IJDS 2022, Vol. 09 No. 2, Nov 2022, pp. 201-214
P-ISSN: 2355-2158, e-ISSN: 2654-4148
DOI:

Designing an Accessibility Portal for a Higher Education Institution

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Article history:
Received: August 4, 2022
Revised: October 11, 2022
Accepted: December 6, 2022

Published online at
ijds.ub.ac.id

Abstract

Education has a vital role in improving one's quality of life. Therefore, education should be inclusive or can be easily accessed by anyone without exception. Brawijaya University is one of the universities that incorporates an inclusive campus program into its policies. All facilities and infrastructure in Brawijaya University should be accessible to benefit the entire academic community of Brawijaya University. But in reality, the facilities at Brawijaya University are still not fully accessible. One thing that needs to be developed to support the creation of an accessible environment is the existence of an online portal that can be a source of information and education for anyone related to disability and accessibility. Using the Design Thinking method, the author researches the Design of an Accessibility Portal for Brawijaya University. This study aims to propose a design solution related to the problems above. This research in the process involves stakeholders (PLD website manager). From this research, the author produced a solution design in the form of a high-fidelity prototype which was then tested using the Single Ease Question method. The solution design gets an effectiveness rate of 98% and an average ease value of 6.51 points from each given task scenario. This test concludes that the solution design has succeeded in providing a solution and is relatively easy to implement on the PLD website.

Keywords: Portal Accessibility, Design Thinking, Prototype, Inclusive Education

1. Introduction

Education has a vital role in the process of improving a person's quality of life. Therefore, education should be inclusive or can be easily accessed and obtained by anyone without exception. *Undang-Undang* (Law) No. 8 of 2016 regulates inclusive education concerning Persons with Disabilities. In addition, Government Regulation (*Peraturan Pemerintah*) No. 13 of 2020 regulates the details related to the fulfillment of accessibility rights in the education sector concerning Adequate Accommodation for Students with Disabilities.

Brawijaya University is one of the universities that incorporates an inclusive campus program into its policies. It started when Brawijaya University established PSLD (Center for Disability Services Studies) in 2012 through the Decree of the Chancellor of the Brawijaya University Number: 135/SK/2012, and continued by providing a special

admission quota for people with disabilities in the amount of 20 allocations. Therefore, facilities and infrastructure in Brawijaya University should be accessible.

Jefri (2016) stated that Brawijaya University already has many facilities and infrastructure accessible for people with disabilities, especially for the physically disabled. Only a few things need to be considered to realize an inclusive campus. The lack of a ramp, the small size of the toilet, and the unavailability of handrails on each toilet are examples of things that need to be considered by Brawijaya University.

The occurrence of things mentioned above is caused by the absence of a common perception of how a facility can be accessible. Until now, there is no place to easily access all information related to accessibility. This problem eventually sparked a solution idea, such as the need for an accessibility portal that can be a source of information and education related to disability and accessibility. The solution is to avoid people's misperceptions about accessibility and make it easier for people to access information about accessibility itself.

Using the Design Thinking method, the author researches the Design of an Accessibility Portal for Brawijaya University. The first phase is to explore the needs and problems faced by stakeholders (PLD website managers) related to the lack of a common perception of accessibility. Then the author brainstorms with stakeholders to generate solution ideas that can solve problems and meet needs.

These solution ideas are used as a reference for designing the user interface of the Accessibility Portal for Brawijaya University. The design of the Accessibility Portal was tested using usability testing to find out if there were problems and whether there were things that could be improved from the design. In addition, the author also uses the Single Ease Question method by asking the level of ease of the design solutions on a scale of 1-7. With this research, it is expected to realize the Accessibility Portal for Brawijaya University so that the problems regarding the dissemination of information and education related to disability and accessibility can be resolved in the future.

2. Theoretical Framework

2.1 Literature Review

In this study, one study is used as a reference, namely the research conducted by Vallian Kautsar Fahdrerazi, Ismiarta Aknuranda, and Hanifah Muslimah Az-Zahra in 2020. With the research title "Evaluating the Family Search Genealogy Application with Usability Testing.", the authors use this research as a reference in testing the design of the Accessibility Portal that has been made.

2.2 Design Thinking

Design Thinking is a human-centered method that provides design solutions to problems faced by users and focuses on things that are seen and felt by users (Sari, 2020). Design Thinking is a method that integrates user needs, technology, and business capabilities to create innovations in product design. The stages of Design Thinking are:

A. Empathize

At the empathize stage, we understand the user and the problems experienced. Several things must exist to do this empathize stage, including observe (observing user behavior), engage (engaging directly by interacting with users), and watch and listen (combining the two previous things) (Kelley et al, 2018).

B. Define

This stage aims to understand users and problems more deeply so that the problem definition process can be carried out (Kelley et al, 2018). The tool used in this stage is How-Might-We (a method in the form of questions that can encourage someone to create various scenarios of solution ideas to solve problems (Rosala, 2021)).

C. Ideate

At this stage, we develop various solution ideas based on the problem definition carried out in the previous stage. The first thing we do is list the solution ideas to solve the problem within the selected How-Might-We scope. Then, the solution ideas are categorized into information architecture.

D. Prototype

Kelley et al (2018) state that the next stage is the prototype, namely ideas that have been categorized into tangible forms (user interface displays) and then connected all of the user interfaces into a prototype.

E. Test

The test is the stage for testing the products produced to ensure whether the solution design can solve the problems (Kelley et al, 2018). In this stage, the tools used are interviews and Single Ease Questions. Sauro et al (2016) describe that SEQ is a method to find out whether the task scenario given to the respondent is easy to do by asking the respondent to assess working on the task scenario. From Picture 1. you can see that in SEQ, the leftmost point (point 1) indicates that the task scenario is very difficult to do, then the further to the right shows that the task scenario is getting easier to do.

Picture 1. Single Ease Question

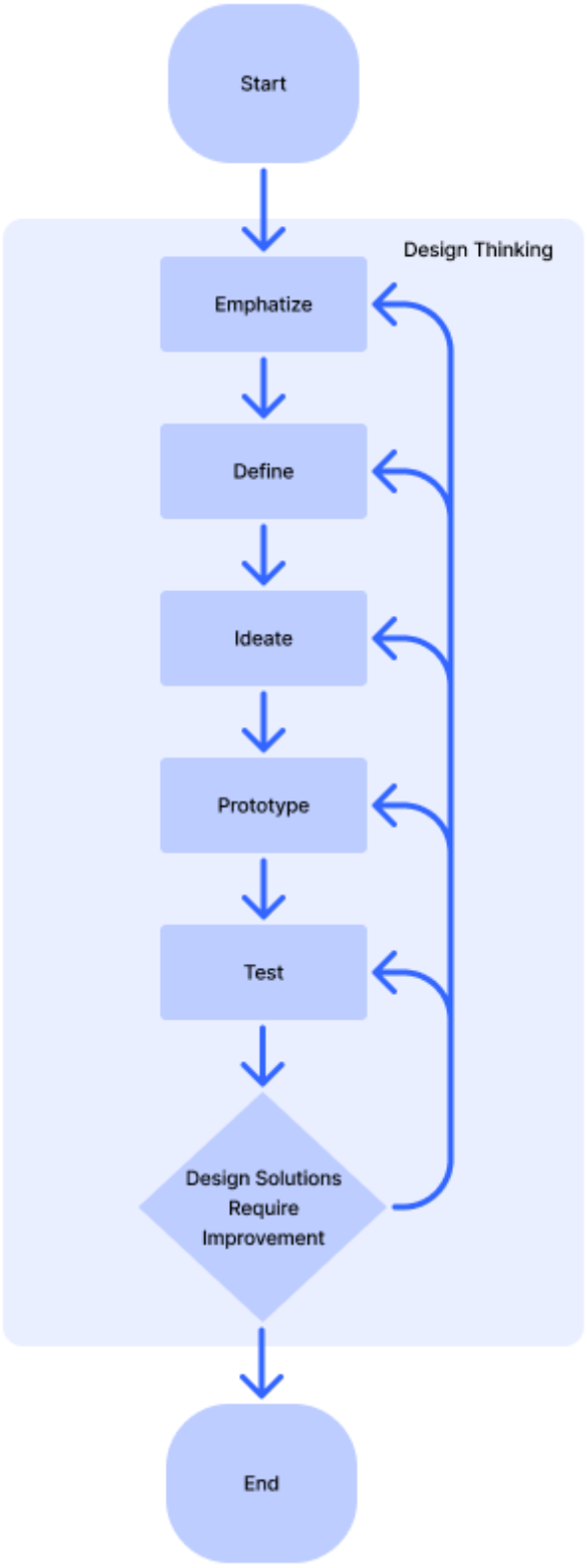
2.3 Inclusive Design

Before going into the discussion of Inclusive Design, it is essential to note that the term accessibility is taken from the Webster dictionary, which means something that is adapted to make it easy for people with disabilities to use or access it. Gilbert (2019) says that when it comes to accessibility, accessibility areas should focus on areas of visual, auditory, motor, and cognitive disabilities. By focusing on these things when creating a design, it is hoped that later the design will be able to make a product inclusive (available and usable by as many users as possible (Gilbert, 2019)).

One way to create an accessible product is to adopt a universal design process. Zheng (2021) says that we can use seven principles of Universal Design to plan and guide our design process inclusively. Those seven principles of Universal Design can be described more broadly into examples or simple guidelines. To make these things easier to find, the author creates an accessibility web portal that contains information and knowledge that anyone can learn and use (especially people who work in the field of education). This accessibility web portal is expected to help people who want to make an accessible product and indirectly help all people, whether people with disabilities or not.

3. Methodology

The steps taken in carrying out the research can be seen in Picture 2 below.



Picture 2. Flowchart of Research Methodology

The steps are taken in the research begin with empathize, the process of exploring the problem. This stage starts by interviewing the PLD website manager. At this stage, tools from Personas are used to find out the needs and problems that need to be solved.

Then the author maps the user's needs into an Empathy Map. After that, we enter the define stage; the author defines the problems and needs of the users in the How-Might-We statements.

The next stage is the ideate, where the author develops solution ideas (defining features and contents) that answer the How-Might-We statement. Then from the solution ideas, the author arranges or categorizes the features and defines them into the information architecture.

After that, we enter the prototype stage; the author realizes the solution ideas in a tangible form (the user interface of the accessibility portal), then all of the user interface designs are connected into a prototype. The last stage is a test which in this stage is testing prototypes to 4-5 respondents who are PLD website managers (stakeholders) using two methods, interviews and giving single-ease questions. This test will obtain the ease value of the Accessibility Portal design. And also, there are some suggestions and additions from the respondents to improve the design of the accessibility portal.

4. Requirements Analysis

In this chapter, we will discuss the results of the two initial stages of the Design Thinking method, empathize and define. The author collects information and references from the PLD UB website and the Accessibility Portal of Clemson University to explore what contents and things need to be displayed on an accessibility portal. In addition, the author also conducted interviews with the stakeholders (website managers of the PLD). From the interview process, it can conclude that a portal is needed that contains information and knowledge (such as guidance on the procurement of accessibility facilities) and a portal that contains all the services provided by PLD. The following is Picture 3, the stakeholders' (PLD staff of unit's content, information, and website management) persona.

Pak Randy

Age: 29
Education: Bachelor of Sociology
Hometown: Malang
Occupation: PLD Digital Accessibility Unit

"There are facilities for accessibility, but they do not work well. From there, it occurred to think how to avoid misperceptions about things in the field of accessibility."

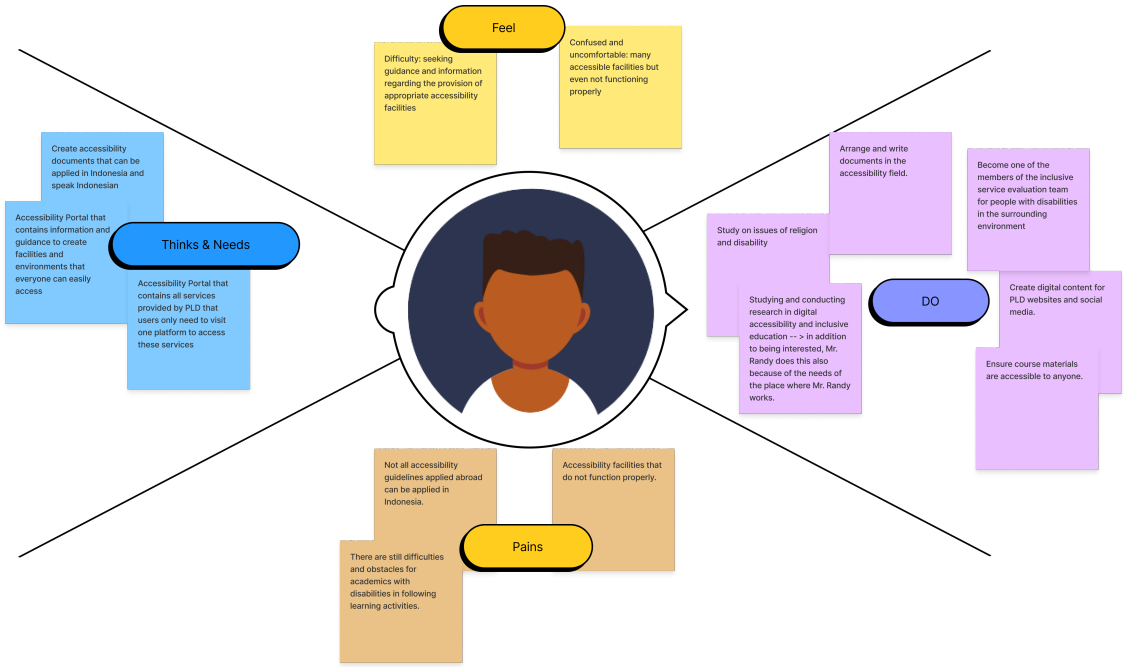
Goals
The existence of a platform that contains guidelines and information on the provision of facilities and infrastructure is accessibility that anyone can access.

Frustrations
Until now, guidance and information on how to make accessible facilities and infrastructure are still scattered.

Mr. Randy is one of the PLD's administrators and managers of information and content dissemination. In his daily life, Mr. Randy works in the field of studies related to issues of religion and disability, as well as technology services and digital accessibility. Therefore, Mr. Randy knows and understands what issues and problems commonly occur in the scope of people with disabilities. Mr. Randy often found some fundamental errors related to the provision of facilities and infrastructure that are accessible. For example, in some places Mr. Randy knows, there is an inclined plane with a steep height that can endanger many people, especially wheelchair users. There are also roads and slippery sidewalks that do not make it easier for wheelchair users because they can slip. From there, Mr. Randy understands that a platform is needed that can avoid people's misperceptions related to the issue of disability itself.

Picture 3. Persona of PLD Staff

In addition, after defining the persona, the next step is to create an empathy map, which is a method to assist the design process of a digital product by describing the users' characteristics. The following is Figure 4, an empathy map of stakeholders (PLD staff of unit's content, information, and website management).



Picture 4. Empathy Map of PLD Staff

In the next stage, the persona and empathy maps above are summarized into several problem definitions using the How-Might-We as follows:

1. How might we create a platform or portal that includes information and guidance on accessibility so that all existing accessibility facilities comply with established standards?
2. How might we create a platform or portal that contains all the services provided by PLD so that users can access services easily?
3. How might we create a platform or portal that is accessible so that everyone can easily access it?

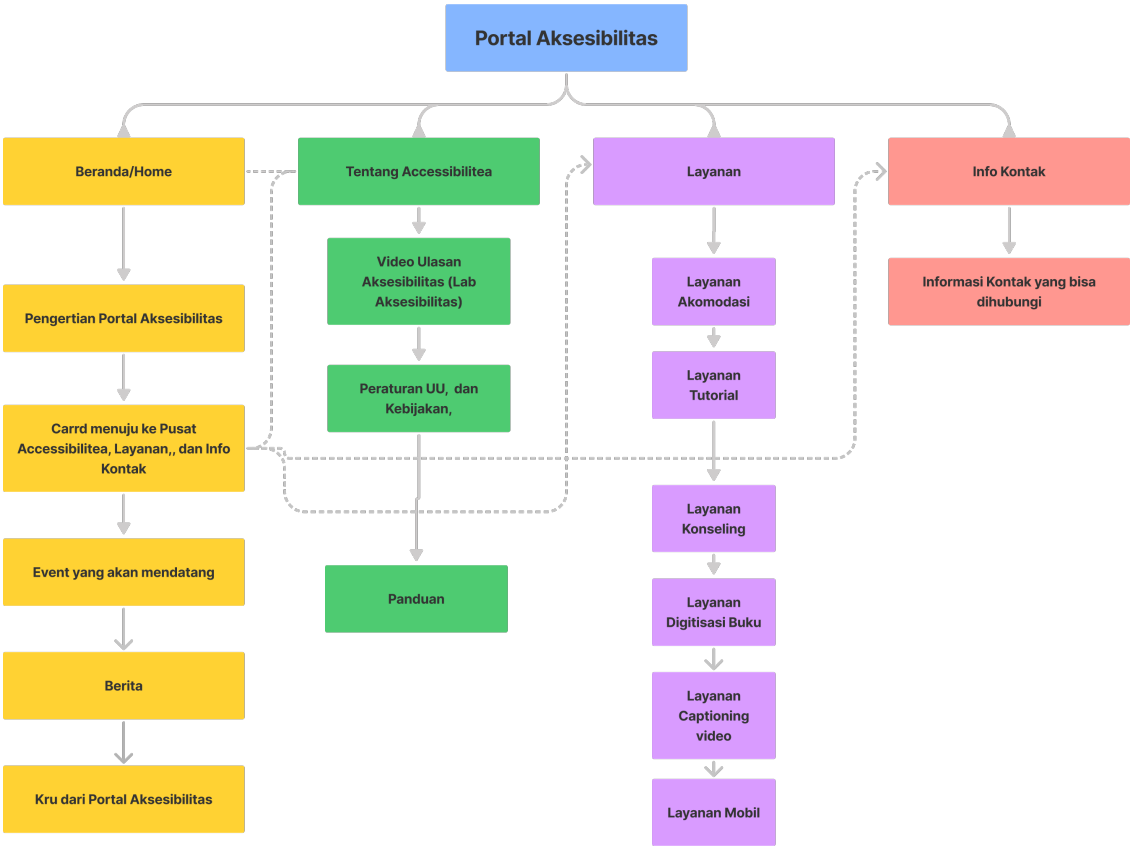
5. Solution Design

This chapter will discuss the following two stages of Design Thinking: ideate and prototype. The author maps the How-Might-We questions that the stakeholders have approved into several solution ideas to answer the problem. The following are the idea solutions:

1. Create events and news features so that users can find out and follow what events hold by PLD and what events happen in the PLD.
2. Create a video viewing feature so users can see and absorb information from the videos that PLD creates and uploads.

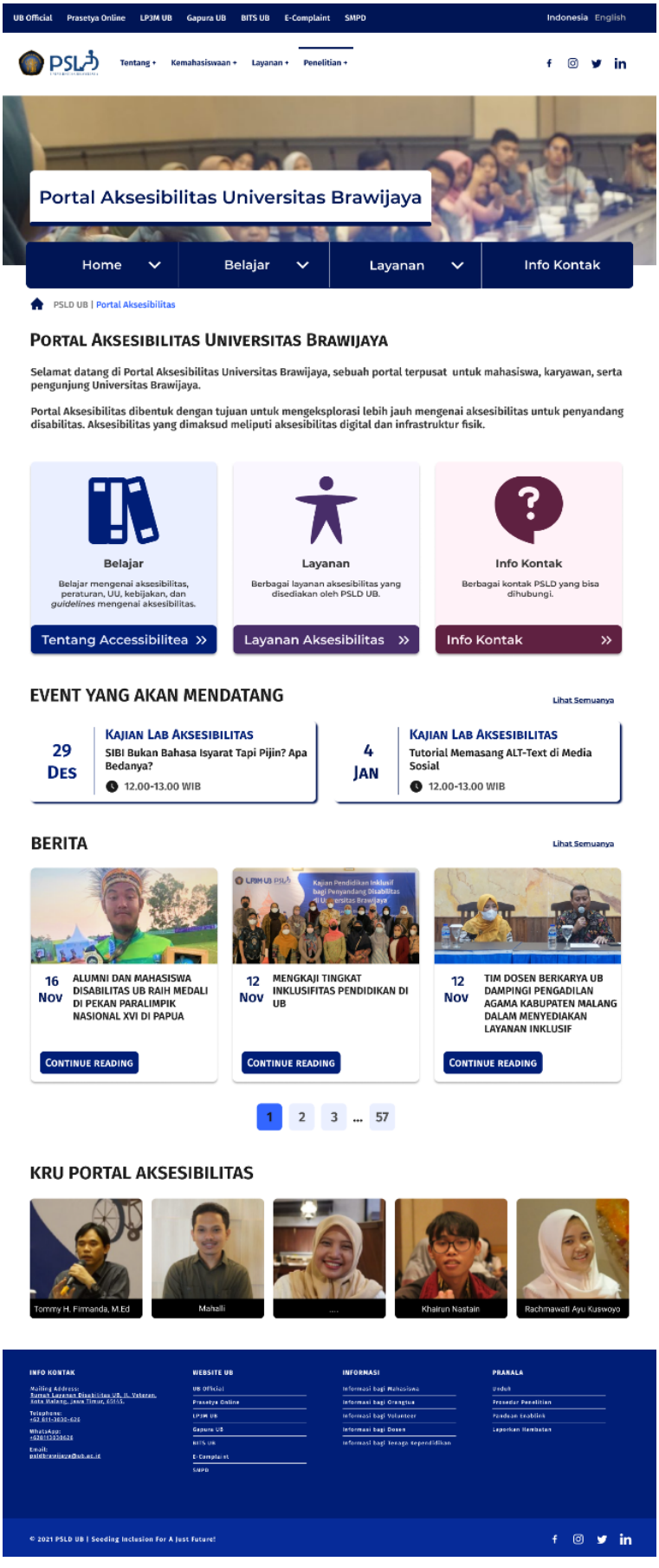
3. Create a feature collection of laws, regulations, and university policies so that users can see and know the rules and policies that underlie matters related to the requirement of facilities and services that are accessible.
4. Create a set of guide features so that users can find out and learn what steps can be taken in making a product or facility so that it is accessible.
5. Create service features so users can find out what services PLD provides to support the accessibility education environment.
6. Create a contact info feature so users can find addresses to contact PLD UB.

The solution ideas are then mapped into an information architecture to make it more structured and easier to understand what kind of content will be created. The following is the information architecture for the accessibility portal.



Picture 5. Information Architecture of the Accessibility Portal

In the next stage, the idea solutions defined in the information architecture are realized in the form of an Accessibility Portal web design with four main pages, namely the Home page, Study page, Service page, and Contact page. Here is one view of the web design that has been made.



Picture 6. Accessibility Portal Home Page Design

6. Test

The next stage is testing. The author tested the design on five respondents. Respondents from this testing phase are PLD staff who manage the PLD website and those responsible for distributing content and information about PLD. The test was carried out separately between one respondent and another respondent and took about 45 minutes with two stages, namely the interview and the provision of a single ease question (SEQ). The following is a list of task scenarios that respondents must carry out during the testing phase:

1. Task 1 (T1): Find information about events held by PLD that explain how to install ALT-Text on social media.
2. Task 2 (T2): Looking for news information about the achievements of UB students with disabilities and what PLD UB has been doing recently.
3. Task 3 (T3): Watch a video uploaded by PLD related to how low vision accesses video and digital content.
4. Task 4 (T4): Seek information on laws related to the national education system.
5. Task 5 (T5): Looking for guidance on how to create accessible PDF documents.
6. Task 6 (T6): Find information about the services provided by PLD.
7. Task 7 (T7): Find PLD contacts to be contacted

From the test results, a total of 31 of the total 35 task scenarios were successfully carried out by the respondents. From these data, it concludes that the effectiveness of the Accessibility Portal design is 88.5%, which shows that the effectiveness of the Accessibility Portal design is relatively high. In addition, the authors also asked the value of the ease of each task scenario carried out by respondents using the SEQ scale. The average value of the ease given by the respondents to each task scenario in the Accessibility Portal design is 6.28, which means that the Accessibility Portal design is quite easy to use.

7. Iteration of the Solution Design

After conducting the testing phase with the respondents, the author knew several things needed to be improved on the Accessibility Portal design. One conclusion is that the Accessibility Portal will join the PLD website on the Accessibility Lab page in the research menu. In the initial step in making iterations to improve the design of the UB Accessibility Portal, the author discusses with the PLD website manager to get solution ideas that now focus on answering one problem expressed by the PLD website manager. The main problem in this stage was how might we create a platform or portal that includes information and guidance regarding accessibility so that all existing accessibility facilities comply with the established standards.

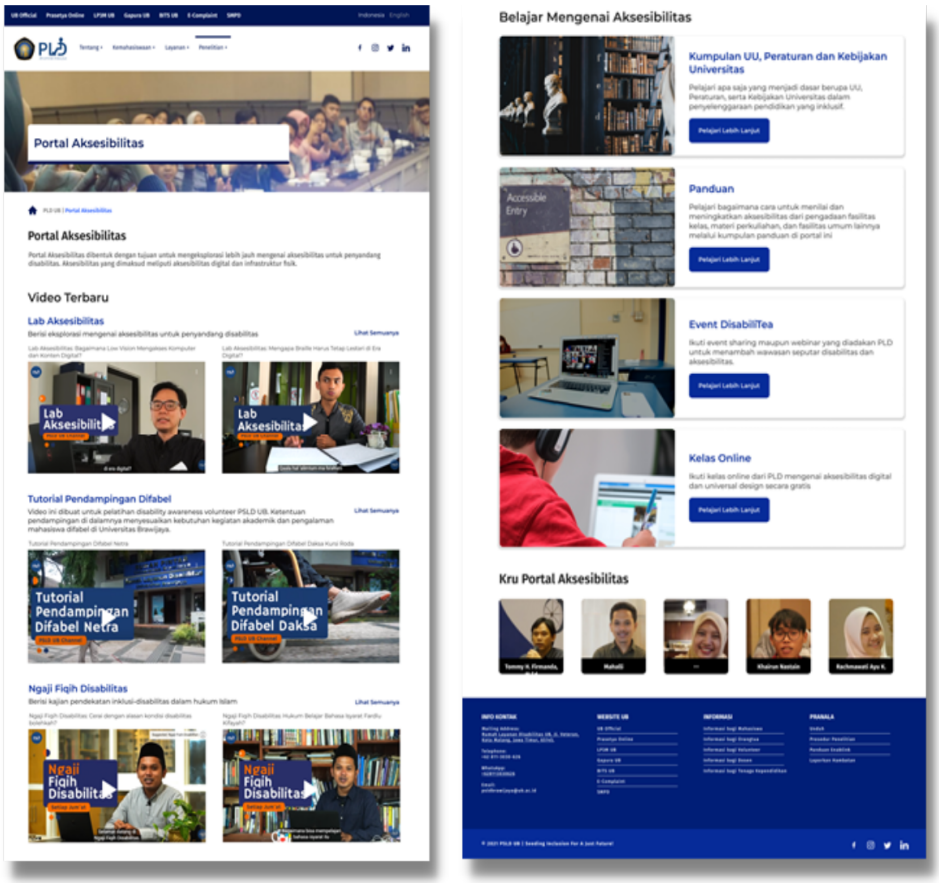
7.1 Requirements Analysis (Iteration)

At this stage, the author discusses with the PLD website manager to get solution ideas that are now focused on answering one expressed problem. The following is the formulation of the solution ideas from the discussion:

1. Create a video playback feature about disability and accessibility issues uploaded by PLD on His YouTube account
2. Creates a collection of laws feature, regulations, and university policies so that users can see and find out the rules and policies that underlie matters related to the provision of accessible facilities and services.
3. Create a set of guide features so that users can find out and learn what steps can be taken in making a product or facility accessible (inclusive content guides, website design guides, and other design guidelines).
4. Create a Disabilitea event feature so that users can know and follow the events held by PLD.
5. Create an online class feature (which users need to register before joining the class)—then add a class forum feature.

7.2 Solution Design (Iteration)

In the next stage, idea solutions (features) are then realized in the new Accessibility Portal design. The following is one display of the portal design that has been created:



Picture 7. Home Page Design

7.3 Test (Iteration)

The next stage of the iteration process is the second test process. The author tested the design on four respondents. Testing is carried out separately between one respondent and another and takes about 30 minutes. The second test provides task scenarios to respondents to try the Accessibility Portal design. The following is a list of task scenarios that respondents must do during the testing phase:

1. Task II-1 (TII-1): Watch a video tutorial for assisting the visually impaired uploaded by PLD.
2. Task II-2 (TII-2): Look for information about the Brawijaya University policy regulating the Independent Selection (*Seleksi Mandiri*) process for UB's Persons with Disabilities.
3. Task II-3 (TII-3): Seek guidance on how to make accessible online lectures and exams.
4. Task II-4 (TII-4): Follow/join the ongoing Disabilitea event.
5. Task II-5 (TII-5): Look up detailed Digital Accessibility class information.
6. Task II-6 (TII-6): Register / create an account.
7. Task II-7 (TII-7): Log in to the previously created account.
8. Task II-8 (TII-8): Join the class and study the material.
9. Task II-9 (TII-9): Answer practice questions in the class forum.
10. Task II-10 (TII-10): Add a new topic or question to the class forum.
11. Task II-11 (TII-11): Look up account profile details.
12. Task II-12 (TII-12): Look up account profile details.
13. Task II-13 (TII-12): Logout of the account.

From the task scenario above, the following is Table 1, which shows the respondent's completion of the task scenario.

Table 1. Completion of Task Scenario Table

Task Scenario	R2	R3	R4	R5
TII-1	1	1	1	1
TII-2	1	1	1	0
TII-3	1	1	1	1
TII-4	1	1	1	1
TII-5	1	1	1	1
TII-6	1	1	1	1
TII-7	1	1	1	1
TII-8	1	1	1	1
TII-9	1	1	1	1
TII-10	1	1	1	1
TII-11	1	1	1	1
TII-12	1	1	1	1
TII-13	1	1	1	1

The information above concludes that the effectiveness of the Accessibility Portal design is 98%, which shows that the effectiveness of the Accessibility Portal improvement design has been quite high. In addition, in the second test, the authors also asked the

value of the ease of each task scenario carried out by respondents using the SEQ scale. The following are the results.

Table 2. Table of SEQ Values

Task Scenario	Respondents				Average Score of each Task
	R2	R3	R4	R5	
TII-1	6	7	6.5	7	6.6
TII-2	5	7	5	5	5.5
TII-3	6	6.5	7	7	6.6
TII-4	6.5	7	7	7	6.8
TII-5	6	7	7	7	6.7
TII-6	7	6.5	7	7	6.8
TII-7	6.5	7	7	7	6.8
TII-8	6	6.5	6.5	5	6
TII-9	6	6.5	6	6	6.1
TII-10	5.5	6.5	6.5	7	6.3
TII-11	6	7	7	6	6.5
TII-12	6	7	7	7	6.7
TII-13	6.5	7	7	7	6.8
Average Score					**6.51**

In the table above, the average SEQ value given by respondents to the execution of each task scenario in the Accessibility Portal design is 6.51, which means that the new Accessibility Portal design is quite easy to use.

8. Conclusion

From the research conducted, the following are some conclusions:

1. From the interview process and problems exploration to stakeholders or PLD website managers, the Accessibility Portal is an information portal containing regulations, guidelines, and tutorials on making accessibility products. In addition, there is a need for a feature to learn together (related to disability and accessibility) realized through Disabilitea events and online classes.
2. The contents in the Accessibility Portal are:
   a. Regulations (Laws, Brawijaya University policies) that regulate disability and accessibility in the scope of education, facilities, and infrastructure.
   b. Guides for developing accessible content or learning products, guidelines for creating accessible websites, and other product design guidelines to make them accessible.
   c. Disabilitea events contain various activities held by PLD around disability and accessibility itself.
   d. Online classes on accessibility that are organized by PLD so that users can learn materials and guides for making an accessible product.
3. The Accessibility Portal design has an average point of 6.51 in the Single Ease Question, which means that the Accessibility Portal design created is quite easy to

use. Then from short interviews conducted after testing with respondents, the Accessibility Portal is considered to bring many benefits, especially for people who want to learn about disability and accessibility and people with disabilities themselves.

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