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RESEARCH ARTICLE

UI/UX Design Web-Based Learning Application Using Design Thinking Method

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Abstract: Humans are basically inseparable from education in carrying out life. The implementation and development of educational studies must also be adapted to the conditions and social situations that exist in the community. The main focus of Goal 4 on Sustainable Development Goals (SDGs) is to provide inclusive quality education or to ensure everyone has an equal opportunity to get good quality of education. In fact, Indonesia is still struggling in the quality of teacher issue. In the school year of 2019/2020, there are 8.98% unqualified teachers and headmasters on primary school level, 6.16% on junior high school level, 10.07% on senior high school level, and 10% on vocational high school level. Cumulatively, from primary school level to vocational high school level, there are 247.462 unqualified teachers and headmasters in Indonesia. This is a serious problem, considering that teachers are important component in determining the quality of education itself. In this research, UI/UX design prototype of learning web application named "IdeIn" was developed using Design Thinking method that consists of empathize, define, ideate, prototype, and test stages. The main focus of this learning web application is to provides an opportunity to the whole community to support education in Indonesia by conducting online classes.

Keywords: SDGs, Education, User Interface, User Experience, Design Thinking

1. Introduction

Sustainable Development Goals (SDGs) are a new development agreement that encourages sustainable development based on human rights and equality for social, economic, and environmental development. The SDGs are implemented with universal, integrated and inclusive principles to ensure that no one will be left behind or "No-one Left Behind" (Batmetan, 2018). Among the 17 goals in the SDGs, education is one of the sectors in it, which is stated in Goal 4. The main focus of Goal 4 is to ensure that all people have equal opportunities to get a quality education. Apart from the SDGs, the distribution of quality education itself is the focus of the Indonesian government, which is stated in Article 31 paragraph (1) of the 1945 Constitution, which reads "Every citizen has the right to education". But in fact there are still many gaps between education that occurs in urban and rural areas (Susanti et al., 2019).

Education is very important, talking about education of course we have to talk about teaching staff or teachers, because these two things are an inseparable unit, where teachers have a big role in determining the quality of the education unit itself (Adhitya et al., 2021). In Indonesia, one of the important qualifications to become a teacher at the elementary, junior high and high school levels is to have taken a Strata 1 education (Karnawan et al., 2020). The existence of this



qualification is certainly an effort to provide quality education for all students in Indonesia, because it cannot be denied that the educational background of teachers will greatly affects the quality of the teacher's teaching, so that teachers with good educational backgrounds are also likely to be able to provide good teaching as well. (GRIFFITH, 2017)

But in fact, Indonesia is still struggling to overcome the problem of teaching staff. In the 2019/2020 school year, at the elementary level 8.98% of teachers and principals did not meet the qualifications, at the junior high school level as many as 6.16%, at the high school level as many as 10.07% (Ministry of Education and Culture RI, 2020b), and 10% for SMK. Or in other words, from the SD-SMA and SMK levels, there are as many as 247,462 teachers and principals in Indonesia who have not passed the qualifications. This is a serious problem, considering that teachers are an important component in determining the quality of education itself.

Actually, there are now a lot of learning applications that can be found, of course, being the answer to the problems of quality education in Indonesia. Where the application provides online learning materials so that they can be easily accessed by all students in Indonesia. However, the learning platform is not fully the answer to this problem, because accessing the material on the application requires a large amount of money, which makes it impossible for all people to reach. In addition, there are also learning applications that provide learning materials for free so that anyone can access them at no cost. However, this learning platform also does not fully answer the problem, because there is no renewal of learning materials, which over time will be irrelevant to students, considering that the education curriculum in Indonesia is periodically updated.

Therefore, through this research, the authors developed a prototype of the UI/UX design of a web-based learning application called "IdeIn" which aims to provide equal opportunities for all students to access quality education. In this web application concept, there are 2 main users, namely students and mentors. Student users are all Indonesian students who are currently studying for SD, SMP, SMA or equivalent. Meanwhile, mentors are all Indonesian people with different backgrounds who are willing to share their knowledge with students. In this study, the design thinking method was used to develop a UI/UX design prototype, which consisted of 5 stages, namely empathize, define, ideate, prototype, and test. At the test stage, the author uses the System Usability Scale (SUS) method which focuses on the level of effectiveness, efficiency, and user satisfaction with the UI/UX design prototype

2. Literature Review

This study uses several references related to the object of discussion about the method of Design Thinking, based learning, and designing web-based learning application designs with additional QR Code and Email Gateway features.

(Razi et al., 2018) conducted research by designing a model UI/UX on the mobile application for handling cases of lost items and finding scattered items in public places with the application name "return". This application model is designed using the Design Thinking method based on the target user in order to facilitate the need for information exchange for the case. This application design model can act as an intermediary in facilitating the need for information exchange between the victim and the rescuer. The results obtained are a design model in the form of a native mobile application.

(Salleh et al., 2018) Web-based learning model by applying the QR Code as providing very positive benefits in its implementation in foreign language teaching in the context of universities in Indonesia. The survey results illustrate that the use of QR Code media is easy to apply in the process of learning foreign languages, provides a deep understanding, can influence students to be motivated in learning foreign languages and foster an autonomous learning environment

Research (Rahardja & Aini, Qurotul et al., 2018) discusses the Automated Email System (AEMS) as a notification media for learning outcomes assessment. PEN+ (Plus Assessment) is one of the evidences of the development of information systems in terms of education at



Raharja College, which was developed to provide information on learning outcomes to students quickly via email. The Automated Email System (AEMS) acts as a lecturer remainder for perform input values, as well as monitoring by the RPU and the Head of the Department. The results of this study are the Automated Emailing System on Assessment Plus (PEN+) helps in disseminating information in the form of student grades and minimizing the use of paper, the process of publishing learning values effectively, efficiently and in real time, easing the RPU part in disseminating information on student grades, and the existence of a system existing email notifications. In the PEN+ system, students get information about exam results faster via email which will be sent automatically after the lecturer inputs the value. In this study, there are similarities with previous research, namely similarities in the use of web-based QR Code, the use of Design Thinking methods in designing UI/UX designs and the use of email. notification. The differences in this study include the use of the firebase database as a data storage medium, the use of QR Code as voter data verification, and the use of Android technology to prototype implementation.

3. Research Method and Materials

The process in the design thinking method is an iterative process with several stages to identify and understand users, user problems and solutions that allow the author to define the problem from a certain point of view. So that later the design thinking method allows writers to generate as many ideas as possible and develop innovative solutions by democratizing the design through hypothetical testing and prototypes. The design thinking method can be divided into the following stages:

3.1. *Emphatize*

In this first stage, a deeper understanding of users is carried out to understand their challenges and needs. The purpose of this stage is to understand user needs, what motivates them, and what they do every day. At this stage knowledge of psychology will be very useful, this can be achieved by involving users such as by conducting interviews.

3.2. *Define*

This stage in the design thinking method aims to see the real problem to be solved. From this stage, the empathy stage is used to identify the problem, and find the potential that makes the user better by defining the problem based on the results of user research, without eliminating the human side of the product. Ideally, this stage will define the problem that will later become the focus in the development of a UI/UX design prototype.

3.3. *Idiate*

At this stage, the search for ideas will be carried out by paying attention to assumptions and creating innovative ideas. Through this stage, a list of ideas that can be responded to will be generated. These ideas will become high-fidelity mockups that will develop into prototypes.

3.4. *Prototype*

At this stage, the realization of the chosen idea will be carried out. Where the selected idea will be developed into a prototype. After the prototype is made, interactions will be added in it so that a real product is then produced in the form of a prototype.

3.5. *Test*

The prototype that has been created in the previous stage will be experimented with by users. From user experience in using prototypes, input will be obtained to make better products and make improvements to existing products.

All stages in the design thinking method can be described in figure 1.



Figure 1: Stages in the Design Thinking Method (Dam Friis & Siang Yu, 2020)

4. Results and Discussion

4.1. *Empathize*

Based on the empathize stage, it can be assumed that there is no platform that can provide free education with quality teachers in Indonesia. Furthermore, based on these problems, it can be assumed that the target users are students who are studying at the elementary, junior high, and high school levels. As evidence of the target user hypothesis, the authors conducted further research by conducting interviews, from the results of the research, the authors found that they still had difficulties in the learning process at school, so they needed to understand all the lessons themselves or take courses outside of school. However, not all students can take the course due to cost constraints.

4.2. *Define*

At this stage the author collects all ideas from interviews conducted with target users as support in creating a platform that can meet user expectations and turn it into a user persona. Based on the results of the interview, it was found that the core of the problem in the empathize stage is that students in Indonesia need a platform that can provide cheap courses to help them understand the lessons in school. So the solution is to present a platform that can provide free education with quality teachers who are able to facilitate their needs by utilizing internet technology.

4.3. *Ideate*

At this stage, the idea generated as a solution must be in accordance with the user's problem statement in the form of a user story. A user story is a description consisting of one or more sentences from the end user or system user that captures what the user does or needs to do as part of his job function. From these results, a low-fidelity wireframe or wireframe and mockup or high-fidelity wireframe were created using Figma show in figures 2-8.

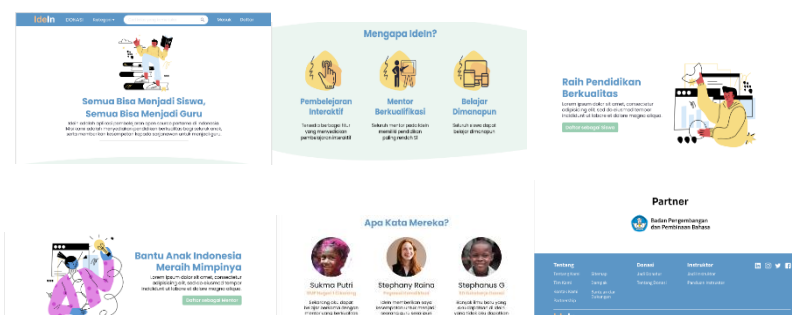


Figure 2: Landing Page

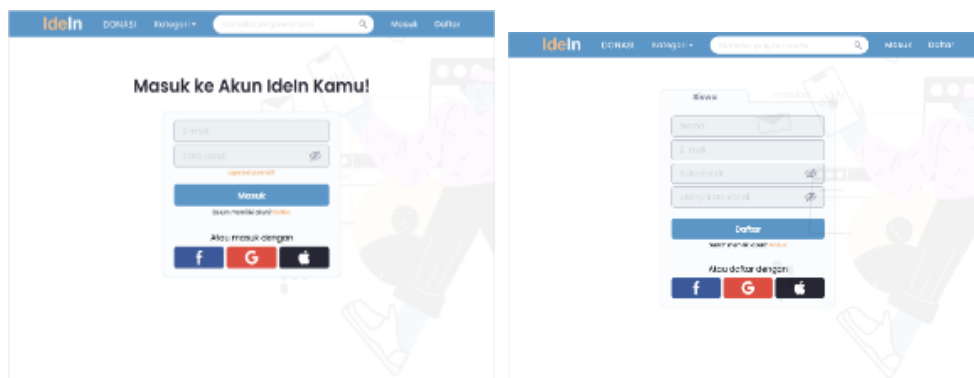


Figure 3: Login (left) & Register page (right)

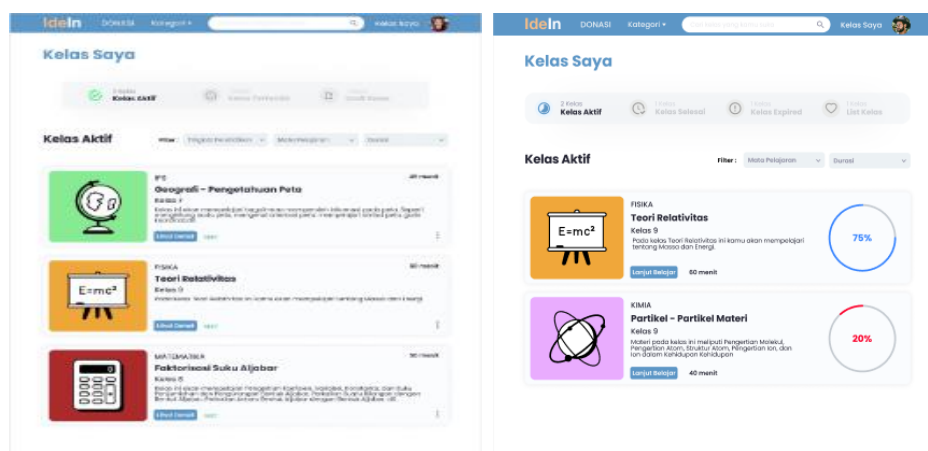


Figure 4: Class List page for Mentors (left) & Class List for students (right)

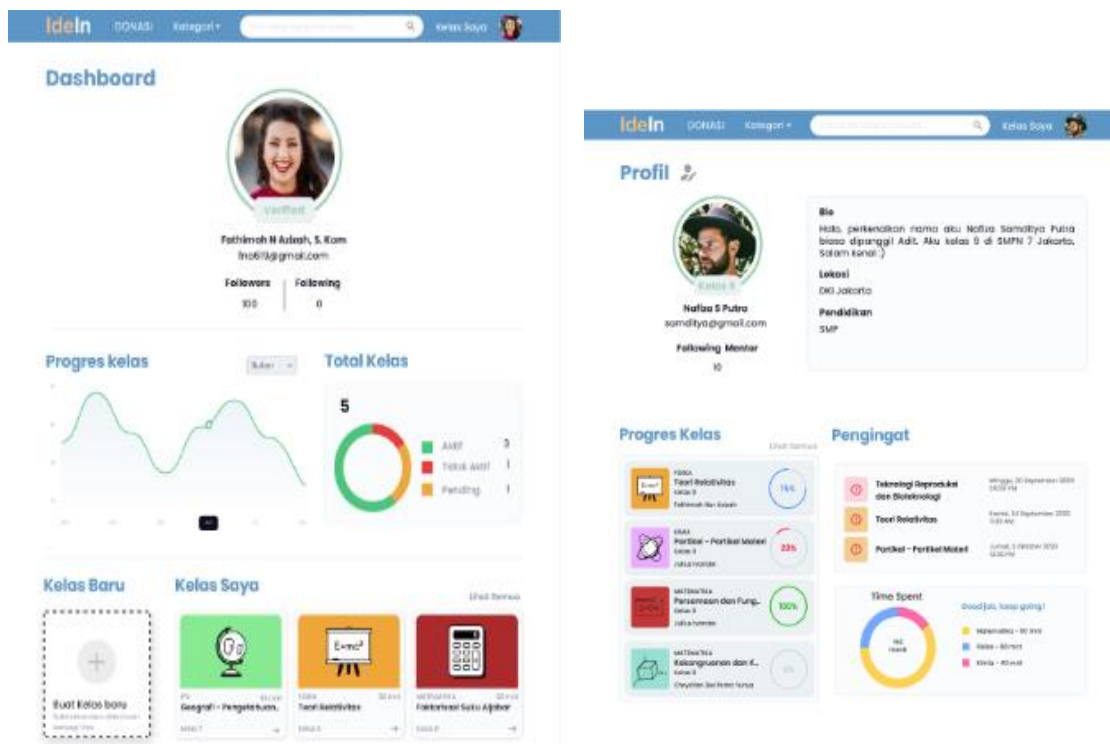


Figure 5: Mentor Dashboard (left) & Student Dashboard (right)



Figure 6: Homepage on Students

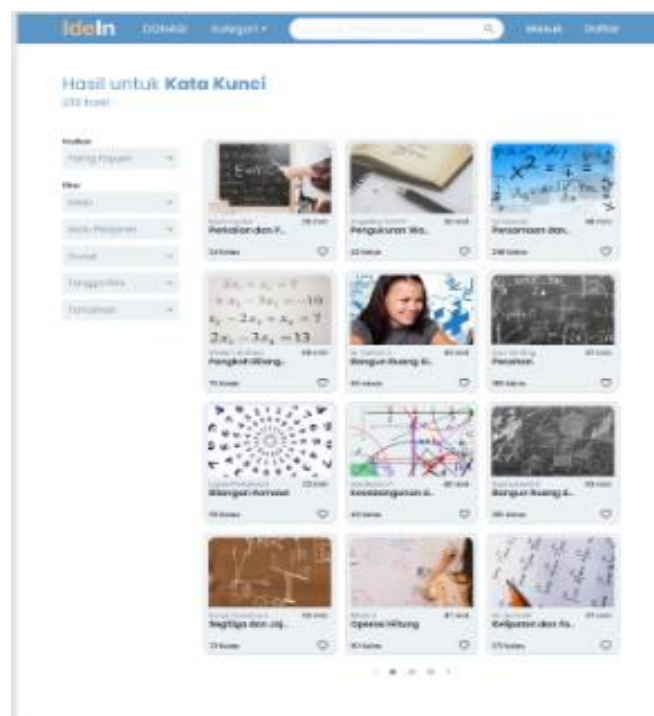


Figure 7: Page Search page



Figure 8: Class Details Page

4.4. Prototype

At this prototype stage, the researcher created a clickable mockup with the help of the same application, Figma. After each page is linked, researchers can generate a user flow that describes the flow of the web application. The clickable mockup from the prototype stage can now be tested for the testing stage.

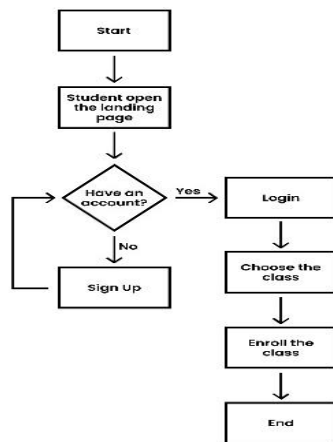


Figure 9: Student User Flow

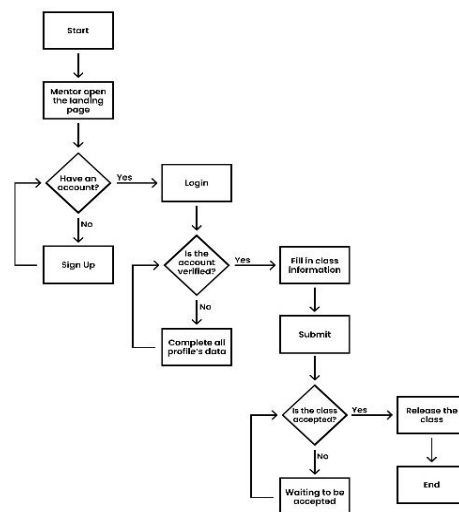


Figure 10: User Flow Mentor

The following is an explanation of the user flow, which is broken down into login and register, register and create classes.

a. Login and Register

To access the features of the web application, login and registration are required for each user. Each user will initially be directed to a landing page as shown in Figure 2. There are 2 options for users to login or sign up, first through the navigation bar, and second through the landing page. Users will be directed to the login or register page as shown in Figure 3.

b. Class Enroll

Class Enroll is a feature for students to study any class they want. After students log in, students will be directed to the homepage as shown in Figure 6. The homepage will display all recommended classes based on the popularity and interests of students. Students can also find

any class using the search feature. After the student selects the preferred class, the student will be directed to the class details page. Finally, students register a class by pressing the “take a class” button.

c. *Create a Class*

Just like registering for a class, creating a class is a feature for mentors to share their knowledge with students. Mentors need to verify and validate their accounts to continue the process. The mentor then creates a class by pressing the “add” button available on the mentor dashboard as shown in figure 5. The mentor will be directed to create a class page as shown in figure 9 and fill out all forms and press the “publish” button. Classes will be posted if they have been verified by the course team provided by “IdeIn”.

d. *Test*

At this stage the author conducts usability testing on the UI/UX design prototype. The user testing method used at this stage is the System Usability Scale (SUS) method. This usability testing method is in the form of a questionnaire consisting of 10 positive and negative user statements. This questionnaire uses a Likert scale as a data measurement with a range of 1-5. Where 1 means strongly disagree and 5 means strongly agree.

Table 1: User Statement

No.	Statement
1	I think I will use this app periodically
2	I feel this app is so complicated that it needs to be simplified
3	I think this app is easy to use
4	I think I need the help of a technician to be able to use this app
5	I find the various functions of this application are well integrated
6	I think there are a lot of inconsistent things in this app
7	I think most people can learn this app quickly
8	I find this app very complicated to use
9	I feel confident to use this application well
10	I need to learn a lot of things first before using this app

Respondents involved in this questionnaire consisted of 5 people with student backgrounds and the general public who could represent the end users of the “IdeIn” web application. After all respondents have filled out the questionnaire, the next step is to calculate the feedback that has been given by the respondents. Where is the calculation regarding the following rules:

- Points for each odd-numbered user statement are calculated using the formula $x - 1$ (x is the number given by the respondent for each user statement).
- Points in each even-numbered user statement are calculated by the formula $5 - x$.
- The sub-score is the accumulated points of each user statement multiplied by 2.5.
- The SUS score is the average of the accumulated sub-scores.

Table 2 shows the results of a questionnaire involving 5 respondents (denoted as R) and consisting of 10 user statements (denoted as P).

Table 3 shows the results of calculating the SUS score for the UI/UX design prototype from the “IdeIn” web application.

Table 2: Questionnaire Results

Resp.	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	P 9	P10	Point (ΣS)
R1	3	3	4	4	4	4	3	4	4	4	37
R2	4	4	4	4	4	4	4	4	4	4	40
R3	3	3	4	3	4	2	3	3	4	2	31
R4	3	4	4	3	4	4	4	3	3	4	36
R5	4	4	3	3	4	4	3	3	4	4	36

Table 3: Calculation of SUS Score

Responden	Poin	Sub-Skor (Poin * 2.5)
R1	37 * 2.5	92.5
R2	40 * 2.5	100
R3	31 * 2.5	77.5
R4	36 * 2.5	90
R5	36 * 2.5	90
Skor SUS		90

The SUS scores that have been obtained are interpreted into the categories shown in Figure 11.

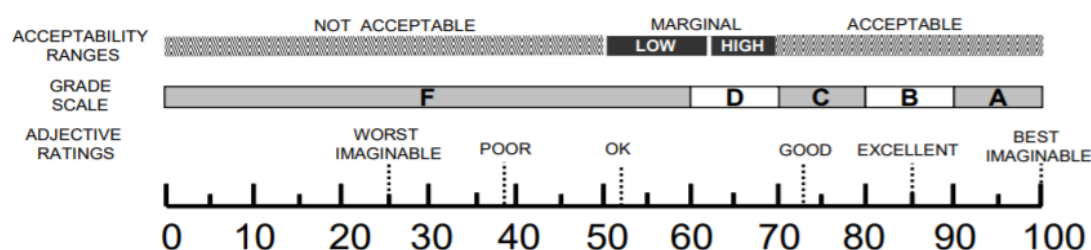


Figure 11: SUS Score Interpretation (Bangor et al., 2009)

Through the results of the calculations that have been carried out and the interpretation of the SUS score shown in Figure 11. So with a SUS score of 90, the UI/UX design prototype of the “IdeIn” web application is in the very good category, which means it has a high level of effectiveness, efficiency, and good user satisfaction.

5. Conclusion

Based on the research results, the research on the design of the “IdeIn” web application using the design thinking method aims to create a design that suits the needs of each user so that they can achieve Goal 4 of the Sustainable Development Goals (SDGs). Through usability testing using the SUS method, the UI/UX design prototype of the “IdeIn” web application resulted in a SUS score of 90 which means it has a good level of effectiveness, efficiency, and user satisfaction.

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