APPENDIX A . Initial Proposed Method

The purpose of the initially proposed method was to offer support exclusively for the research group members during its initial application rather than being intended for use by other professors. In this context, its presentation in this work serves primarily as a means of providing consultation and documenting the method's development. For proper usage of the method, it is recommended to refer solely to the final version presented in Appendix B.

A.1 Empathize

The Empathize stage of DT is focused on understanding users and their needs. In this phase, students can empathize with users, gaining insights into their motivations and challenges. This understanding helps students create relevant and meaningful solutions.

Before starting, students should be divided into groups (we recommend a maximum of 10 groups) and each group will be responsible for developing an accessible mobile application for a specific accessibility characteristic, such as blind, deaf, among others. The accessibility characteristic of each group will be defined during the first activity.

A.1.1 Learning about accessibility characteristics

The main objective of this activity is to familiarize students with the different accessibility characteristic, what difficulties these people face, and how these people interact with computing devices (such as computers or cell phones).

To start, each group must choose an accessibility characteristic, and this group will be responsible, throughout the classes, for developing an accessible mobile application for the chosen accessibility characteristic. Groups are free to choose the desired accessibility characteristic. It is advisable that they are not repeated. However, once the possibilities are exhausted, it is okay for more than one group to be responsible for the same one. The suggested characteristics are the following:

- Deafness
- Blindness
- Low vision
- Dyslexia

- Low Literacy
- Older Adults
- Motor Disability
- Autism
- Learning Disability
- Intellectual Disability

With the division finished, this activity comprises two activities. For the first one, each group should research the chosen accessibility characteristic on the internet and find as much information about that group of people as possible. What is the nature of that accessibility characteristic, what difficulties do these people face in their daily lives, and what adaptations do they need to face these difficulties.

For the second activity, we will turn the groups' attention to how these people interact with technology. Each group should now research on the internet how these people use computers, cell phones, and other devices and what software adaptations they need. The goal is to understand how software can be adapted to allow these people to perform everyday tasks, such as sending an email or consuming content, such as watching videos and playing video games. If it is easy to reproduce, the groups can also try to simulate the interaction of these people with the software, such as, for example, in the case of visually impaired people, turning on the cell phone screen reader (TalkBack for Android and VoiceOver for iOS) and trying to interact with some app with eyes closed.

A.1.2 Present to the class

This activity aims to have the knowledge about each accessibility characteristic acquired by each group to be shared with all other groups. Each group should briefly present and share with the class the knowledge they acquired about the chosen accessibility characteristic in the previous activity. The needs of that group of people, the difficulties faced, what adaptations these people need to carry out daily activities, how they interact with computing devices, and what adaptations they need in software to use it.

A.2 Define

In the Define stage of the Design Thinking process, the examination of potential solutions to the problems identified in the previous stage takes place. During this phase, the criteria for an effective solution are established, taking into account both user needs

and technical feasibility. This definition serves as the basis for guiding the entire subsequent creative process.

A.2.1 Learning about accessibility and guidelines

This activity aims to familiarize students with the formal and legal concepts of disability and accessibility while also introducing them to the concept of accessibility guidelines, specifically focusing on the Web Content Accessibility Guidelines (WCAG). Starting with the formal definition of disability and accessibility found in the Brazilian Law for the Inclusion of Persons with Disabilities, the activity also discusses a broader interpretation of accessibility. This inclusive perspective shows that accessibility extends beyond people with disabilities, including anyone with reduced capabilities. Such limitations can be permanent, as evident in disabilities, temporary, like impaired mobility due to an injury, or situational, such as difficulty hearing in noisy environments.

This first discussion is intended to demonstrate to students the value of integrating accessibility adaptations into software products. By emphasizing this integration, not only can people with disabilities be better served, but all users benefit from enhanced usability. After this, the lecture goes on to discuss accessibility guidelines. Accessibility guidelines are standards for developing an accessible product, offering criteria for developing accessible products. These guidelines provide a set of rules that software development professionals can follow, ensuring their products meet specific accessibility levels while simplifying their work process.

After the slides on guidelines, the last part of the activity consists of an interaction moment on accessibility and guidelines. Some interfaces will be shown in the slides, with examples of how an interface can adhere or not to some of WCAGs success criteria. The goal is to initiate a discussion for each displayed interface, seeking to identify any issues that may hinder its usability for individuals requiring accessibility. This involves identifying the specific group of users affected by the problem and determining which WCAG guideline is being violated.

A.3 Ideate

In the Ideate stage, the focus is on generating ideas. At this stage, the final product to be developed will be imagined, using all the knowledge about users acquired in the Empathize stage and all the knowledge of ways to solve this problem acquired in the Define stage.

A.3.1 Learning about accessibility in software development

This activity highlights the importance of considering accessibility in the software development process. Using a generic software engineering waterfall model with five steps: requirements gathering, design, implementation, testing, and maintenance, the lecture explains how accessibility should be integrated into each stage.

A.3.2 Idealize the application

In this activity, students will define the key points of the application they plan to develop. Groups are free to use the internet to consult previously explored concepts or find new information. Building on the information gathered in the previous stages, they will specify the following aspects of the application:

- What is the application purpose?
- What is the main flow of application usage?
- What are the technological needs of people with the accessibility characteristics of the group?
- What design decisions to avoid by thinking about the accessibility characteristics of the group?
- What are the technological preferences of people with the accessibility characteristics of the group?

A.3.3 Present to the class

In this stage, each group will briefly present the questions they answered in the previous activity. It's encouraged for groups to freely ask questions and provide suggestions regarding one another's projects.

A.4 Prototype

The Prototype stage is the time to materialize ideas into tangible prototypes or visual representations. Prototyping will allow students to transform what was idealized in the past stage into something concrete and testable.

A.4.1 Learning about prototyping

This activity consists of a lecture in which students will be presented with the basic concepts of prototyping to educate students on the significance of prototyping

in the software product development process alongside a study of diverse prototyping methodologies. The groups will be utilizing Paper Prototyping to create their prototypes, and as a result, this specific technique will be introduced and explained in detail.

A.4.2 Prototype the application

The main objective of this activity is to provide the groups with an opportunity to develop prototypes for the applications that were ideated in the previous stage. Through this exercise, students gain practical insights into the translation of theoretical concepts from earlier stages into concrete design and functionality decisions.

During this activity, the groups are instructed to utilize the paper prototyping technique to craft the planned application interfaces. Students can draw the interfaces using pencils, pens, colored pencils, and similar tools.

A.4.3 Present to the class

The main goal of this activity is for the groups to share their developed prototypes for their applications. Each group will briefly present their prototype and explain how the assigned accessibility characteristic influenced the design decisions for the interfaces.

A.5 Test

The Test stage is the final stage of DT, where prototypes are subjected to testing. Students will collect feedback from each other, and based on the information collected, they will be able to validate solutions that meet the needs of users.

A.5.1 Learning about testing

This activity consists of a Lecture to provide students with a foundational understanding of testing principles. It covers essential concepts like defining personas, test scenarios, and conducting tests using paper prototyping. The prototypes developed earlier will be utilized for these tests. The activity highlights the importance of testing in the development process, emphasizing its iterative nature. By conducting tests, issues can be identified and addressed, contributing to continuous product improvement.

A.5.2 Test the application

The main purpose of this activity is to enable groups to evaluate the prototypes they have developed and identify any issues that may need to be addressed. Members of other groups will conduct the testing to gain an external perspective on the prototypes.

To begin the activity, each group must define a test persona, including their name, age, and the accessibility characteristic they possess. Additionally, the group should outline at least three tasks that the tester will perform within the context of the application's usage scenario, as defined by the prototype.

Next, the professor should select one member from each group to act as the tester for another group. The chosen member will adopt the persona described earlier and perform the three tasks using the paper prototyping testing technique. Meanwhile, the other group members will observe and take notes of any encountered problems, including a description of the issue, its location in the prototype, and possible solutions for correction. After the tests, each group should prepare a brief report listing the observations for each test conducted.

A.5.3 Present to the class

This is the last activity of the method, and this is when the groups will present the problems discovered during the testing stage, along with their proposed solutions. Each group will briefly share the main issues encountered during testing, their specific locations in the prototype, and suggestions for resolving them through redesign if needed.