Mobile Application Developed According to Accessibility Design Guidelines

Author/Presenter

Felipe Luna Tersi
Eldorado Research Institute
felipe.luna.tersi@gmail.com

Author/Presenter

Ilana de Almeida Souza Concilio
Eldorado Research Institute
ilana.concilio@eldorado.org.br

Felipe Luna Tersi
Eldorado Research Institute
felipe.luna.tersi@gmail.com

Resume

UX/UI Designer at Eldorado Developer Agency at Eldorado Research Institute - Campinas. Designer student at Apple Developer Academy @ Eldorado Research Institute - Campinas. Graduated in Digital Design at PUC-Campinas and Post-Graduate in Interaction Design UX/UI at PUC-Campinas.

Ilana de Almeida Souza Concilio
Eldorado Research Institute
ilana.concilio@eldorado.org.br

Resume

Pedagogical Coordinator at Apple Developer Academy at Eldorado Research Institute - Campinas and professor at FIAP, Impacta and Idea9. Experienced Teacher with a demonstrated history of working in the higher education industry with research and publications in Education, Educational Resources, Educational Technologies and Methodologies. Professional skilled in Computer Science, Lecturing, Educational Technology, Games, Swift and Computer Graphics. Strong Experience in mentoring for iOS, watchOS and tvOS apps development.

INTRODUCTION

- The development of accessible applications does not keep pace with the improvement of devices' technology, becoming inaccessible to people with disabilities;

- Accessibility of mobile communication does not mean simply keeping users connected with other people; it also means offering them more security and autonomy, aiming to be socially independent and an integral part of society;

- It was registered that there are more than 1 billion people living with some type of disability in the world, 39 million are affected by blindness and that 246 million suffer of moderate or severe loss of vision;

- This projects shows the development process of an iOS application (Palpite Olímpico) following two accessibility guidelines with the aim of promoting inclusion of blind people and users with low vision and/or visual processing disorders.

Mobile Accessibility and Design Guidelines

- Accessibility of mobile devices refers to the ability to interact properly with the operating system of the devices;

- There are a number of accessibility tools available in the operating systems of these devices, such as a screen reader, magnifier and contrast control, but only few apps support them and in order for them to work correctly, it is necessary to implement them programmatically and adapt the applications accordingly;

- There are some accessibility standards available in order to guide the development of applications accessible to users with special needs;

- In this project the two guides used were Web Content Accessibility Guidelines (WCAG) and Human Interface Guideline (HIG).

Mobile Accessibility and Design Guidelines

Web Content Accessibility Guidelines (WCAG)

- Developed by the W3C (World Wide Web Consortium - the main standardization organization on the World Wide Web);
- Provide guidance to create accessible content in a standardized way for the web for people with special needs;
- It does not specifically address mobile applications, but the principles and success criteria outlined in WCAG is relevant to mobile apps;

Consists of four principles:

- **Perceptible:** Information and interface components must be presented to users so that they can perceive them;
- **Operable:** Interface components and navigation should allow users to use them without difficulty;
- **Understandable:** The information and the interface must be understood by all users;
- **Robust:** Content needs to be robust enough to be concisely interpreted by a variety of user tools, including assistive technologies.

Mobile Accessibility and Design Guidelines

Web Content Accessibility Guidelines (WCAG)

• For each principle, there are a number of secondary recommendations that indicate how to address the primary ones. In total, 61;

- **Level A:** It is the minimum level of criteria met in general accessibility barriers, but does not guarantee a highly accessible application;

- **Level AA:** Meeting the requirements at this level already guarantees a very accessible application for most users and use of most technologies;

- **Level AAA:** It is the most rigorous criterion to be reached, as it has already passed through level A and AA.

Mobile Accessibility and Design Guidelines

Human Interface Guideline (HIG)

• Developed by Apple is a guideline that offers a series of recommendations, in order to improve the user experience through more intuitive, didactic and consistent interfaces, created to enrich the development of applications for all Apple mobile devices;

There is the Accessibility section, which addresses the four main categories:

• **Visual impairment:** VoiceOver, a tool that translates all information present in the interface in speech; color inversion to change how content is displayed; font size configuration that allows users to set the size of the text; screen zoom that enlarges the screen and a feature that uses the device's camera as a magnifying glass;

• **Hearing loss:** Alternatives to aural interaction, such as closed captions, visual and haptic notifications and typing for Siri;

• **Physical and motor disabilities:** Siri to control the devices and applications using their own voice and also Assistive Touch that facilitates the interaction through standard gestures;

• **Literacy and learning disabilities:** Provides features such as Speak Screen - the system reads a text for the user; Typing Feedback - while typing, user receives feedback as well as speak text corrections and word suggestions; and Safari Reader - isolating text without distractions, such as advertisements.

METHODOLOGY

Challenge Based Learning (CBL)

• Helps finding solutions to real problems, in a fully collaborative way, regardless of the area and situation of the problem;

Consists of three different interconnected phases:

• **Engage:** At this moment, it is necessary to choose a large area of activity known as Big Idea, in the project described in this paper, the area was “Accessibility”;

• **Investigate:** There were raised a series of questions that would help understanding the problem and would be fundamental to find an optimal solution to it. They are known as Guiding Questions and some of them were: "*What guidelines to study to use as a basis for the development of this application?*", "*What accessibility resources can we focus on in the study and development that will bring greater value to users*?", "*How to correctly apply these resources and technologies?*”;

• **Act:** Which is precisely the implementation of the solution defined as a result of the investigation phase, the solution consisted of the development of Palpite Olímpico, an iOS application for guessing the matches of each game in the Olympics.

RESULTS

Palpite Olímpico

• Mobile application developed for the 2020 Olympics, to allow to guess the matches of each game in the competition;

• Presents a calendar containing all games matches, so the user would search for the match of his favorite sport and category and guess which country would win the selected match;

• According to the correct answers, the user would accumulate points and rise in the ranking among other users;

An iOS mobile application concerning some accessibility features as:

• Voice Over for blind people to be able to browse autonomously;

• Dynamic Type for users with low vision making font size adapt to the size set in the device;

• Color Contrast Checker at AAA level, to provide better experience for color blind and low vision users, enabling the correct choice of colors.

RESULTS

Dynamic Type

• Implemented throughout the application and when enabled, the font size of the text in the app must adapt to the size and weight specified in the device settings;

• Provide better readability of the information on the screen by people with visual impairment or loss of vision;

• Figure 1 (a) and (b) shows the support of Dynamic Type. In Figure 1(a) it is possible to see the Palpite Olímpico's home screen without the feature enabled, with a calendar at the top showing five days a week and below a collection of sports with three sports by row;

• The Figure 1(b) presents the home screen with the Dynamic Type enabled at its maximum size. It can be noted that the distribution of the elements change, the calendar now shows only three days, and the sports categories are arranged in only one column instead of three.

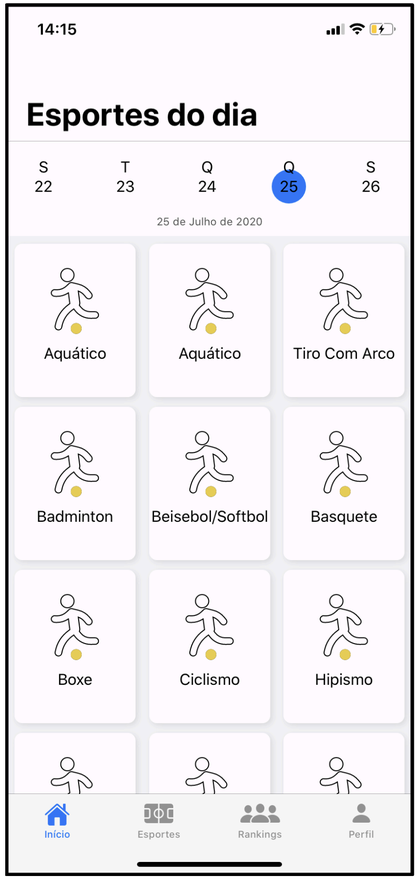

Figure 1(a)

Figure 1(b)

RESULTS

Color Technologies Contrast Checker

• Contrasting colors were selected in relation to the background, to better identify the elements;

• Figure 2 shows a feature for users with color blindness to choose the color palette to be applied according to their type of color blindness;

• Font color of a text or icon and the color of the background element and Palpite Olímplico obtained the AAA level classification, according to WCAG's Color Contrast Checker.

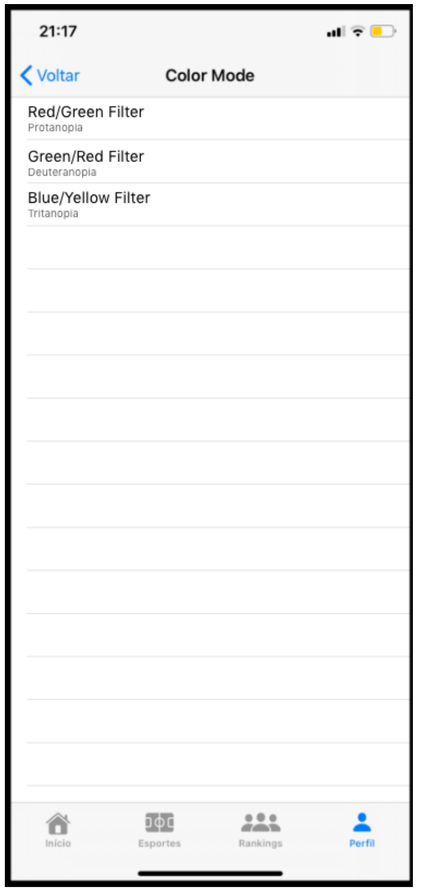

Figure 2

RESULTS

Voice Over

• Implemented, helping blind users to navigate the entire application;

• Allows navigability through touch providing an audio description to guide the interaction;

• Voice Over activated, a black rectangle appears around the element the user interacts with, that also may help users with low vision to navigate;

• All audio narrated by Voice Over was edited by a Pronunciation Editor, allowing to create phonetics corresponding to the subject, providing tips on how to interact with the selected element, describing images, texts and button actions.

Preliminary Tests

First Test

• Bruno Nogueira, 56 - With Cataract disease;

Consisted of three steps:

• **First step:** Asking him to try to use the application Palpite Olimpico with the standard font size of the operating system, The user could not see anything, just a blurry screen and he was unable to distinguish what was really being shown;

• **Second Step:**, the largest font size that comes standard in the system was activated. At this moment, the user started to distinguish some texts and icons, but he was not sure what was written or what the icons represented;

• **Third Step:** Dynamic Type was applied in its largest font size and the user stated that he could read everything and also distinguish the icons, as he was using glasses and a magnifying glass;

• “It would be incredible if every application could place fonts of this size, because I often need to use the cell phones but there is no one near me to help and I end up being dependent on others” - Bruno Nogueira, 56

Preliminary Tests

Second Test

• Guilherme Caiola, 24 - With the condition of color blindness which is a vision disorder that interferes with color perception;

• Should browse the application Palpite Olimpico with the standard colors and it was clear that it was possible for him to see and understand everything;

• Pointed out that the contrast between the texts and the images were, thus confirming that the use of color contrast at the AAA level actually worked;

• “It would be very interesting if all applications were designed concerning the contrast of colors, because it is impossible for me to read and understand the interface” - Guilherme Caiola, 24

CONCLUSIONS

• Really difficult and thorough process so that all accessibility features and tools have an efficiency and safety during their use;

• It is often necessary to make adjustments to the layout and even the navigation flow;

• Biggest lessons, accessibility must be a concern for everyone, because at any moment a disability or illness can arise, and you may need these resources;

• Expected to carry out tests with a larger sample of users, to effectively prove the relevance of using accessibility guidelines in the design of mobile applications;

• Necessary test the efficiency of the Voice Over feature and prove that it allows navigation autonomously and without error for this type of user.

Thank you