

# INCLUSIVE DESIGN: GRAPHICAL INTERFACE FOR CHILDREN WITH DOWN SYNDROME

Ana Raquel Cidade e Souza Herrera<sup>1</sup>, Isadora Burmeister Dickie<sup>2</sup>, Haro Schulenburg<sup>3</sup>

Rua: Dom Bosco, 155. Apartamento: 202 bloco 1, Bom Retiro, Zip Code: 89222-540. Joinville,  
Santa Catarina – Brazil.

<sup>1</sup> anacidadesouza@gmail.com, <sup>2</sup> isadora.dickie@gmail.com, <sup>3</sup> haro@harodesigner.com.br

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## 1 Context

Considering the specific needs of each user group, a Design Final Course Research Paper was prepared on the theme of the digital and interactive interface for the stimulation of cognitive development in children who have an intellectual disability, specifically Down syndrome. Thus, this article presents the main findings on this respective work. Interactive design is one of the themes researched in this study, which has defined its objective to enhance the understanding of the user, develop products with usability, easy to learn, effectively used, and provide the user a pleasurable experience.

In the case of people who have Down syndrome, understanding the needs of the user can mean knowing how the selective attention process occurs. According to Valmaseda (1995, apud CIDADE, 1998 p. 61) “the attention capacity is found to be deficient, and the child displays greater difficulty [...] to discriminate stimuli”. Thus, it is necessary to introduce one stimulus at a time, in order to achieve better results from the information. According to Cidade (1998, p. 62) “not having control on selective attention, the individual is not able to focus on relevant aspects from the information, reflecting on the communication skills of these children.”

In this manner, tablet apps stimulate the development of cognitive, attention, speech, language, auditory, and visual, concentration, memory, and other capabilities. The tablet is introduced as a single visual stimulus to the user, promoting attention in playful learning activities. According to Pueschel (1993, p. 243) “Children who have Down syndrome learn much more quickly when the situation is happy, enjoyable, and meaningful to them, the same way as this occurs in any child”.

## 2 Method

The following themes were investigated for the theoretical basis of the work, such as: the learning experience of children who have Down syndrome, ergonomic aspects in the interactive design, users' experience, and their characteristics. After the theoretical foundation was established, data collection on the users began. The methodology for this research step is based on the authors GIL (2010) and YIN (2005). Also, some specialists were interviewed (occupational therapist), observation of users, previously performed research analysis on the use of tablets in Brazil was employed to justify the use in this project and synchronic analysis was performed.

In the interviewing step, three occupational therapists were interviewed, two in Joinville and one in Londrina, in Parana State and two work in the ADESD institution (the Joinville Down Syndrome Association) and the other therapist at APAE (the Association of Parents and Friends of the Exceptional) in Joinville. The therapist in Londrina works with Down syndrome children at the Human Rehabilitation Research Center.

In the synchronic analysis phase, the objective was to compare existing products on the market to promote understanding on what can be improved and avoid previous mistakes. The apps were downloaded from the Google Play for Android platform apps and from iTunes for the Apple platform. The analyzed apps was divided into learning categories (Literacy, puzzles, memory games, and sounds), and the analysis was performed especially based on the difference among each app and what each one is profitable for helping in cognitive stimulation of children who have Down syndrome, especially to stimulate the attention for the enhancement of learning skills.

## 3 Results

The characteristics of the apps were defined as follows: abide by the usability targets to provide a playful enjoyable learning experience and introduce a few visual elements so that the children would not lose their attention in activities, among other characteristics studied.

There are four cognitive development areas to be explored in apps and they are as follows: Learning, reasoning, memory, and auditory stimulus, all of them seek to catch the child's attention in the activities; by way of literacy, numbers, and colors, memory games, reasoning for fitting in puzzle pieces, and audio stimulus and increasing the repertoire of knowledge and sound identification

Based on the "PROJETO E" (PROJECT E) methodology, a visual identity of the app was created, using grid diagrams, logography, chromography, pictography, and iconography. The "**aplicativo ludos**" (playful app) is characterized by icons and few visual elements, bright and vibrant colors, and few visual elements, as during the research studies it was confirmed that the child with Down syndrome is easily

distracted, losing the focus/attention in the activity being performed. Besides the visual characteristics, the ergonomic and usability characteristics were also researched to analyze if there was a satisfactory, pleasant, and enjoyable experience in a friendly interface and meeting the specific needs of the user, providing a playful and enjoyable experience.

The concepts proposed throughout the projects (usability targets, targets arising from the experience of the users and the hedonomic concepts), based on studies, analyses, and observations, as well as the mandatory and desirable requisites to provide a playful learning experience to children who have the Down syndrome, are displayed by the graphic solutions in the “**aplicativo ludos**” (playful app) – a world of entertainment.

## 4 Conclusions

The objective in the development of this project sought to create a graphic interface for a specific app to meet the learning needs of children who have Down syndrome. Regarding this, the theoretic foundation was fundamental for understanding the characteristics of children who have Down syndrome and evaluate their cognitive possibilities to interact with the app. It was also possible to synthesize the design principles focused on the user for the specific project. The need for individuals with Down syndrome and their learning possibilities was already viewed in the phase when the child was observed and the interview with the specialist took place.

Regarding, the results from this study, it has been inferred that the “**aplicativo ludos**” (playful app), when all its phases will have been concluded, there will be few visual elements and bright colors as its characteristics to meet the needs of the target public of this investigation. Based on this study, the app will be developed, so that it is possible to make the app available to educators whose focus is on the learning of users who have Down syndrome or any other child who displays an intellectual disability.

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