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6 The use of User-centered Design Canvas for Rapid Prototyping

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Abstract. This paper presents the use of User-Centered Design Canvas to help students design the user experience (UX) on the designated Collaborative Projects. The Collaborative Project itself has been conducted by students with multi-discipline backgrounds. The User-Centered design itself was widely used as an approach to software development in order to achieve better alignment between the user experience and the business goal. Adopting Business Model Canvas, the User-Centered Design Canvas was introduced as an acceleration tool for rapid prototyping and ensures the effectiveness and efficient manner for the sake of user satisfaction. As the results from the questionnaire, more than 78% of users express the benefits of the current adaptation of User-Centered Design Canvas. Also from the Log Metric Analysis, users² have completed a designated task under 5 minutes with minimum repetition. This indicates that the use of proposed adaptation is easy to use and shows the effectiveness of the User-Centered Design Canvas for rapid prototyping.

1. Introduction

In the year of Covid-19 pandemic in Indonesia, distance learning is a most suitable learning model for implementing a social distance and a self-quarantine [1], [2]. On other hand, Prototyping is one of the software development stages that deliver the early product [3]–[5]. For learning experience, prototyping is the most suitable option to give students to help implement their idea [6], [7]. Prototyping in software development is needed to know if the problem was visible to solve technically or not [8], [9]. Moreover, prototyping in the development of user interaction (UI) and user experience (UX). In this paper, we briefly discuss the use of User Centered Design Canvas to help students to explore, plan and develop the user experience with proposed ideas. Also, how to implement the prototyping process using User Centered Design among students while conducting distance learning.

2. Proposed Method

In this paper we propose the use of User Centered Design Canvas to helps student develop the user experience in their developed application as course assignment. Also we developed and extra feature from our developed supportive tool to help students adapt the User Centered Design Canvas while implementing distance learning. The proposed method is illustrated in Figure 1.



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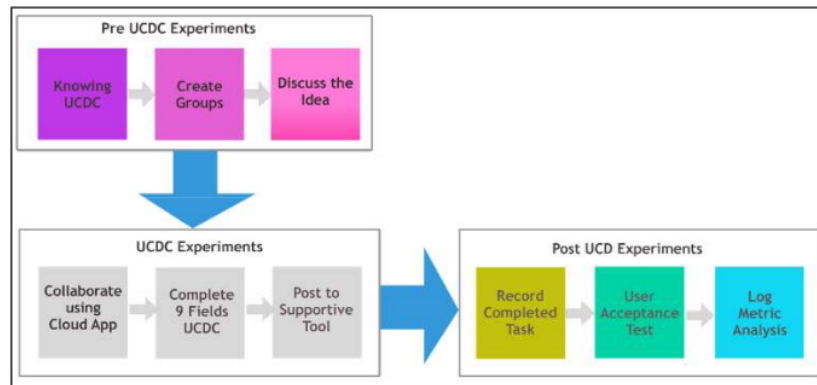


Figure 1. UCDC Experiments Method

2.1. User Centered Design Canvas

User Centered Design Canvas is a framework that is inspired from Business Model Canvas [10]. Therefore, it was claimed the UX Tool combining user needs with the business goals [11]. By using UCDC, it will help UX designer to:

1. Understand the targeted user and market needs.
2. Make a definition of product/market fit.
3. Aligning the business goal for the competitive advantages.
4. Define Unique Value Proposition as the brand communication strategy.

Adapting with Business Model Canvas, UCDC is divided into 9 fields. Start with the user-centered approach until summarizing the Unique Value Proposition. Those field are detailed in Table 1.

Table 1. UCDC Fields

Field	Name	Description
1	Business	Define Brand/Product name.
2	Users	Define the potential/targeted users
3	Problems	Define the problem and how the proposed app solve the problems
4	Motives	Define user motivation that is willing to use the proposed app.
5	Fears	Define user fears that would not use the proposed app.
6	Solutions	Define existing solution from field 3.
7	Alternatives	Define the possible alternative app/solution that might be chosen by users instead of the proposed app.
8	Competitive Advantage	Define the features or the characteristics that differentiate the proposed app and competitors
9	Unique Value Proposition	Define the phrase that describes the value of the proposed app.

2.2. Cloud application and Supportive Tool Extended Features

As part of this research, we developed extended features that will be used by students to collaborate designing the UX. For the collaboration, we use Cloud Application for the collaboration process. Figure 2 shows the cloud application (Google Spreadsheet).

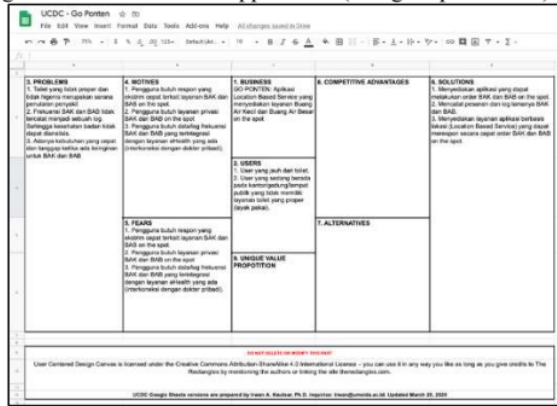


Figure 2. UCDC collaboration using cloud application



Figure 3. UCDC entry at developed Supportive Tools

After each group completes the UCDC template at Google Sheet, each group is requested to post the final results to our current development Supportive Tools [12]. Figure 3 shows the UCDC entry on the Supportive Tool.

2.3. User Responses

After explaining the use of UCDC at the beginning of the academic semester, Students have been given the assignment to develop some apps that might be needed by higher education students. Also, Students were requested to design the user experience of the proposed app using UCDC. We conduct questionnaires about the use of UCDC in several classrooms that consist of 168 students as participants. The aim of the questionnaire was: #1) to determine the effectiveness of the proposed method for rapid prototyping, and #2) to evaluate our current development supportive tools. The students as participants vary from 1st until 4th year bachelor degree.

3. Results and Discussions

This section will briefly discuss the questionnaire result about the use of UCDC for rapid prototyping.

3.1. Results

Before using or learning UCDC, all participants have been requested to fill the designated questionnaire. Table 2 shows the questions for the questionnaire.

Table 2. Questionnaire for participants

Questions	Response and Percentage (%)
Have students ever created software?	Yes (98), No(2)
Are students familiar with some prototyping tools?	Yes (82), No(18)

Are students familiar with some UX specifically prototyping tools?	Yes (74) , No(36)
Do students ever design UX generally?	Yes (12) , No(88)
Do student ever learn or use UCDC?	Yes (6), No (94)

Next, Likert scale had been used to measure the perception from all participants about the use of UCDC for their prototyping process with following formulas [13], [14]:

$$P = \frac{N \times R}{I} \times 100\%$$

Where:

P = The percentage value each questions

N = The value of each answer at each instruments

R = Answered Value Frequency

I = The highest answered value multiplied with number of participant (5 x 168 = 840)

The user perception results are shown in Table 3.

Table 3. Beta testing of the proposed method

Questions	Percentage (%)
Is the UCDC easy to use?	81.5
Is the use of UCDC way more reasonable to define the UX Problems?	77.4
Does it help define the bussioness value propotion ?	82.1
Does it help define the problem solving?	79.8
Would students like to use UCDC for their next project?	88.1
Is UCDC Does it help rapid prototyping?	79.2
Is the cloud application and supportive tool helps collaboration in online conditions?	82.7
Is the UCDC Instruction given easy to follow?	83.9
Average Percentage	81.3

Next, we record the accomplished time each group (from 168 students formed into 48 groups) for how long it takes to finish each field in the UCDC. We had categorized each groups into 3 conditions. Which are less than 5 minutes, 5 to 10 minutes, and more than 5 minutes. The result are shown in Figure 4.

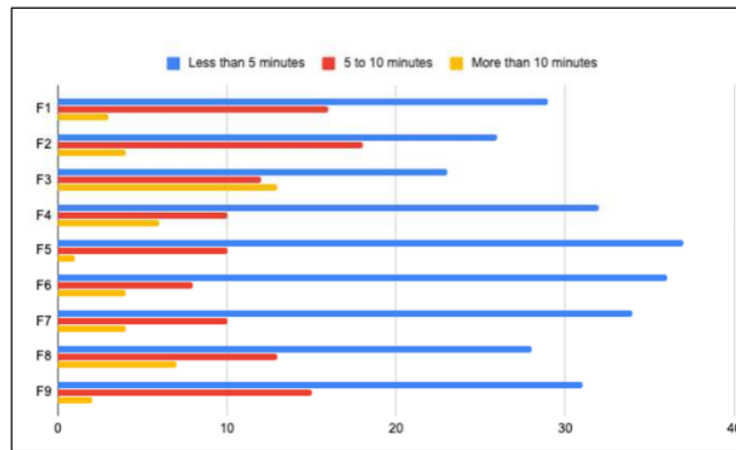


Figure 4. Accomplished Time The use of UCDC

4.3. Discussions

Based on acceptance result, UCDC helps student to do rapidly prototyping. Furthermore, the use of existing cloud applications and supportive tools enable students to do collaboration in online condition. This learning models are suitable in pandemic crisis. Which physical distancing are needed. From this point of view, the use UCDC is way more practical to transform idea into real application. As part of the learning process, collaboration among each group member that had been conducted in fully online condition will create new culture of creative process as positive affect when pandemic happened.

4. Conclusions and Future Works

User Centered Design Canvas (UCDC) helps do more rapidly at prototyping and define more in depth understanding about the basic need while designing User Experiences. Also, the use of cloud application and supportive tools enable collaboration among students that implement distance learning while at pandemic era. For future works, it needs to study to integrate the UCDC (for design UX) with other prototyping tools for UI design.

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