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# DESIGNING UI/UX FOR ELEMENTARY SCHOOL E-LEARNING USING DESIGN THINKING METHOD

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**Abstract:** Advances in technology and the internet have an impact on various daily activities, including the teaching and learning process. E-learning facilitates flexible learning without being constrained by space and time constraints. With e-learning, subject matter can be delivered consistently and more standardly than conventional learning which depends on the conditions of the teacher or instructor. One school in Banjarnegara Regency faced problems with students who had difficulty in learning, especially English. The learning media owned is limited to package books only. Therefore, schools need to have media that can support the learning process to be more optimal. This study aims to design and test UI/UX e-learning designs that suit the needs of the school using the design thinking method. This UI/UX design is expected to be an effective solution to overcome the limitations of learning media and improve the quality of student learning. Before the UI/UX design is implemented into the system, this study also conducts testing of the UI/UX design to assess its feasibility. Testing using the SUS (System Usability Scale) method resulted in a value of 82 with grade B, so it can be concluded that the design developed in this study is feasible to be deployed into the system and further developed.

**Keywords:** E-learning; design thinking; system usability scale; UI/UX

**Abstrak:** Kemajuan teknologi dan internet berdampak pada berbagai aktivitas sehari-hari, termasuk proses belajar-mengajar. E-learning memfasilitasi pembelajaran yang fleksibel tanpa terkendala oleh batasan ruang dan waktu. Dengan e-learning, materi pelajaran dapat disampaikan secara konsisten dan lebih standar dibandingkan pembelajaran konvensional yang bergantung pada kondisi guru atau instruktur. Salah satu sekolah di Kabupaten Banjarnegara menghadapi permasalahan dengan peserta didik yang kesulitan dalam pembelajaran, khususnya bahasa Inggris. Media pembelajaran yang dimiliki terbatas hanya pada buku paket saja. Oleh karena itu, sekolah perlu memiliki media yang dapat menunjang proses pembelajaran agar lebih optimal. Penelitian ini bertujuan untuk merancang dan menguji desain UI/UX e-learning yang sesuai dengan kebutuhan sekolah tersebut menggunakan metode design thinking. Desain UI/UX ini diharapkan dapat menjadi solusi efektif untuk mengatasi keterbatasan media pembelajaran dan meningkatkan kualitas belajar siswa. Sebelum desain UI/UX diterapkan ke dalam sistem, penelitian ini juga melakukan pengujian terhadap desain UI/UX untuk menilai kelayakannya. Pengujian menggunakan metode SUS (System Usability Scale) menghasilkan nilai 82 dengan grade B, sehingga dapat disimpulkan bahwa desain yang dikembangkan dalam penelitian ini layak untuk dideploy ke dalam sistem dan dikembangkan lebih lanjut.

**Kata kunci:** E-learning; design thinking; system usability scale; UI/UX

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## INTRODUCTION

Advances in technology and the internet have an impact on various daily activities, including the teaching and learning process. Technology and the internet allow the application of e-learn ing methods or electronic learning in education. E-learning facilitates flexible learning without being constrained by space and time constraints. With e-learning, subject matter can be delivered consistently and more standardly than conventional learning which depends on the conditions of the teacher or instructor.

One of the subjects that must be studied is English. English is one of the important international languages and has a crucial role in the current era of globalization. The ability to speak Engl ish provides significant advantages in a variety of fields, including education, career, and cross-cultural communica tion. Children who have good English skills have wider opportunities to develop themselves and interact with the outside world. But the interest in learning English is so low that it makes it difficult to learn English.

Many teachers complain because their students are difficult to teach the material so that media is needed that can support teaching and learning activities, one of which is e-learning. In this study, we will create a UI / UX design that focuses on the needs of elementary school students with the design thinking method. For the school that we make as a research site, one of the elementary schools located in Banjarnegara Regency, Central Java Province. As for some studies used as literature review material First, made ui/ux e-learning which was made because the learning system was carried out online. Using user centered system method and tested with System Usability Scale (SUS). Based on the evaluation, it was found that the comp letion rate was 84%, Overall Relative Efficiency was 91%, and SUS was 75.38 [1] .

Second research Made a proto type of the Amikom Center application designed by analyzing user experience using design thinking methods to assess the effectiveness and efficiency of its use. Design testing results showed a value of 88.6% in effectiveness and efficiency [2].

Third research designed e-learning that teachers and students use to learn technology simultaneously. Creating an attractive and attention-grabbing user interface (UI) and user experience (UX) [3].

Fourth research made a UI/UX design for an e-learning website prototy pe. Using the Design Thinking Approach, tested with 9 respondents, obtained a score of 83.33 on SUS [4]. further research Obtained a design used for e-learning but did not test in the design [5]. Further research Said that e learning is a solution to improve learning efficiency. This research uses design thinking method to design UI/UX LMS applica tion [6].

As for other research Said that e-learning is a solution in education. This research only designs UI/UX on LMS applications for user effectiveness and satisfaction [7]. by other research research developed UI/UX design skills and made application prototypes [8]. Designed UI/UX which was tested using SEQ and SUS. The result is a prototype mentor on demand feature with an SEQ score of 96% and an average SUS of 80, Acceptable Excellent category [9].

further research made a mobile application UI with the design thinking method. The result is 10 low fidelity display designs upgraded to high fidelity

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for better user experience [10].

This research is different from the previous average research that has been carried out e-learning contains many subjects so that it is difficult to under stand and e-learning users in general are colleges or high schools.

This study aims to design and test UI/UX e-learning designs that suit the needs of the school using the design thinking method. This design is focused on one subject, namely English, and is aimed at primary school students with the aim of facilitating their learning process. In addition, this study ensures that UI/UX designs are made based on the needs of users, namely students and teachers, and are equipped with relevant features and questions that support learning.

The uniqueness of this research lies in the design testing step before the implementation stage. Many other studies do not test designs that have been made, whereas in this study, UI/UX designs are tested first using the SUS (System Usability Scale) method to assess their feasibility. The test results show a grade of 82 with a grade of B, which indicates that the design is feasible to deploy into the system and be further developed. Thus, this research not only produces designs that suit the needs of users but also ensures that the design has a high level of usability before implementation.

## METHOD

Design Thinking is a design approach that focuses on the human need to solve problems and create innovations [11]. This method involves several stages, ranging from gathering informa tion about users, making an underst anding of their needs, developing crea tive solutions, creating representations of solutions, and testing the results of representations to obtain feedback [12]. In Image 1 is the stage of design thinking.


Image 1. Stages of Design Thinking

### EMPHATIZE

This stage focuses on an in-depth understanding of the users through observations and interviews. This stage involves an in-depth understanding of the end users, including students, teachers and administrators. Then for the respo ndent data used is five people because this research contains making the display design only so there is no need to use many respondents. This has been adju sted based on the testing method, namely the System Usability Scale where respon dents for research are at least five people.

### DEFINE

After understanding the user, this stage involves formulating the problem to be solved. The team outlines the information gained from the empathy stage to identify the core of the problem to be solved. The goal is to formulate a shared understanding of what must be achieved and direct design efforts in the right direction [13], This includes determining the main features that must be present, the specific needs of students and teachers, and the learning objectives to be achieved [14].

### IDEATE

This stage encourages creativity and out-of-the-box thinking. Teams collaboratively generate as many ideas or

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potential solutions as possible to solve predetermined problems [15]. The idea tion stage in LMS design involves crea ting various ideas or concepts to improve the user experience.

**PROTOTYPE**

After gathering ideas, the next step is to create a rough representation of the solutions. The prototype can be a sketch, physical model, or digital mock-up that allows the user to interact with the proposed concept [16]. The goal is to get early feedback and iteratively refine the design based on user response. This prototype helps to visualize and test the design concept before full implemen tation [17].

**TEST**

The final stage involves testing the prototype with the end user to get valuable feedback. This test aims to identify the advantages and disadva ntages of the proposed solution and improve it based on user response. In this study design testing using SUS (System Usability Scale. System Usability Scale (SUS) is an assessment method used to measure the level of user satisfaction with a product or computer-based system [18]. This method is often used in user experience (UX) evaluation to evaluate how easy the product or system is to use by users [19]. SUS consists of a series of questions designed to assess different aspects of usability, such as ease of use, clarity, and overall user satisfaction. The results of the SUS assessment provide a score that can be interpreted to determine the level of satisfaction and usability of a product or system [20].

**RESULT AND DISCUSSION**
**EMPHATIZE**

This stage obtained the results of interviews that students had difficulty in understanding the subject matter, espe cially English because it was a foreign language according to them. Students also want tools for learning media to facilitate the teaching and learning process and the material can be unde rstood quickly.

**DEFINE**

At this define stage, a process of identifying the problem is carried out by making problem points and how-might-we

How-might-we is a method of turning problems into questions, thus encouraging the creation of innovative ideas or solutions to overcome the challenges faced. Image 2 shows the problem points, while Image 3 is the result of how-might-we.


Image 2. Pain Points Problem


Image 3. Results How-might-we

**WIREFFRAME**

In the early stages of design to show the location of key elements such as text, images, buttons, and other

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content areas without visual design details or actual content. For Image 7 is a wireframe from e-learning.

Image 4. Wireframe E-Learning

**MOCKUP**

Mockups help to visualize how the product will look and behave before actual development begins, allowing to evaluate the design thoroughly before implementation. In Image 8 is a mockup that has been made and adjusted to the needs of the user.

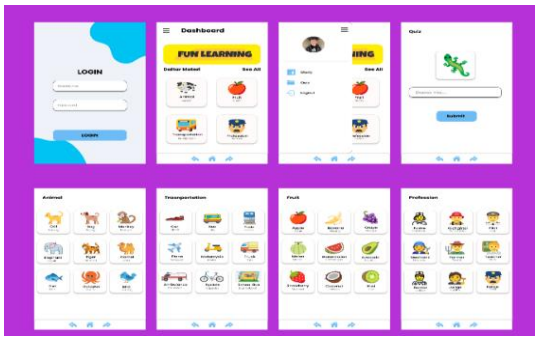

Image 5. Mockup Aplikasi E-Learning

For mock up results based on user needs, UI / UX design is equipped with a translate that can make it easier for students to better understand what is learned, in addition to translation, an overview of the object is also given. The design is made as simple and attractive as possible, hopefully users will not get bored quickly when using this application later.

**TEST**

In the testing phase utilizing the Usability testing methodology, a group of five respondents is engaged for each scenario, with the primary objective being the acquisition of robust and credible results [23].

For a comprehensive understandi ng of the results, readers are encouraged to refer to the elaborated insights provided in tables 4 and 5. Furthermore, the detailed questionnaire items presen ted are available for review in table 3.

Table 1. SUS Questionnaire Questions

| No | Questions |
|---|---|
| 1 | I'm thinking of using this system again? |
| 2 | I feel that this system is complicated to use? |
| 3 | I feel that this system is easy to use? |
| 4 | Do I need help from someone else or a technician in using this system? |
| 5 | I think these system features are working properly? |
| 6 | I feel that there are a lot of things that are inconsistent (mismatched on this system)? |
| 7 | I feel that others will understand how to use this system quickly? |
| 8 | I find this system confusing? |
| 9 | I feel that there is no obstacle in using this system? |
| 10 | I need to familiarize myself first before using this system? |

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Table 2. Score respondent results

| NO | Respondent Score | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 |
| 1 | 5 | 5 | 3 | 4 | 4 | 5 | 3 | 5 | 4 | 5 |
| 2 | 4 | 5 | 4 | 5 | 5 | 3 | 4 | 5 | 4 | 4 |
| 3 | 3 | 4 | 2 | 4 | 5 | 5 | 4 | 3 | 4 | 4 |
| 4 | 4 | 4 | 5 | 4 | 3 | 5 | 5 | 4 | 5 | 4 |
| 5 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 3 | 5 |

Table 3. SUS Calculation

| NO | Score SUS | | | | | | | | | | Sum | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | | |
| 1 | 4 | 4 | 2 | 3 | 3 | 4 | 2 | 4 | 3 | 4 | 33 | 82 |
| 2 | 3 | 4 | 3 | 4 | 4 | 2 | 3 | 4 | 3 | 3 | 33 | 82 |
| 3 | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 2 | 3 | 3 | 30 | 75 |
| 4 | 3 | 3 | 4 | 3 | 3 | 4 | 4 | 3 | 4 | 3 | 34 | 85 |
| 5 | 4 | 4 | 4 | 3 | 4 | 4 | 3 | 3 | 2 | 4 | 35 | 87 |
| Average score | | | | | | | | | | | | 82 |
| Description / Grade | | | | | | | | | | | | Excellent / B |

In table 3 is the pure result of the distribution of the questionnaire, the SUS calculation is then carried out by subtracting 1 from the original score, for example the questionnaire score is 5 then if it is included in the SUS calculation to 4. Then after calculating the SUS scores from Q1 – Q10 are added and multiplied with 2.5. To get the average score, the total is summed all then divided according to the number of respondents. In this study, grade B was obtained based on the measuring aspects of the SUS (System Usability Scale) method contained in Image 9. In Image 9 there are several aspects from the smallest grade to the largest grade.

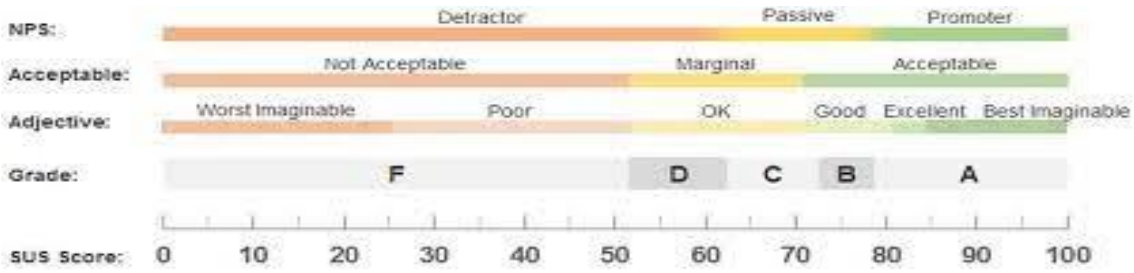


Image 6. Measuring aspect of SUS

## CONCLUSION

There are several conclusions that can be drawn. First, the UI / UX design of E-learning applications that can be used for elementary schools in this case is focused on making UI / UX in one of the schools in Banjarnegara Regency, namely Madrasah Ibtidaiyah Al Manshurah. Second, the UI/UX E-learning design process for English

subjects uses the design thinking method, which involves creating user personas, empathy maps, how possible we are, and prototyping with low-fidelity and high-fidelity stages. Then testing the results of measuring the level of user satisfaction obtained a score of 82, which showed that the System Usability Scale (SUS) score was above average, with a rating of "Acceptable" and received the title of "Excellent" in the category of "Adjective Assessment". With the successful implementation of UI/UX E-learning design, this research makes an important contribution in advancing current knowledge especially in the development of educational applications.

The developed design can serve as a model for developing similar applications in other schools, thus providing better access and more effective learning experiences for students. The use of design thinking methods in designing UI / UX can also be a guide for researchers and design practitioners to improve user experience in an educational context. Thus, this research work proves that a design approach focused on user needs is able to have a positive impact on the development of educational technology.

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