

Design of Digital Library Prototype Using The Design Thinking Method

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Abstract

According to UNESCO (United Nations Educational, Scientific and Cultural Organization), Indonesian people's reading literacy interest has a literacy percentage of 0.001%, which means that out of 1.000 people, only one person likes to read. The digital reading movement attracts people's reading interest, especially with a digital library. Lahat District Library Service wants to re-establish a digital library that has been removed. By paying attention to usability and user experience, a digital library prototype design is carried out to develop the application to get user experience results with good success and satisfaction. The method used is Design Thinking, which aims to design usable and valuable solutions by focusing on user needs. The results of the usability testing analysis of the digital library prototype created using the User Experience Questionnaire (UEQ) get "Excellent" in six aspect categories: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty.

Keywords: Design Thinking; Literacy; Digital library; User Experience Questionnaire (UEQ)

Abstrak

Minat literasi baca masyarakat Indonesia menurut UNESCO (United Nations Educational, Scientific and Cultural Organization) memiliki persentase literasi 0,001% yang memiliki arti bahwa dari 1.000 orang hanya ada 1 orang yang gemar membaca. Gerakan membaca secara digital, khususnya dengan adanya perpustakaan digital dinilai menarik minat baca masyarakat. Dinas Perpustakaan Kabupaten Lahat berkeinginan diadakannya kembali perpustakaan digital yang mana sebelumnya telah ditiadakan. Dengan memperhatikan aspek kegunaan dan pengalaman pengguna, maka dilakukan perancangan prototype perpustakaan digital dengan tujuan pada pengembangan aplikasi tersebut akan didapatkan hasil user experience dengan tingkat keberhasilan dan tingkat kepuasan yang baik. Metode yang digunakan ialah Design Thinking yang bertujuan untuk membuat desain solusi yang dapat digunakan dan berguna dengan berfokus pada kebutuhan pengguna. Hasil dari analisis usability testing dari prototype perpustakaan digital yang telah dibuat menggunakan User Experience Questionnaire (UEQ) mendapatkan kategori "Excellent" pada keenam aspek yaitu attractiveness, perspicuity, efficiency, dependability, stimulation dan novelty.

Kata Kunci: Design Thinking, Literasi, Perpustakaan Digital, User Experience Questionnaire (UEQ)

INTRODUCTION

One way to increase efforts to spread information knowledge is to increase literacy in the community. Literacy is a person's ability to access knowledge through reading to obtain information from various sources (Ainiyah, 2017). The existence of good literacy is the right thing to reduce the spread of bad news in the community.

UNESCO (United Nations Educational, Scientific and Cultural Organization) in 2016 stated that the reading literacy interest of the Indonesian people had a reading interest percentage of 0.001%

(Kominfo, 2022). It means that out of 1,000 people, only one likes to read.

One of the places that serve as a source of information that plays an essential role in creating a literate society is libraries (Darmayanti, 2016). The library is an information center that provides books and other references to deepen knowledge. Therefore, the library has a function to create a literate society. The Lahat District Library Service is one of the libraries that has been actively operating until now.

Based on the author's interview at the Lahat District Library Service in January 2022, the Head of the Library Development and Reading

Passion Cultivation Division said that the interest and attractiveness of reading in the Lahat District are currently shallow. In the interview, it was also said that the Lahat District Library had a mobile-based digital library application in 2017, which has now stopped procuring due to cost problems and the interest of application users, who were still few at that time. In this case, there is great enthusiasm for re-establishing the digital library by paying attention to usability and user experience to increase interest in the surrounding community. User experience results in success and satisfaction in developing applications.

By paying attention to the usability aspect, namely how easy and fun the features are to use. According to Nielsen, usability (utility) is about what features the user needs to become practical or valuable (Nurhadryani et al., 2013). Researchers are interested in researching and making the prototype of the digital library. Where the design of a prototype based on the User Interface (UI) and User Experience (UX) can affect the functionality and implementation of the system according to what users will need later (Rusanty et al., 2019). By prioritizing the user as the research user, the Design Thinking method is the author's choice for this problem.

According to Jakob Brown (in Tri et al., 2020), design thinking is a creative problem-solving method that involves the user's perspective as the primary consideration of problem-solving. Design Thinking has five stages in it, namely: empathize, define, ideate, prototype, and test (Wolniak, 2017).

User Experience (UX) refers to the overall experience related to the perception (emotion and thought), reaction, and behavior that the user feels and thinks through his or her direct or indirect use of a system, product, content, or service. At the same time, the User Interface (UI) refers to a system and a user interacting with each other through commands or techniques to operate the system, input data, and use the contents (Joo, 2017).

Research according to Wei (in Rakha, 2022), asma rakha related to digital libraries explain that features provided by digital libraries such as e-books, digital lending, digital readers or memberships, personal libraries (for example, book borrowing and latest book updates).

Previous research was conducted by (Fajri et al., 2021) to design a paid online survey application user experience for mobile-based students to produce a high-fidelity prototype using the Design Thinking method. The Design Thinking method is considered to be successfully applied in the process, namely placing user-centered concentration on creating solutions and meeting

user needs. Problems and objectives and the use of research written in a narrative in paragraphs do not need to be given a particular subheading. Likewise, an operational definition, if deemed necessary, is also a written narrative.

Further research conducted by (Wijaya et al., 2019), which resulted in user experience design in school catering applications using the human-centered design method, produced a high-fidelity prototype with the evaluation results of the User Experience Questionnaire (UEQ) getting a positive value with an excellent category in every aspect.

RESEARCH METHODS

Types of research

The type of research conducted is descriptive quantitative. This research raises the topic of current phenomena or problems by seeking information by collecting data related to the subject in the form of numbers and interpreting the data according to the objectives to be achieved, planning how to approach them, and collecting various kinds of data as material for making reports (Jayusman & Shavab, 2020).

Time and Place of Research

The research was conducted in the Lahat Regency, namely Dinas Perpustakaan Kabupaten Lahat, with a research time of about eight months (November 2021 to June 2022).

Research Target / Subject

Research subjects are informants, which means people in the research setting who are used to providing information about the situation and condition of the research setting, according to Moleong (Fahlevi & Dewi, 2019). The subjects of this study were the people of the Lahat Regency and employees of the Lahat District Library Service.

Data, Instruments, and Data Collection Techniques

Techniques and data collection instruments in solving a problem in the study were carried out in two ways. The first is research interviews conducted to understand and get the problems experienced by users directly, and interviews were conducted with several employees of the Lahat District Library Service and the Lahat Regency community designated as research respondents. Then the questionnaire was given at the testing step using the User Experience Questionnaire (UEQ).

Application of Design Thinking for Prototype Development Method



Source: Coursera.org

Figure 1. Design Thinking Workflow

Figure 1 shows the stages of the design thinking method. The following are the steps of this method.

1. Empathizing is a stage in interpreting empathy from the problem to be solved. At this stage, it can be done by conducting interviews to obtain user needs. Then make a User Persona based on the results of the interviews that have been carried out. The researcher made the User Persona using the Figma application at this stage.
2. Define that is to define or describe user needs from problems that have been obtained previously. This stage is carried out by making a Point Of View (POV) and performing the Benchmarking method using Competitive Analysis. At this stage, the researcher made a Point of View (POV) and Competitive Analysis using the Figma application.
3. Ideate was at this stage, ideas and solutions from problems and user needs are developed using Affinity Diagrams. The researcher made the Affinity Diagram using the Figma application at this stage.
4. Prototype, namely the step of producing a prototype of the ideas and solutions that have been previously defined. Prototypes are made using the Figma application, up to high-fidelity prototypes. At this stage, the prototypes were made using by Figma application.
5. The test is the final stage in the design thinking method: testing and evaluating the intended user. At the test stage, users are given tasks to do about the digital library prototype that has been made using the Maze application, and then users are asked to fill out the User Experience Questionnaire (UEQ), a questionnaire used by users to measure user experience. The UEQ contains 26 items grouped into six scales: Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty (Schrepp et al., 2017b). According to Nielsen (Azmi et al., 2019), to conduct usability research, it is enough to do with five (5) respondents because usability testing with five people is enough to find almost all usability problems.

Application Prototype Testing Method Using User Experience Questionnaire (UEQ)

UEQ is a questionnaire that provides a quick and reliable tool assessment to measure the user experience of interactive products. It allows users to express their feelings and experiences when using the product being tested very simply (Wijaya et al., 2019).

Although this method requires enormous effort: gathering appropriate test subjects, developing tests, and establishing a testing environment, typical sample sizes are petite (about 10-15 users) (Schrepp et al., 2017a). This analysis yielded the final questionnaire with 26 items arranged into six scales: Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty (Schrepp et al., 2017b).

	Att.	Eff.	Per.	Dep.	Stl.	Nov.
Excellent	≥ 1.75	≥ 1.78	≥ 1.9	≥ 1.65	≥ 1.55	≥ 1.4
Good	≥ 1.52 < 1.75	≥ 1.47 < 1.78	≥ 1.56 < 1.9	≥ 1.48 < 1.65	≥ 1.31 < 1.55	≥ 1.05 < 1.4
Above average	≥ 1.17 < 1.52	≥ 0.98 < 1.47	≥ 1.08 < 1.56	≥ 1.14 < 1.48	≥ 0.99 < 1.31	≥ 0.71 < 1.05
Below average	≥ 0.7 < 1.17	≥ 0.54 < 0.98	≥ 0.64 < 1.08	≥ 0.78 < 1.14	≥ 0.5 < 0.99	≥ 0.3 < 0.71
Bad	< 0.7	< 0.54	< 0.64	< 0.78	< 0.5	< 0.3

Figure 2. Benchmark Intervals for the UEQ Scales

User Experience Questionnaire (UEQ) is available in 17 languages at www.ueq-online.org inside the "UEQ Data Analysis Tool" Excel file. The benchmark is beneficial when a product is measured for the first time with the UEQ (Schrepp et al., 2017a).

RESULTS AND DISCUSSION

The Result of User Persona

User Persona is one way to collect data or information about users to find out the needs and understanding of users in meeting system needs (Ferro & Wahyu, 2021).

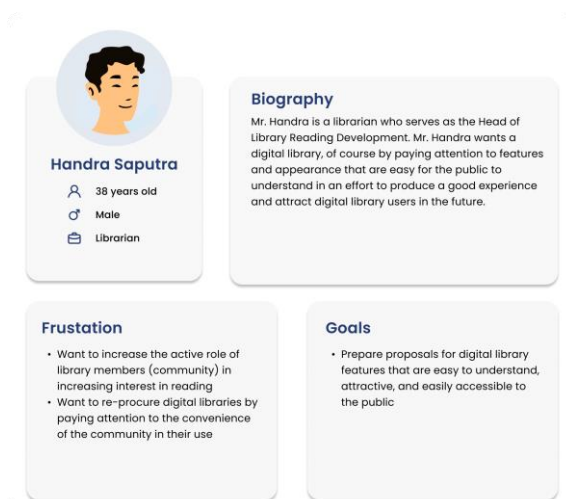


Figure 3. Handra Saputra User Persona

Figure 3 shows the user persona of Mr. Handra Saputra, 38 years old, the librarian who currently serves as the Head of Library Development Reading Development. Mr. Handra said the existence of a digital library, of course, by paying attention to features and displays that are easy to understand by the public to produce a good experience and attract the interest of digital library users in the future. It is wanted to be done because they want to increase the active role of library members (community) in increasing interest in reading and want to re-produce a digital library by paying attention to the ease of use of the community.

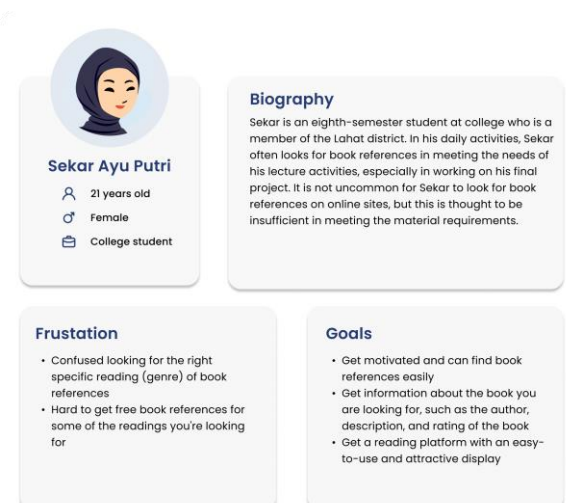


Figure 4. Sekar Ayu User Persona

Figure 4 shows Sekar Ayu Putri, a 21-year-old student and Lahat Regency Resident. Sekar often

looks for book references in his daily activities to meet his lecture activities' needs, especially in working on his final project. Not infrequently, Sekar looks for book references online, but it is thought insufficient to meet the needed material needs. Sekar also talked about the confusion in finding the proper specific reading (genre) for reference books, so getting free book references for some of the books he was looking for was difficult. Sekar also said that he wanted to get motivated and could easily find book references, get information about the books he was looking for, such as; the author, description, and rating of books, and get a reading platform with an attractive, easy-to-use display.

The result of Point of View

A Point of View table in the define stage contains users' insights, problems, and needs.

	Insight	Problem	Need
Handra Saputra The Head of Library Reading Development	At that time, there was very little interest in the Digital Library application users	Want to provide the e-library application again by taking into account the convenience of the community in its use	A digital library that is easy to understand, attractive, and accessible to the public
Sekar Ayu College student	Confused looking for and finding the book references you are looking for Lots of paid eBooks	Want to get a reading platform with an attractive appearance Want to get free book references for some of the reading you're looking for	Get motivated and can find book references easily Get a reading platform with a user friendly and attractive appearance

Figure 5. Point of View

The Point Of View table in figure 5 is taken from two user personas. From Mr. Handra's point of view, it can be concluded that there is a need for a digital library that looks easy to understand, attractive, and easily accessible to the public, considering that there was very little interest in digital library applications at that time.

Meanwhile, from the point of view Sekar, who is a community of Lahat Regency, wants to get free book references for some of the readings they are looking for and also wants to get a reading platform with an attractive appearance to get motivated and can find book references easily.

The Result of Competitive Analysis

In Figure 6, a comparison is made of three digital library applications known among the public, namely iPusnas, a digital library application belonging to the National Library of the Republic of Indonesia, in which there is a collection of free books that can be read.

	iPusnas	Gramedia Digital	Google Play Books
Product Description	iPusnas is a digital library application owned by the National Library of Indonesia, in which there is a collection of free books that can be read.	Gramedia Digital is a book buying and reading service which provides books, magazines, newspapers in digital form.	Google Play Books is a service that offers electronic books that make it easier for users to buy or download eBooks.
Product Features	<ul style="list-style-type: none"> Book categories (religion, language, sports, literature etc.) Filter (collection, e-Library and user) Random books recommendations on the main page Book details and file sizes Bookshelf Free books are accessed by joining and account verification The books provided have their respective stocks. 	<ul style="list-style-type: none"> Product categories (books, magazines and newspapers) Filter (book category, price, popular and latest books) Best seller book recommendations, top magazines, news of the day, editor's choice, etc. Similar eBooks are recommendations for similar books Book details Paid with a monthly subscription There are free eBooks 	<ul style="list-style-type: none"> Book category (education, health, children's books, biography, etc) eBook charts (top selling, deals, new and free) Recommendations for similar books Book details and ratings Library for personal book collections (your books, shelves, series) Audiobooks Percent of books read Paid per book There are free eBooks
Product Strength	<ul style="list-style-type: none"> Free There are many categories of books Bookshelf in the form of books borrowed, wishlist and history 	<ul style="list-style-type: none"> Book stock is always there There are magazines and newspapers Many popular collections and best sellers 	<ul style="list-style-type: none"> Book stock is always there There are Book charts, with a large collection of free books Has a rating on each book Audiobooks Percent of books read
Product Weakness	<ul style="list-style-type: none"> The interface is still ordinary How to register and borrow books is still confusing There are many book collections, but the majority are still ordinary collections 	<ul style="list-style-type: none"> Paid Does not have a wishlist feature for purchased books A small collection of books from small publishers 	<ul style="list-style-type: none"> Most books are paid Popular books and best sellers in Indonesian language are still few

Figure 6. Competitive Analysis

Digital Gramedia is a service to buy and read books which include books, magazines, and newspapers in digital form, and Google Play Books is a service that offers electronic books that make it easy for users to buy or download eBooks.

The three digital library applications are compared based on users' characteristics and need for competitive design needs. Based on the characteristics of the available product features such as; book categories, filter (search) books, book details, book stock, book recommendations, and more. The advantages and disadvantages of each product.

In Figure 7, it can be seen that the priority scale of the affinity diagram is divided into three parts, namely the top priority, which is the essential requirement in the design which includes registration and entry to the digital library, search, book lending, book details, and user profiles. Middle priority is the need that is needed after top priority needs, like book recommendation and review features, and low priority with input in the form of input given to participants, namely an attractive appearance that is not boring, easy display, and color choices such as blue, light blue or green.

The result of the Affinity Diagram



Figure 7. Affinity Diagram

The result of the Design Prototype

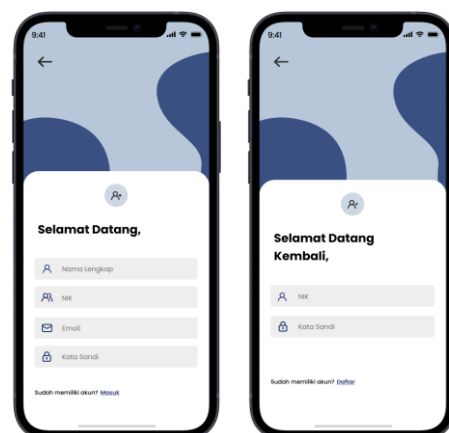


Figure 8. Registration and Login Page

Figure 8 shows the registration and login page users use to register and enter the digital library if users do not have an account or log back in if users already have an account by filling out the available personal data form. If the personal data has been filled in, continue pressing the start button until the user successfully enters the application.

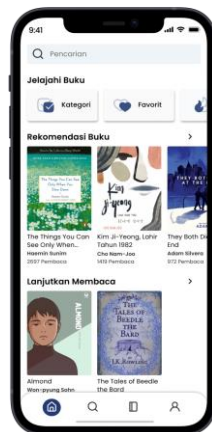


Figure 9. Home Page

Figure 9 shows the main page's home page when the user enters the digital library. At the top application search box is displayed, then book categories, favorite books, and newly released books, and there are several book recommendations, then books that were borrowed. At the bottom, a navigation bar displays several menu options such as search, bookshelf, account, and the homepage itself.

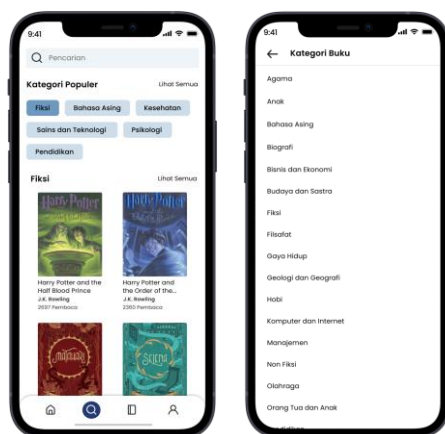


Figure 10. Search Page

In the search page shown in Figure 10, at the top of the page, there are search boxes and a category of popular books following recommendations from popular category books. The contents of the book category are grouped based on several categories, such as religious books,

children's books, foreign languages, lifestyle, and others.

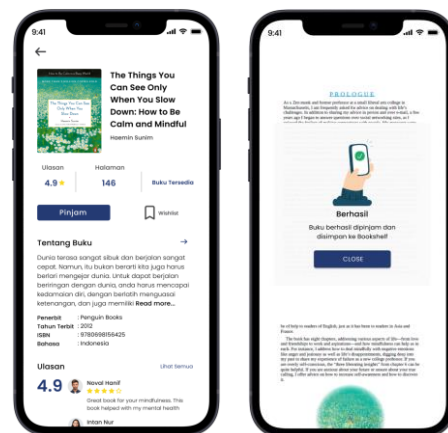


Figure 11. Book Detail and Borrow Page

The book detail page displays information about the book it is looking for, including the book cover, title, author, synopsis, and book reviews. Then at the bottom of the book, details show recommendations for similar books to that related book. Borrowing books can be done by pressing the borrow button "Pinjam" the digital library will automatically download books, and then books that have already been downloaded will be successfully borrowed and saved to the bookshelf.

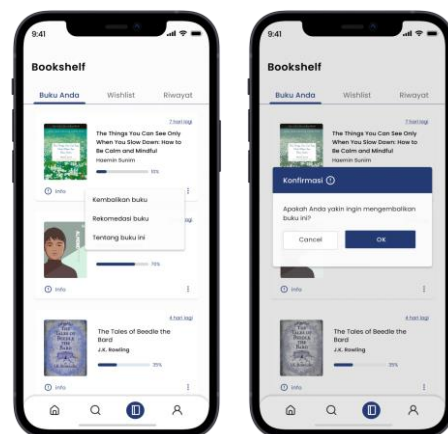


Figure 12. Book Return Page

On the bookshelf menu, some books are being borrowed. If it wants to return a book, press the info icon or the three-dot icon to display options such as return books, book recommendations, and about this book.

The Analysis of Usability Testing

The last step of the design thinking method is the testing step of the digital library prototype design already made in the previous step. In testing

the digital library prototype using a tool from the website “maze.co” used specifically for testing high-fidelity prototypes by providing a UEQ after completing the tasks.

Ten people in Lahat city carried out prototype testing by providing ten tasks participants could complete when testing ran. According to Nielsen (Azmi et al., 2019), to conduct usability research, it is enough to do with five (5) respondents because doing usability testing with five people is enough to find almost all usability problems. Here are ten tasks in implementing the digital library prototype design.

Table 1. Digital Library Tasks Testing

No.	Name of Tasks
1.	Login digital library
2.	Looking for a specified book(Azmi et al., 2019)
3.	Borrow book
4.	Bookmarking book pages
5.	Add the book to the wishlist
6.	Add a review to the book
7.	Continue reading the book
8.	Return the book
9.	Edit profile
10.	Log out from the digital library account

After usability testing was done using the Maze. Co-application, the user’s success value in carrying out ten tasks on 10 participants who had been given the following calculation was obtained.

Table 2. Result and Category of User Experience Questionnaire (UEQ)

Scale	Average	Category
Attractiveness	2.15	Excellent
Perspicuity	2.15	Excellent
Efficiency	2.30	Excellent
Dependability	1.78	Excellent
Stimulation	1.75	Excellent
Novelty	1.70	Excellent

For the overall results of the digital library UEQ scale, the average results obtained on the Attractiveness scale with a value of 2.15, Perspicuity with a value of 2.15, Efficiency with a value of 2.30, Dependability with a value of 1.78, stimulation with a value of 1.75, novelty with a value of 1.70 with all scores getting the “Excellent” category. Figure 12 is a graph of the overall results of the UEQ scale.

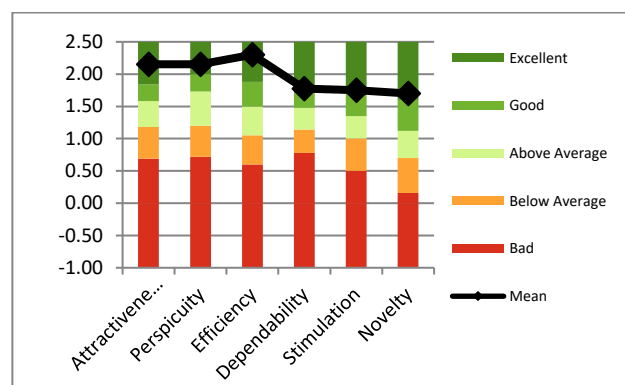


Figure 13. Digital Library UEQ Scale Graph

CONCLUSIONS AND SUGGESTIONS

Conclusion

Based on the entire research process that has been carried out, it can be concluded that this research resulted in a high-fidelity digital library prototype design using the design thinking method. In usability testing, a high-fidelity digital library prototype using the User Experience Questionnaire (UEQ) on six scales: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty gets the “Excellent” category.

Suggestion

Based on the results of research that has been carried out, some suggestions are given, such as designing a high-fidelity prototype that can help facilitate the community in the process of searching for the required book information and be able to facilitate services in the process of borrowing and returning books. The UEQ calculation shows the Excellent category. This calculation means that the application prototype that has been built follows the needs of people who want to use this digital library.

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