APPS. ACCESSIBILITY AND USABILITY BY PEOPLE WITH VISUAL DISABILITIES

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ABSTRACT

The increasing use of ICT devices, such as smartphones and tablets, needs development of properly software or apps to facilitate socio-educative life of citizens in smart cities: Adaptive educational resources, leisure and entertainment facilities or mobile payment services, among others. Undoubtedly, all that is opening a new age with more information and autonomy for each individual, but the point is if these apps are accessible for the whole population. And when we talk about accessibility in an App, we are not only considering if the user is able to switch it on or unfold it main menu, we consider interface aspects that can present difficulties for some users.
This study analyzes accessibility and usability of 15 Apps for people with visual dysfunction, because this difficulty has the greatest influence on the effective and efficient use of them. Data are collected through a descriptive scale made by a deductive-inductive process on four categories with a wide use of Apps. Social and specifically social-networking category is the largest consider accessibility on their apps, being highly demand by users and cost-effective for companies. Other categories are evaluated as completely inaccessible by users.

1. INTRODUCTION AND ESTATE OF THE TOPIC

On the last decades, the internet is used by most people to exchange information, compare and search for data or as a single entertainment, being this procedures as something absolutely socially accepted. But although, the internet has been remarkably successful like ubiquitous and universal mass media, there are still a lot of aspects to work out. Dominigue (2011) states, it is necessary to go forward on new ideas to satisfy investigation and society, to accept new challenges and chances of the digital society.

The blooming emergence and use of Information and Communication Technologies (ICTs) by people, especially smartphones and tablets, brings a need to development properly smart software or apps, to get the best achievements on these devices, which have been well received for making our everyday life easier.

The creation of hundreds of mobile applications try to make easier the city life, from discovering available entertainment venues every single day, to finding out the petrol station with lowest price, to the roads conditions at any time time. It is a fact that ICTs are opening a new age, improving and facilitating the information our personal autonomy.

But what is exactly an "app"? This word comes from "application", defined by Gil and Rodríguez-Porrero (2013), as the software application used in mobiles devices and .specially designed for mobiles phones and tablets, accessed by a touchscreen. You can downloaded free or paid for, from websites of companies of these devices, although one of the widest world used is by Company Google, called "Play Store". Also, they have easy installation, automatic updating, small file sizes and minimum storage capacity on the hard disk, despite their quite intuitive interface. Therefore only in a few minutes, the users can try these apps, erase and look for another one more suited to their interest on different platforms or apps stores. They can look for several tools, according to personal needs and abilities, turning their phones in a useful and powerful tool to facilitate their daily life.

Are these new technologies actually accessible to everybody? The concept of accessibility is a pretty broad term and covers different fields. Broadly, it could be defined as the capacity of objects or places of being useful for any user, regardless of their abilities. Alonso (2007) defines it as "the possibility of going

where it's required or achieve the things we wish (...) in the context of disability the term acquires an aggressive touch when it refers to rights" (p.16) As Alonso explains, this process of removing barriers implies quite complex interventions and it involves a high cost many times, because they are only aimed to a little percentage of population. On this way, an app is really accessible when the user can interact with all applications elements, regardless a physical, psychological, sensory disability or any other disability.

The application elements means all the application's interface elements, including the overview when you start the application, keys of control and so on.

And the app's accessibility is not only switch on, open and access to the application main menu, it means an easy interface to facilitate surfing on all elements of app, without barriers for some users. Also, Gil y Rodríguez (2013) explain other points to be considered by apps' designers, such as organization of application, popups texts, visual appearance, color or contrast, because all of them have a direct influence on the accessibility and usability of the application.

2. MATERIAL AND METHODS

This study analyzes accessibility and usability of 15 Apps (see table 1) by people with visual disability, taken by an intentional selection of a large number of available at Google Play (Android operating system), App Store (iOS operating system) and iTunes Store (iOS operating system) rankings of most used applications of year 2014.

Table 1. Apps' sample

App Store (iOS)	Google Play (Android)	iTunes Store (iOS)
Facebook Messenger	Duolingo	Facebook Messenger
Snapchat	Facebook	WhatsApp Messenger
YouTube	MyFitnessPal	Telegram Messenger
Facebook	Netflix	Facebook
Instagram	Pandora	YouTube
Pandora Radio	NFL Mobile	Google Maps
Google Maps	Flipagram	Instagram
Flipagram	TripAdvisor	Spotify Music
Spotify Music	Candy Crush Saga	Shazam
2048		Wallapop

The apps are grouped according to their environment of use: Educational environment (Google and Dropbox and Duolingo); Social environment (Facebook, Twitter, Youtube, Wallapop, EsAccesible and Fever); Health and Sports environment (Endomondo and MyFitnessPal) and Travelling environment (TripAdvisor, Blablacar, Madrid Metro/Bus/Cercanías and Google Maps). After their descriptive analysis, we can establish their accessible and usable level by these visual disabled citizen.

This difficulty has the greatest influence on the effective and efficient use electronic devices. They appear because of malformations, diseases or injuries at the sight organ of hereditary origin, dominant- recessive, or linked to gender. Depend on its severity, causes low-vision or blindness (Lou, 2011). The World Health Organization (WHO) (2014) divides vision ability in 4 levels in its briefing note 282: Normal vision, moderate visual disability, severe visual disability and blindness. Gathering the third from last and the second to last under "low-vision" that represents visual disability cases together with the blindness term. We can find

285 million people suffering from visual disability all around the world, 30 million blind and 246 low-vision rated. In light of this data, a large part of world population suffers with this disability, so thinking and look after these people is an obligation when it comes to the time of creating and designing open spaces, buildings and technologies, among which we can find the Apps.

The descriptive scale, as instrument to register data, consider eighth indicators of accessibility. The following table 2, about education field, is showed as a single example one of the apps assessed on this field.

Table 2. APP's Accessibility Indicators on EDUCATION FIELD

Indicators	Google Chrome		
1. Images description	1. Images, Graphics, colours and videos are not equally described. X	2. Images, graphics, colours and videos are described in some situations.	3. Images, graphics, colours and videos that appear are described.
2. Media content	1. It doesn't let you make images, graphics nor videos big.	2. It only lets you make content big in specific situations.	3. It lets make all images, graphics and videos big. X
3. Contrast, brightness and colour	1. Levels of colour, brightness and contrast are unchanging. X	2. Only some of the levels can be changed and just in some situations.	3. It allows to change colour, brightness and contrast levels.
4. Auditory signals	1. There's no auditory signal that guides the process. X	2. In some cases there are auditory signals.	3. The app accompanies the information with auditory signals all the time.
5. Touch surface	1. The keys don't have at least 9mm.	2. Only some keys have at least 9mm.	3. The keys have at least 9 mm. X
6. Customizable controls	1. Interface doesn't allow to modify controls on colour and size. X	2. Some controls are alterable on colour and size.	3. Every control is alterable on colour and size.
7. Text	1. It doesn't let you make the text bigger.	2. Some texts allow you to make its size bigger.	3. Every text let's you make its size bigger. X
8. Clear messages	1. Too much information. More than one phrase per informative act.	2. Generally, information is specific but sometimes there's too much text. More than one phrase per informative act.	3. Information is specific and self-explanatory. It's expressed with words, getting the message through. X

3. OUTCOMES

In the educational field this study consider the wide world uses browser Google, the cloud application Dropbox and the online languages course Duolingo. Although all of them are commonly used in the Educational context, they can be also easily included in other fields.

Regarding their **images description**, none of them give any additional information and they just attach their contents. Something similar happens to increase **size of media contents**, except by Google Chrome, because its navigation function on the touchscreen to enable the size by a finger touch.

Contrast, brightness and color are basic point to facilitate accessibility to a large group of people to these applications. Nevertheless, anyone of them lets user adjust it. That could be half justified because the control of these on the device's control keys, although the app should make it easier.

The **beeps and sounds** are really important to make a difference, for visual disable people, to be able to manage or not an application. Anyone of applications analyzed give this options. The opposite happens about a **minimum touch surface**, fulfilled by all of them.

Another essential point is capacity to increase **size of letters, texts and messages**. That is only facilitate by Google Chrome, due to its function, however the other apps do not it.

Also, the three apps analysed in the educational field, show something common. That is the indicator 8 about **clear messages**, because all the information displayed on the apps is clear and concise.

As an overall outcomes on all environments analyzed, Apps can be organized in four categories, depending on the relation of citizen and users with them:

- **Full Accessible App**. App interface facilitate adaptation of several points required by users
- **Partly Accessibility App**. App does not facilitate accessible elements. So, users need special tools to adapt and transmit the content, such as Talk-Back.
- **Twin Accessible App**. App created along the original for specials users to make up its lack of accessibility.
- **Non Accessible and Usable App**. App interface cannot facilitate ant adaptation for users who requires it.

This work concludes on two main ideas: Firstly, some accessible points all usual in all apps analyzed, such as a touch surface of 9 mm or clearance of information displayed, but most of the points about accessibility are not so good. And regards the accessibility issues, all points on the apps should be balanced integrated, if not a couple of positive points, do not count for rising this points.

And, Apps used on a social field are widely businesses by software companies, trying to give users several possibilities to their demands, and therefore, these apps have usually more accessible points than others. Being important for instance, possibility of rising size of the texts or media contents. On this social field are located social networks, the most used by the world's population, despite not being totally accessible most of them or having important points to work on.

Summarizing, this work show shocking data about the ICTs in present days, widely used by everybody, with major investments by governments and private companies, and on which the citizen hopes for help to make theirs life a little easier. But yet, for part of the population with disabilities, the digital divide is getting wider every day.

Considering that communication and information technology make everything easier on a daily basis for people. However the digital divide is growing every day. Disabled users can't be an active part in their society, that separates them and makes them be just passive agents.

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