# Let's Keep on Reading: User-Centered Design of an Online Book Loan System for University Students in Bandung

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| Keywords: | ABSTRACT |
|---|---|
| User-centered design<br>Book loan system<br>Online<br>University students | The demanding life nowadays limits people from doing their hobbies in their spare time, including reading books. Borrowing books from a book loan center is a common practice in Indonesia. However due to the limited time, people go less often to such book loan centers. The rise of internet and mobile technologies facilitates people to easily borrow books online, without having to go physically to the book loan center. Therefore, it is necessary for every book loan center nowadays to provide a user-friendly online book loan system for its members. The aim of this research is to design a user-friendly application to borrow books online for Taman Bacaan Gubuk Dongeng, a book loan center located near Parahyangan Catholic University in Bandung. The majority of its customers are university students who like reading but have limited time due to their busy schedule. A number of user-centered design activities were conducted from identifying user requirements, generating design concepts through a design workshop, refining the selected design concept, prototyping, to evaluating the prototype. As primary users, university students were highly involved in the design process. The design workshop resulted in five design concepts from which one final concept was selected, further refined and developed to a low-fidelity prototype. The evaluation showed that the application has successfully met the user needs and user-friendly criteria. |

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## 1. INTRODUCTION

For some people, reading books is a hobby that they usually do in their spare time to relax from their busy life. Borrowing books for a book loan center is a common practice in Indonesia. However, the limited time people have cause them to go less often to such book loan centers. The demanding life nowadays drives people to find easier and faster ways to do all their activities, including borrowing books. The use of internet and mobile technologies has increased in Indonesian society especially the young generation. The rise of these technologies facilitates people to easily borrow books online, without having to go physically to the book loan center. Therefore, it is considered necessary for every book loan center nowadays to provide an accessible and user-friendly online book loan system for its members.

Taman Bacaan Gubuk Dongeng is a book loan center for borrowing novels, comics and magazines, located in the surrounding of Parahyangan Catholic University in Bandung. This book loan center was established in 2002 and has around 3000 members. The majority of its customers are Parahyangan Catholic University students who like reading but have limited time due to their busy schedule. Currently, Taman Bacaan Gubuk Dongeng has no accessible information media for its members. The interactions between customers and the book loan system occur in the book loan center. They have to go physically to the center to borrow books or to get some information about the book collections. An online book loan system is envisioned for Taman Bacaan Gubuk Dongeng to accommodate its busy members and provide a more

efficient system for borrowing books. Such system would help Taman Bacaan Gubuk Dongeng to maintain its customer's loyalty and its business competitiveness.

This paper describes a study to provide a user-friendly application to meet the needs and accommodate the characteristics of Taman Bacaan Gubuk Dongeng customers for borrowing books online. We approach the design problem from a user-centered design and interaction design point-of-view. We choose the user-centered design approach instead of others because we aim to optimize the design around the context of its end-users by ensuring that their needs, wants and limitations are accommodated [1,2].

## 2. RESEARCH METHOD

The approach of user-centered design, which places user in the center of the design process, was used in this study. According to ISO Standards [3], user-centered design involves four types of activities: specify the context of use, specify user requirements, produce design solutions and evaluate against requirements (see Figure 1a). The user-centered design approach was complemented with the interaction design lifecycle model [4], which also involves four activities: identify needs/establish requirements, design, build an interactive version and evaluate (see Figure 1b).
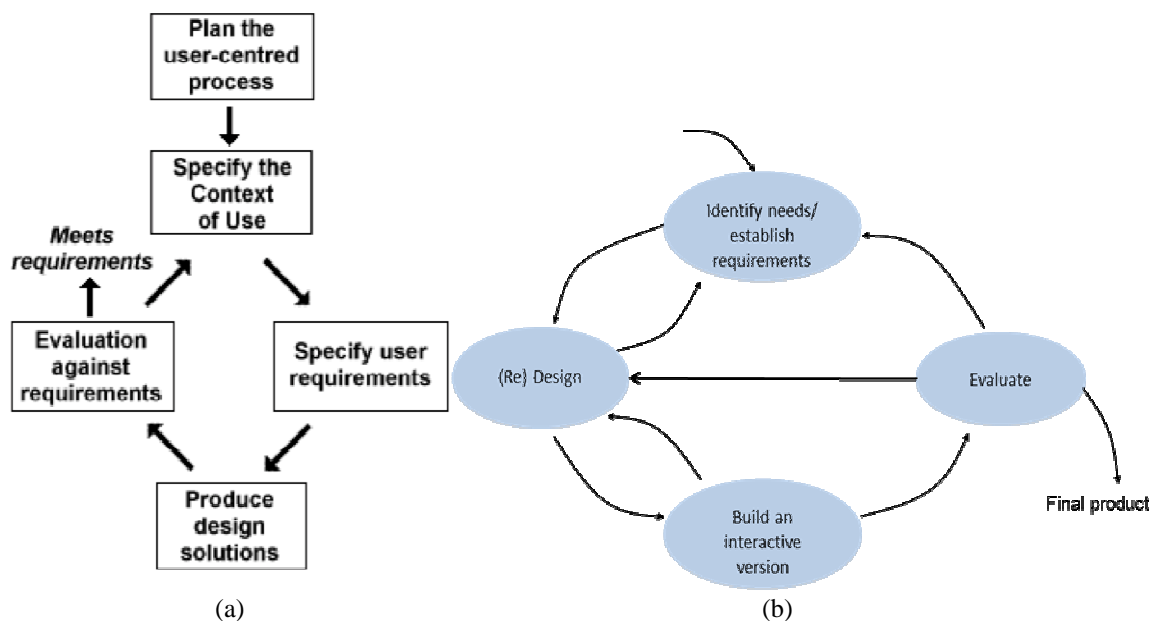


(a)        (b)

Figure 1. Research methodology: (a) User-centered design and (b) Interaction design lifecycle model

Based on these two approaches, four user-centered design activities were conducted as follows:
1. Identifying user requirements
2. Generating design concepts
3. Prototyping the selected design concept
4. Evaluating the prototype

The study aims to develop a user-friendly application to borrow books online for Taman Bacaan Gubuk Dongeng based on the user-centered design approach. Throughout the development process, a number of Parahyangan Catholic University students who like reading but have limited time due to their busy schedule were involved as the potential primary users of the envisioned application.

The identification of user requirements was carried out through interviews followed with a survey on the importance level of each identified need. Based on the observation of the user group, a persona and usage scenario was developed to give insights about the user group characteristics and the typical description of the envisioned application usage to the designers involved in the concept generation phase. The design concepts were generated through the conduct of a design workshop followed by five designers who were Parahyangan Catholic University students as well. As a result of the design workshop, five design concepts were created in terms of the application user interface sketches. One final design concept was selected and further refined. An interactive, low-fidelity prototype was built based on the final design concept. As the last step in the study, the prototype was evaluated through a quick-and-dirty usability testing.

## 3. RESULTS

### 3.1. Establishment of Requirements

The process of identifying user needs and establishing user requirements was conducted through interviews with 12 students (4 males and 8 females, mean age=20.3 years) from different departments, who were members of Taman Bacaan Gubuk Dongeng and have borrowed books for at least 5 times. The goal from the interviews was to gain an insight of their current practice of borrowing books and the difficulties they experienced. From the interviews, a list of 23 needs was identified. Through a follow-up survey, the students were asked to rate the importance level of each identified need (1=very unimportant to 5=very important). Table 1 shows the list of user requirements established for the design of a user-friendly application to borrow books online.

Table 1. User requirements

| No. | Identified needs | Students' comments | Average importance level |
|---|---|---|---|
| 1 | Application gives information on the book title | *From the title, we can more or less know what the story is about* | 4.6 |
| 2 | Application gives information on the book availability | *I want to know whether the book is available or not, so I don't go there for nothing* | 4.4 |
| 3 | Application shows the cover of the book | *First I usually look on the title, then the cover, then the synopsis* | 4.3 |
| 4 | Application gives information on the deadline of the book loan | *Sometimes I forgot when to return the books* | 4.3 |
| 5 | Application gives information on the new release books | *From the title, we can more or less know what the story is about* | 4.2 |
| 6 | Application gives information on the book location | *Sometimes it's hard to find the book because I don't know its location* | 4 |
| 7 | Application gives information on the book loan center layout | *Usually only the staffs who know the layout by heart, so I have to depend on him to search for the book, I can't search it by myself* | 3.8 |
| 8 | Application can be used as a reminder of the book loan deadline | *To tell me when to return the books, like a reminder* | 3.8 |
| 9 | Application shows the list of recommended books | *When I have no particular books in mind, I ask to the staff or a friend about the books they recommend to read* | 3.7 |
| 10 | Application shows the book synopsis | *I always look on the synopsis when I want to borrow a book* | 3.7 |
| 11 | Application gives information on the book loan period | *I don't know for sure how many days I can borrow the books* | 3.6 |
| 12 | Application gives information on the book loan cost | *I want to know how much it costs to borrow the book* | 3.5 |
| 13 | Application gives information on the book author | *When I forget the book title, I can still search it from the author* | 3.4 |
| 14 | Application gives information on the book genre | *Usually I look on the genre, then the inside of the book* | 3.4 |
| 15 | Application shows the list of currently borrowed books | *I tend to forget which books to return when* | 3.3 |
| 16 | Application can be used to reserve books | *I want to be able to book the books I'd like to borrow before anyone else* | 3.1 |
| 17 | Application accommodates the delivery and pick-up service of borrowed books | *It would be so much nicer if there's a kind of delivery service so that I don't have to go there to get the books* | 3.1 |
| 18 | Application accommodates the storage of book loan cost surplus | *A feature to store some surplus money from the previous to the next loan would be useful* | 3.1 |
| 19 | Application shows the inside of the book | *To choose, first I look at the cover then I scheme to inside of the book* | 3 |
| 20 | Application gives information on the book loan history | *Usually I forget which books I've borrowed because there are so many* | 3 |
| 21 | Application gives information on the book publisher | *Immediately show the book when I input the author or publisher* | 2.5 |
| 22 | Application accommodates the interaction between the book loan center and its members | *Before I borrow a book, I can ask the staff first without having to go there* | 2.5 |
| 23 | Application accommodates users to give comments | *I want to give comments on the book like how I do it with the online comics* | 2.3 |

### 3.2. Design Concepts Generation

To generate alternatives of design concepts that meet the requirements established earlier, a design workshop was held with 5 students as representative participants from the user group as shown in Figure 2. First, the persona and scenario were introduced to the students as a reference in the design process. Then, the user requirements were also revealed to the students. Afterwards, each student was asked to sketch the user interface as a design concept to answer the design problem.

Figure 2. Design workshop

Five alternatives of design concepts were resulted in the design workshop. Figure 3 illustrates the design concepts generated for an online book loan system application in this study. Due to the limited space, these concepts were not discussed in more details in this paper. To select one final design concept, 10 students were presented with all of the five design concepts and were asked to rank them. The concept with the highest total rank score, Alternative 5, was selected as the final design concept. This concept met 91.3% of the user requirements mentioned in Table 1. Two requirements were not met in the final design concept: (1) Application gives information on the book loan history and (2) Application accommodates users to give comments.
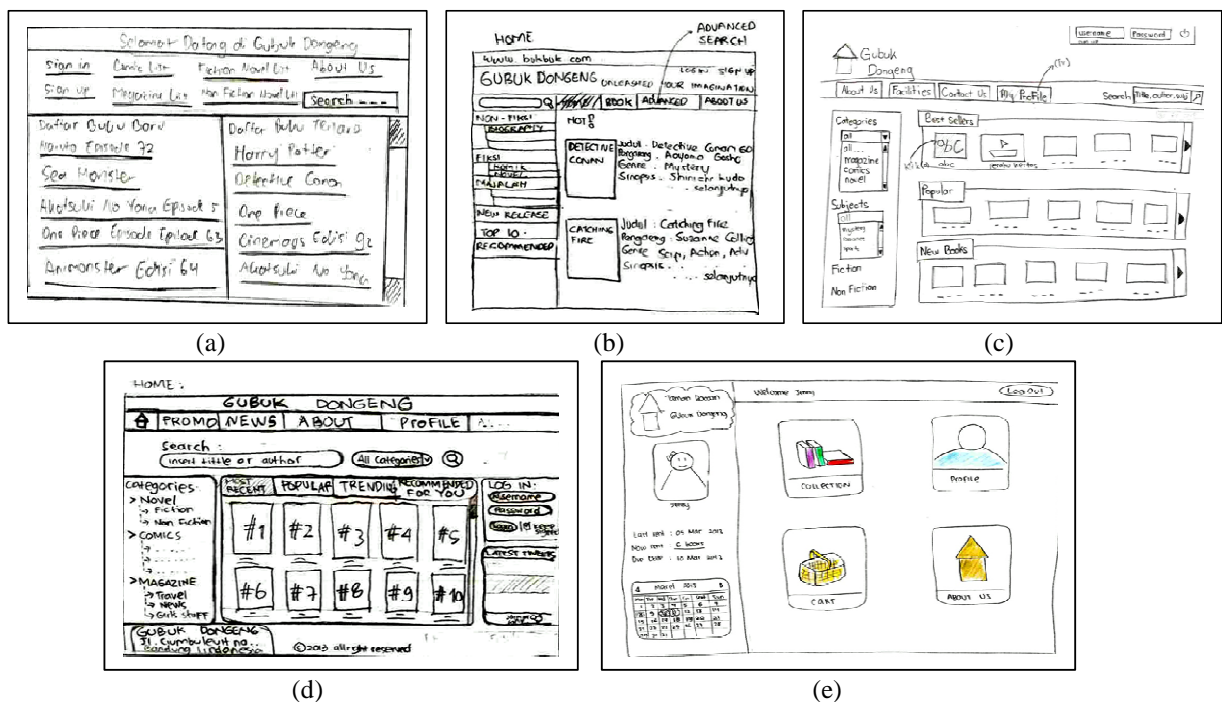


(a)           (b)           (c)

(d)           (e)

Figure 3. Design concepts: (a) Alternative 1, (b) Alternative 2, (c) Alternative 3,
(d) Alternative 4 and (e) Alternative 5

### 3.3. Prototype and Evaluation

The selected design concept was further refined and developed into an interactive, low-fidelity prototype as depicted in Figure 4.

Figure 4. The prototype of an online book loan system application

The prototype was evaluated by 11 students through a quick-and-dirty usability testing with 3 task scenarios as follows: (1) Search a specific book, (2) Borrow a book using the delivery service feature and (3) Return a book using the pick-up service feature. Overall, the students found that the prototype has successfully met their needs. The process of searching and borrowing books were easy to understand and carry out. However, several usability problems were found. For example, in the process of reserving books, users often pressed the reserve button repeatedly due to the lack of feedback confirming the reservation. To assess how far the user-friendly criteria [5] were met, the students were asked to rate the prototype from 1 (very bad) to 5 (very good) for each criterion. Table 2 shows the user-friendliness assessment results of the prototype.

Table 2. User-friendliness assessment

| No. | Criteria | Average score |
|-----|----------|---------------|
| 1 | Legible and aesthetically pleasant | 4.2 |
| 2 | Cultural conscious | 4.6 |
| 3 | Intuitive | 4 |
| 4 | Consistent in style and wordings | 4.4 |
| 5 | Responsive | 3.8 |
| 6 | Error tolerant | 1.9 |

## 4. CONCLUSION

In this paper, we have provided a design of a user-friendly application to meet the needs and accommodate the characteristics of Taman Bacaan Gubuk Dongeng customers for borrowing books online. The final design, as shown in Figure 4, was established based on the application of the user-centered design approach, which involves active participation of university students as Taman Bacaan Gubuk Dongeng customers and the potential users of the application in the phase of needs identification, design concepts generation and prototype evaluation of this online book loan system application. The low-fidelity prototype evaluation showed that the application has successfully met the user needs and user-friendly criteria. However, further design improvements are necessary since there were still users who experienced difficulties in using the application.

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## BIBLIOGRAPHY OF AUTHORS

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