	Total Testers	Misclick Rate	Avg Duration	Avg Success	Avg Bounced
T1	15	9.3%	15.4 s	73.4%	20.0%
T2	12	22.7%	7.6 s	91.7%	0.0%
T3	10	5.0%	8.7 s	50.0%	10.0%
T4	9	11.0%	4.1 s	77.8%	0.0%
T5	9	22.2%	19.6 s	77.8%	0.0%
T6	9	0.0%	39.5 s	11.1%	0.0%
T7	9	11.1%	6.7 s	100.0%	0.0%

Based on the scenario testing in Table 6, it was found that out of the 15 participating expert users, 9 of them successfully completed all the scenario tasks, while the other 6 were unable to complete all the given tasks. In addition, in the first task, there was a high bounce rate (20%), despite the low success rate (73.4%). This can be explained by several factors, including:

(a) Technical Errors: Technical errors caused by the device or browser can cause expert users to quit and abandon the test.

(b) Lack of Exploration: Some expert users may not have done enough exploration in the interface, so they could not complete the task properly.

(c) Testing Without Moderators: A major factor is the use of unmoderated user testing methods. In this method, testing is done without the direct supervision of a moderator. This can cause users to struggle or get confused when facing problems, which in turn can increase the bounce rate.

As a recommendation, in future testing, it may be worth considering using a moderated user testing method. This can help reduce the bounce rate and provide guidance to expert users when they encounter technical difficulties or specific tasks.

In addition, there is a heatmap screen to determine user behavior on each page. If it shows color and size, then it can be said that users often click on that page.

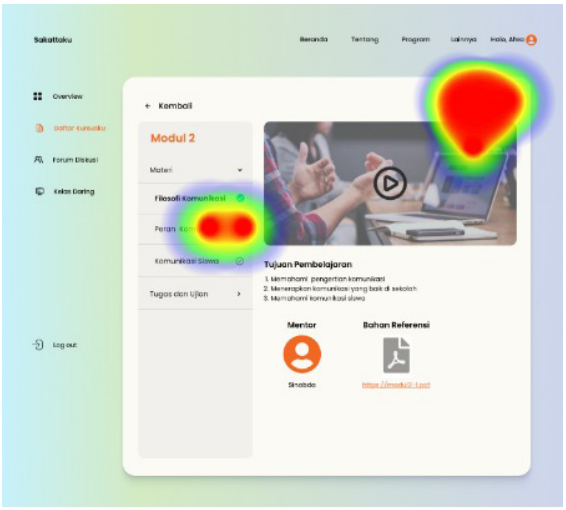


Figure 8. Heatmap of LMS Sakattaku

Figure 8 is one of many visualization maps (heatmaps) taken from one of the experts based on clicking or cursor tracking when the expert explores the application. In Figure 4 it is known that there are two red colors with large and small sizes indicating that user behavior when accessing the module page mostly chooses to click on the 'continue' button rather than clicking on one of the sub materials.

3) User Experience Questionnaire

From the results of the minimum sample obtained, statistical analysis is carried out using the user experience questionnaire (UEQ) based on the average value (mean) for each variable in the question item. The average measurement results for all variables are shown in Table 7.

Table 7. **Average Impression and Scale Variant (*To-Be*)**

UEQ Scales (Mean and Variance)		
Attractiveness	↑2,419	0.78
Perspicuity	↑2,033	0.94
Efficiency	↑2,333	0.80
Dependability	↑2,183	0.85
Stimulation	↑2,283	1.02
Novelty	↑2,067	1.16

Table 7 shows that scale Power pulls *attractiveness* produces the average value is 2.419. Then on the scale, *perspicuity* produces an average value is 2.033. *efficiency* scale gets an average value of 2.333. Furthermore, scale *dependability* produces a value of 2.183. Stimulation scale *stimulation* produces a value of 2.283, and scale *novelty* produces a value of 2.067.

4) Comparison of Processing Result Values Before (*As-Is*) and After Design (*To-Be)*

After the previous usability evaluation, significant differences were seen in all aspects, especially the novelty aspect, as shown in Figure 9.

The average difference for each UEQ scale in evaluating the Sakattaku LMS before the redesign (As-Is) with the Sakattaku LMS after the redesign (To-Be) has a significant difference with a reasonably high increase. The average increase in the evaluation value for each aspect of the UEQ is attached in Table 8.

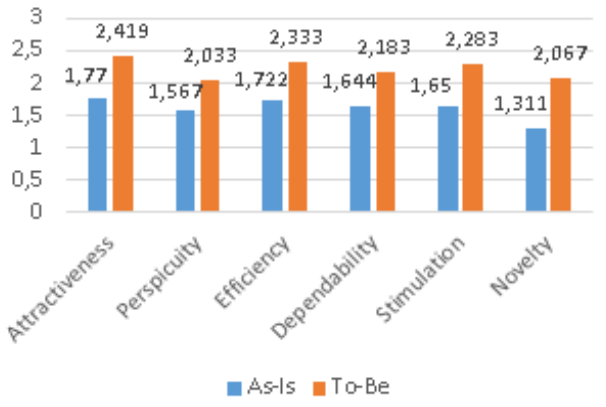


Figure 9. Chart Comparison of Sakattku LMS Evaluation Results Before (As-*Is*) and After Done UI/UX Design (To-*Be*)

Table 8. The average difference in the results of the Sakattaku LMS Evaluation

Scale	LMS Sakattaku (As-Is)	Predicate (As-Is)	LMS Sakattaku (To-Be)	Predicate (To-Be)	Difference
Attractiveness	1.77	good	2,419	*Excellent*	+0.649
Perspicuity	1,567	Above Average	2,033	*Excellent*	+0.466
Efficiency	1,722	good	2,333	*Excellent*	+0.611
Dependability	1,644	good	2,183	*Excellent*	+0.539
Stimulation	1.65	good	2,283	*Excellent*	+0.633
Novelty	1,311	good	2,067	*Excellent*	+0.756

Based on the comparison in Table 8, it can be seen that the design of the Sakattaku LMS after the redesign produced positive evaluation values for all aspects tested in the UEQ, especially in the perspicuity aspect, which previously had the lowest predicate, namely above average being excellent and the novelty aspect which previously had the highest score. The lowest average obtains the highest positive difference value of 0.756.

Overall, with the success obtained from user testing and the user experience questionnaire (UEQ), there is still a need to improve and develop a better design. The list of problems and recommendations for improvement is attached in Table 9.

Table 9. Recommendation Sakattaku LMS Repair

Scenario Task (T)	Objective	Problems	Recommendation Repair
T1	Create an Account	When registering there is no description of the school's origin, the flexibility of features and responsive LMS display for various devices need to be improved considering that many users use different types of devices.	Provide a column for school origin in account registration. Provision of LMS is not only in web form but can be intended for mobile or more portable devices
T2	Login LMS (Log in)	The overview page layout of the logout button is inconvenient.	The position of the logout button is moved parallel to the navigation bar.
T4	Access the Discussion Forum	The discussion forum page is limited to participants, even though a feature is also needed if users experience difficulties accessing the LMS.	The LMS has added a helpdesk feature to help users in case of difficulties.
T6	Do Assignments and Exams	On the assignment page cannot see the value of assignments and exams that have been done before.	The Assignments and Exams page Provides a history of assignments and exams with grades earned.
T7	Print Certificate	There is only One certificate participant as a participant.	Provides a list of certificates for every module as a form of achievement learning to be used as a portfolio.

4. Conclusion

Based on the research results through the literature review, it can be concluded that the Design Sprint and Design Thinking methods have their respective advantages. It was found that there has been no previous research that combines the Design Thinking and Design Sprint methods comprehensively. This opens up new opportunities in integrating these two methods to achieve much more optimal results. Furthermore, the implementation of the UI/UX redesign of Sakattaku LMS, which was developed through the application of Design Thinking, was successful and received a positive evaluation. Results from user testing showed that 9 out of 15 expert users successfully completed the given scenario tasks. In addition, the User Experience Questionnaire (UEQ), which was conducted before and after implementing the UI/UX design, showed positive feedback in all aspects of the assessment. In particular, the aspect of "perspective," which previously received the lowest score, has now achieved an excellent score, surpassing the average level. In addition, the aspect of "novelty," which initially had the lowest average score, showed the highest positive difference value of 0.756 or 75.6%. Thus, based on the results of user testing and UEQ, it can be concluded that the UI/UX design of the Sakattaku LMS is innovative and attractive to users.

The suggestion for further research is to conduct an in-depth study related to the integration of the Design Sprint and Design Thinking methods. In addition, research can be conducted that compares the effectiveness between the use of the Design Thinking method, Design Sprint, and a combination of both. This will help better understand which method is more appropriate for a particular situation or project, as well as how their integration can provide optimal results in a design context.

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