User Experience Design for Information Technology Career Preparation Platform Using the Design Thinking Method

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Abstract. Digital talent is crucial in the thriving Information Technology (IT) industry. Hence, numerous countries seek digital skills to stay competitive in the current era. In Indonesia, the challenge lies not in quantity but in the readiness of digital talents to enter the professional world. To address this issue, we observed the IT career readiness of fresh graduates and senior students from the Faculty of Computer Science, Universitas Brawijaya. The observation revealed that 82.9% of 70 respondents stated doubts about their career preparation in the IT domain. These doubts stemmed from perceived inadequacy in technical skills, lack of readiness in developing a curriculum vitae and facing job interviews. Given the need for career preparation in the IT domain, we address the development of a platform to assist aspiring IT talents. This study proposes a solution as an IT career preparation application designed using the Design Thinking method. The proposed design was tested using the Usability Evaluation, yielding an effectiveness rate of 100% and an efficiency value of 0.08 goals/sec. Furthermore, a satisfaction test was conducted using the SUS questionnaire, resulting in a score of 94.75 (excellent).

Keywords: digital talent, career preparation, design thinking, user experience, usability

1 Introduction

In the era of the fourth industrial revolution, various countries are competing each other to keep innovating in the development of digital economy. A lot of challenges need to be faced to develop this; one of them is the readiness of digital talent. Digital talent is the critical enabler in the successful development of the digital sector. The gap between supply and demand for labor in the ICT industry in the 2021-2025 range is predicted to reach 600,000 workers per year [1]. There is a challenge in preparing IT skills for the digital economy due to the gap between industry needs and the capabilities of human resources produced by educational institutions [2]. In addition, The Ministry of Communication and Information Technology of the Republic of Indonesia revealed this gap mainly due to the need for IT graduates to meet industry demands [3]. This phenomenon was also reported by the World Economic Forum, where it was found that only 64% of university graduates meet industry standards [4].

In this study, we address the need for career preparation among fresh
graduates and senior students to assist them in preparing their future careers by focusing on the three primary issues identified in the work readiness survey. To better prepare senior students for their future careers, there is a need for a personalized mobile application that can align with their interests and talents. Therefore, we aim to conduct study titled "User Experience Design for Information Technology Career Preparation Platform Using the Design Thinking Method". This study proposes an initial solution design based on the current issues encountered by senior students in career preparation and helps them enhance their professional readiness. The design thinking method was used in designing this prototype. Design thinking is an iterative process used to understand users, solve assumptions, and redefine problems to generate ideas that align with user needs [5] [6]. This method has five iterative phases: empathize, define, ideate, prototype, and test. The design thinking method was chosen because it can redefine problems and enable various theories to evaluate assumptions, generate ideas, and test designs that meet the target users. Finally, the proposed design outcomes are expected to deliver an enjoyable user experience when interacting with the application.

2 Literature Review

In this section, we presented some published literatures to obtain information about theories related to the problems raised.

2.1 Digital Talent

Digital talent refers to human resources with the abilities and skills required to utilize digital technology proficiently that comprises hard skills and soft skills [7]. Hard skills in the digital context are technical abilities that include big data, artificial intelligence, coding, and others. While soft skills are 4C abilities, namely Complex problem solving, Critical thinking, Creativity, and Capability to lead. Digital talent is a crucial enabler in developing the digital sector, which continues to increase [8] [9].

2.2 User Experience

User experience (UX) is a process of creating products that provide meaningful and relevant user experiences. UX design involves the entire product design process, including branding, design, usability, and functionality [10] [11]. In addition, according to ISO 9241-21, UX can also be described as a person's reactions and perceptions when using a product, system, or service. Therefore, UX is critical to make sure the user comprehends each step taken and what the user expects each action to accomplish [12] [13].

2.3 Design Thinking

Design Thinking is an iterative process that aims to understand users, challenge assumptions, and redefine problems to identify alternative strategies and solutions [14] [15]. It is also a design methodology that adopts a solution-based approach to problem-solving [5]. The stages of design thinking can be observed in Figure 1. The first stage is Empathise; at this stage, it is the core of user-centered problem-solving. This stage can help researchers discover users' behaviors and habits when carrying out observation activities. The second stage of this process is Define (Definition) which is carried out to collect problem information obtained from the empathize stage. The findings of the problem and the information obtained will be converged and taken to the core of the problem. The third stage in the design thinking method is Ideate (Idea), a transitional stage where the problem formulation leads to
problem-solving. At this stage, the focus will be on generating ideas.

The fourth stage in the design thinking process is the Prototype; this stage will produces an initial product design [5]. At this stage, it is divided into low-fidelity and high-fidelity. Low-fidelity is an initial design in the form of a sketch. This stage is conducted to ascertain whether the design follows the current content information. In contrast, high-fidelity is a design close to the finished product and ready to be tested on users [11]. The fifth stage in this process is the Test; this stage have to be carried out to collect user feedback regarding the design results [5]. This stage also determines whether design iterations are needed or whether the design is sufficient to proceed to the next step. Iteration in the design process is a process that is carried out after the testing stage on each prototype version (low-fidelity and high-fidelity prototype) [11].

![Design Thinking: A Non-Linear Process](image)

Figure 1. Design Thinking Method [5]

2.4 Usability Testing

Usability testing is a method to understand how users feel when interacting with an application or website [16]. Measuring usability involves three components: effectiveness, efficiency, and satisfaction [17]. The following is an explanation of the three metrics of usability:

a) Effectiveness

This metric measures whether users can accomplish a particular goal or not. It can be measured by using the equation for the level of task completion, which can be seen in (1). In this equation, the value of success in completing the task will be assigned a value of 1, while failure in completing the task will be assigned a value of 0. Then this value will be divided by the total number of participants' success in completing the task and finally multiplied by 100% to get an effectiveness value.

\[
\text{Effectiveness} = \frac{N_{ts}}{N_t} \times 100\% \tag{1}
\]

where

\[N_{ts} = \text{Number of tasks completed successfully}\]
\[N_t = \text{Total number of tasks undertaken}\]

b) Efficiency

This metric measures user efficiency based on users' time to achieve their goals.
while considering their success rate. It is measured using the time-based efficiency equation, which can be seen in (2). Time will be measured from when the task was started until finished, whether successful or not.

\[
Time \text{ Based Efficiency} = \frac{\sum_{j=1}^{R} \sum_{i=1}^{N} n_{ij}}{N \times R}
\]  

(2)

where

\( N \) = The total number of assigned tasks
\( R \) = The total number of participants
\( n_{ij} \) = The results of the implementation of task \( i \) by participant \( j \). If the task is completed, the value is 1; if not successful, the value is 0.
\( t_{ij} \) = The time they were spent by participant \( j \) to complete task \( i \). Time is still measured even though the task cannot be completed until the user gives up doing the task.

c) Satisfaction

Satisfaction metrics measure user comfort when using the product [18]. This aspect can be measured using the Test Level Satisfaction questionnaire. Questionnaires will be given after the user completes the test task. One of the questionnaires that can be used is the System Usability Scale (SUS). This study uses a SUS questionnaire adapted to Bahasa Indonesia [19].

3 Methodology

3.1 Research Methodology

To achieve the research goal, the researcher follows the steps outlined in the research methodology flowchart, which can be seen in Figure 2. Firstly, we conducted a literature study by collecting several reference books, scientific articles related to the problem and research objectives to reveal various theories relevant to the problem being faced/researched as reference material in discussing research results. Afterwards, we did steps based on the design thinking method until we got the experiment results and findings. Finally, we concluded the study based on the results and findings and presented possible future works in the conclusion and future works section.

3.2 Research Participant

The participants for the study are fresh graduates and senior students of the Faculty of Computer Science at Universitas Brawijaya, Indonesia. Additionally, the company stakeholders for this study are technology companies involved in recruiting IT employees.

3.3 Data Collection

At this stage, interviews will be conducted with an IT company stakeholder and 6th-semester students or above. The information-gathering techniques use interviews and distributing questionnaires via Google Forms. The interview and questionnaire results will support designing the user experience. The interview questions posed to the participants can be read at https://tinyurl.com/2s45ymca.
4 Requirements Analysis

This section describes the design thinking method's concepts and chronologically defines stages. Problems and needs are collected during empathy. Quantitative surveys and in-depth interviews were used for the research. Seventy fresh graduates and senior students (6th semester or above) from the Faculty of Computer Science at Universitas Brawijaya were surveyed on their job readiness. The poll found that 82.9% of respondents doubted their job preparation. According to the poll, some graduates need greater work readiness.

The survey also found three significant factors that contribute to students' doubts about their job preparation: uncertainty about their technical abilities (91.4%), the readiness of their curriculum vitae during the application process (65.7%), and job interview readiness (61.4%). The founder of an information technology company was interviewed to verify the poll results. During the interview, we needed help to identify qualified individuals. Job seekers' skills don't match vital needs, causing this issue. The applicant's CV should match their skills. Based on student and company stakeholder needs and behavior, personas, empathy maps, and user journey maps are generated during the define stage. This study produced student and company stakeholder identities. Figures 3 and 4 depict the student and company stakeholder personas, respectively. Empathy maps were created to describe students' and IT...
Company stakeholders' Says, Does, Thinks, and Feels to inform application design.

5 Design Solution

This section will discuss the ideation and prototyping stages. The ideation stage involves generating solutions based on the findings and defining existing problems. The findings will be organized into storyboards and information architecture. Furthermore, the prototype stage consists of visualizing the design results. This process begins with creating low-fidelity wireframes that will be developed into high-fidelity and interactive prototypes.

5.1 Storyboard

Storyboards let designers capture user profiles by narrating stories sequentially [20]. Figure 5 shows storyboards for fresh graduates or students using career preparation applications, while Figure 6 shows company stakeholder storyboards.
5.2 Wireframe

Wireframes are low-fidelity design visualizations of solution idea drafts used to create mockups or high-fidelity [21]. Figure 7 illustrates the career preparation application wireframe for fresh graduates or students, whereas Figure 8 depicts the wireframe for company stakeholders.

5.3 Screen Flow

Screen flow shows how user navigations change the app's user interface [22]. Figures 9 and 10 show the account registration screen flows for the career preparation app for students and the stakeholder system.
5.4 Mockup

The mockup design (high-fidelity prototype) followed low-fidelity wireframe drawings. High-fidelity prototypes have a user interface like the original product without a full implementation [23]. The mockup uses Google Material Design 3. Since we targeted Indonesian college students in Empathise, we created a Bahasa Indonesia interactive prototype. Figure 11 depicts the career preparation application's home page, whereas Figure 12 depicts the company stakeholders' dashboard page. The complete initial interactive prototype for the student dashboard can be accessed at https://tinyurl.com/karirkuV1, while company stakeholders can be accessed at https://tinyurl.com/karirkuCompanyV1.
6 Testing

6.1 User Usability Testing Results

Five fresh graduates and five senior students from the Faculty of Computer Science at Universitas Brawijaya tested a high-fidelity prototype. The Maze tool tracks participants' activities during testing to ensure they finish the tasks. Maze records desktop and mobile user journeys without third-party apps [24].

a) Effectiveness

Table 1 shows that all participants completed their tasks in the effectiveness testing. Thus, this application design is 100% effective.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Task 1</th>
<th>Task 2</th>
<th>Task 3</th>
<th>Task 4</th>
<th>Task 5</th>
<th>Task 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Participant 2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Participant 3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Participant 4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Participant 5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Participant 6</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Participant 7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Participant 8</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Participant 9</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Participant 10</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Nts</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

100%

b) Efficiency

According to Table 2, each participant requires varying times to finish a job due to feature flow variances. Time records and the participant's task completion complete the task. The time-based efficiency equation is calculated from the participant's start to finish. As shown in Table 3, the efficiency testing process yielded an overall time-based efficiency of 0.08 goals per second for accomplishing the application's task.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Task Time Spent (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Task 1</td>
</tr>
<tr>
<td>Participant 1</td>
<td>19.2</td>
</tr>
<tr>
<td>Participant 2</td>
<td>27.8</td>
</tr>
<tr>
<td>Participant 3</td>
<td>43.3</td>
</tr>
<tr>
<td>Participant 4</td>
<td>46.9</td>
</tr>
<tr>
<td>Participant 5</td>
<td>28.1</td>
</tr>
<tr>
<td>Participant 6</td>
<td>35.9</td>
</tr>
<tr>
<td>Participant 7</td>
<td>22.4</td>
</tr>
<tr>
<td>Participant 8</td>
<td>30.4</td>
</tr>
<tr>
<td>Participant 9</td>
<td>36.9</td>
</tr>
<tr>
<td>Participant 10</td>
<td>42.5</td>
</tr>
<tr>
<td>Average Time (s)</td>
<td>33.34</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Participants</th>
<th>(\frac{m_{ij}}{t_{ij}})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Task 1</td>
</tr>
<tr>
<td>Participant 1</td>
<td>.052</td>
</tr>
<tr>
<td>Participant 2</td>
<td>.036</td>
</tr>
<tr>
<td>Participant 3</td>
<td>.023</td>
</tr>
</tbody>
</table>
c) Satisfaction

From the SUS calculation process, the average SUS value was 94.75, which falls in the category A (excellent) range [25], indicating that the design results were highly satisfactory.

### 6.2 User Feedback

Interviews addressed all four metrics of the feedback-gathering grid for all prototype testers. Feedback capture grids coordinate participant feedback [26]. Table 4 presents the student-perspective interview results. In the second iteration, student comments improved the design. Stakeholders were requested to perform tasks and provide application design feedback. Table 5 presents test outcomes. The second iteration improved the design using company stakeholders’ input.

#### Table 4. Student Feedback

<table>
<thead>
<tr>
<th>Metrics</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likes</td>
<td>The existing features are very easy to use</td>
</tr>
<tr>
<td>Criticisms</td>
<td>Confusion when looking for the button to do Interview Simulation</td>
</tr>
<tr>
<td>Questions</td>
<td>Can’t users save information temporarily when creating curriculum vitae?</td>
</tr>
<tr>
<td>Ideas</td>
<td>The label on the poster should be placed above the title for better visibility</td>
</tr>
</tbody>
</table>

#### Table 5. Company Stakeholder Feedback

<table>
<thead>
<tr>
<th>Metrics</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Likes</td>
<td>The design meets the needs, and the flow is easy to understand.</td>
</tr>
<tr>
<td>Criticisms</td>
<td>The assessment section is too long, and we must scroll through a lot of content, which can be inconvenient and time-consuming.</td>
</tr>
<tr>
<td>Questions</td>
<td>There is nothing confusing</td>
</tr>
<tr>
<td>Ideas</td>
<td>None, currently there are no recommendations</td>
</tr>
</tbody>
</table>
7 Conclusion and Future Work

According to the study, students' and company stakeholders' application demands must be extracted and analyzed. The study found that students doubted their job application readiness due to three primary issues: insufficient technical skills, a weak curriculum vitae, and a lack of interview experience. Meanwhile, application profiling took time for IT firm stakeholders. The design process produced a storyboard, information architecture, wireframe, screen flow, and high-fidelity prototype. The student and stakeholder application prototypes have been tested based on usability metrics and qualitative testing. The SUS questionnaire result showed a satisfaction rating of 94.75 (excellent), an effectiveness value of 100%, and an efficiency value of 0.08 goals/sec. Qualitative testing highlighted various flaws and suggestions for enhancing the application design. This research provides valuable insights to meet students' and company stakeholders' career preparation needs. In addition, the designed applications' usability testing results are promising. Furthermore, we will develop this prototype with more relevant features and send it to target users. We'll also release the app in English to reach global users.

References