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# João em Foco: A Learning Object About the Dyslexia Disorder

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**Abstract.** This paper presents João em Foco, a Learning Object (LO) to help professionals and parents to understand about dyslexia, a specific learning disorder. The LO provides information about diagnosis, treatment and better practices to help the development of people in this condition, overcoming different barriers faced by them. The validation process was performed with Pedagogy students of the State University of Feira de Santana and by the feedback of specialized professionals that deal with dyslexic people from the ABCD Institute, a social organization that disseminates projects that have a positive impact on the lives of people with dyslexia.

**Keywords:** Learning Object · Serious Game · Dyslexia.

## 1 Introduction

Considered as a specific learning disorder, dyslexia is characterized by the difficulty in the acquisition and development of reading and writing skills, essential abilities to people's daily activities [1]. It affects 15% of the world population [2], which presents some difficulties in the learning process, such as: disorder between letters, syllables or words with simple spelling distinctions (e.g. a-o, c-o, e-c); disorder between letters, syllables or words with similar spelling, but with different orientation in space (e.g. b-d, b-p, b-q, d-b, d-p); partial or total exchange of syllables or words (e.g. me-in, sol-los, som-mos); and replacing words with others with similar spelling or even creating words [3].

The early and accurate diagnosis of dyslexia is an important aspect to overcome some barriers imposed by this learning disorder. In this sense, it is known that initial evidences of dyslexia are more perceptible in the children's literacy, when they have great difficulty in learning to read [2]. However, due to the lack of knowledge of parents and educators about dyslexic children [2, 4], many children

do not receive the necessary follow up to help them in their educational development process, by using different educational resources and methodological approaches.

Regarding the current demand of parents and teachers of dyslexic children to be informed about their difficulties and possible treatments, some works [5, 6] show the importance of the technology in the development process of dyslexic people. As a result, the technology help them to overcome different challenges, creating a receptive and motivator environment to encourage them without disrespecting their abilities and limits, or even labeling them as disinterested, lazy or undisciplined [2, 7].

As an attempt to provide a receptive and motivator environment for dyslexic people, this paper presents *João em Foco* (in English, *John in Focus*). It is a Learning Object (LO) that provides games and scenarios able to disseminate information about the dyslexic disorder, helping different people (e.g. teachers, brothers and parents) to understand and to create a safe environment for a dyslexic person.

Several aspects related to dyslexia, presented by game scenarios, are also reported in this paper, such as: a) the needs of a specialized professional to deal with; b) their difficulties and ways to overcome them; and c) successful diagnosed people, providing information about representativeness. Finally, some considerations about the importance of this project for the social inclusion of dyslexic people are also presented, as well as the future work needed to improve this proposed tool.

## 2 Dyslexia: Concept, Diagnostics and Treatment

Dyslexia is considered as a specific learning disorder of neurobiological origin, characterized by the difficulty in recognizing words, both in terms of decoding and spelling [8, 9]. Children with dyslexia have flaws in the phonological module, which makes it difficult to divide words into underlying sounds, which means that there is difficulty in associating connection sounds present in whole words [10, 9]. This problem results in a poor school performance or in the accomplishment of activities imposed on their daily lives [11].

There are some symptoms that can characterize dyslexia, such as: delay in acquisition and in the tasks of reading and writing; difficulty with sounds of words; incorrect writing (exchanges, omissions, junctions and agglutination of phonemes); difficulty in associating sound to the symbol, rhymes and alliterations; difficulty in sequential organization (e.g. letters of the alphabet, months of the year, times tables); difficulties with organization of time, space and direction; difficulty with mental calculations, memorizing phone numbers, messages, taking notes, and similar; and the difficulty to organize your tasks [12].

According to Costa and others [13], the teacher's knowledge of what dyslexia is serves as a pre-diagnosis, subject to referral and intervention. However, even if the teacher is properly prepared, it is not his role to diagnose a specific learning disorder [14]. In this sense, it is necessary to work with a multi-professional

approach (involving parents, teachers/school and child) to overcome the child's difficulties. Then, after recognizing the problem, the speech therapist's diagnosis must be made through the analysis of phonological, morphological, syntactic and semantics levels [15–17].

With parents active in their children's educational process, the chances of success are greater. In addition, the involvement or participation of parents in school, especially in the monitoring of activities, meeting and notes, generates an important dialogue between these two pillars responsible for the formation of the individual, who are the parents and teachers [18, 19].

Due to the lack of dissemination of information about dyslexia, many family members don't know what this disorder is and end up feeling unable to help, or make an incorrect assessment based on their previous experiences [20]. Therefore, it is necessary not only to disclose information about dyslexia, but also to help specialized professionals to guide parents on how to behave and deal with their children's specificities, such as, for example, in encouraging school activities, not leaving them to give up activities that they find difficult [21, 22]. Attitudes like this can improve the subjects' skills, and, with that, make them safer in the execution of reading and writing activities.

### 3 Related Work

Some studies were developed to provide awareness/information games about dyslexia. One of them is the Dyslexia MT <sup>3</sup> that was created by the Mato Grosso Dyslexia Association. It aims to promote inclusive actions on dyslexia, providing didactic material and support to the family and dyslexics themselves. As a civil organization, the Association relies on the collaboration of members, collaborators, partners and donations to develop its activities in the state of Mato Grosso (Brazil).

Dislexia MT also provides the news functionality regarding the dyslexia disorder across the country, being possible to contact the association for external assistance. As a result, despite the dyslexia information not be transmitted as a playful game, Dislexia MT addresses the proposal of this work, which is to clarify issues related to people with dyslexia.

### 4 Development

*João em Foco* was designed for teachers, parents and children older than 8 years. It provides a single player game mode that can be played with distinct profiles on the same device, such as parents and child, allowing them to learn together about dyslexia and the difficulties that the main character of the game goes through in his daily life.

<sup>3</sup> Available at: <https://apkpure.com/br/dislexia-mt/br.com.app.gpu1910220.gpu62d19f82a6fcbfb9fbfc9f648121608> app. Last Checked: may 2020

The target public was selected thinking not only about helping dyslexic players to better know themselves, but also to help their close people in the process of knowing and helping them. In this sense, teachers are responsible for guiding and motivating them in the classroom and learning process, while their parents follow the growth and the challenges in educating and guiding them throughout their lives.

#### 4.1 João em Foco Operation

After running the LO, a home screen is displayed (Fig. 1), which presents initial options for “Play”, “About” and “Exit”. As the main character of the LO is a child, the built scenarios have many childish elements. It is worth mentioning that the presentation screen is the player’s first visual contact with João, and, with this, the children’s elements bring important nuances, highlighting the beginning of their learning process in the early stages of school.

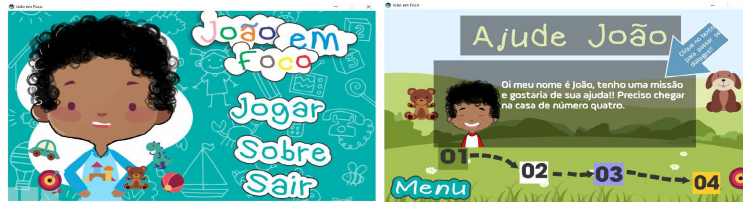


Fig. 1. Learning object presentation screen & Children module board screen.

Users are able to play by clicking on the “Jogar” (in English, *Play*) button (Fig. 1), after that they are able to select between three modules: teacher, children and parents. These modules will be better explained in the following sections.

##### 4.1.1 Children Module

The Children module is inspired by a board game, through which the player must help João to reach the fourth step (the tile 4), which corresponds to the end of the board (Fig. 1). In each step, different contents related to dyslexia is worked on:

- **1<sup>st</sup> step:** a school exercise is presented to João, in which the mirroring of letters occurs (Fig. 2). Mirroring can occur through the exchange of letters from *d* and *b*, *q* and *p*, or it can also happen in the rotation of the axis itself in letters like *a* and *e* [23];
- **2<sup>nd</sup> step:** simulates how a dyslexic person reads a given text, showing that the acquisition of reading and writing is not something trivial for them.

- **3<sup>rd</sup> step:** presents fonts that minimizes their difficult in reading presenting and exercise with the use o it (Fig. 2).
- **4<sup>th</sup> step:** a final feedback is given.

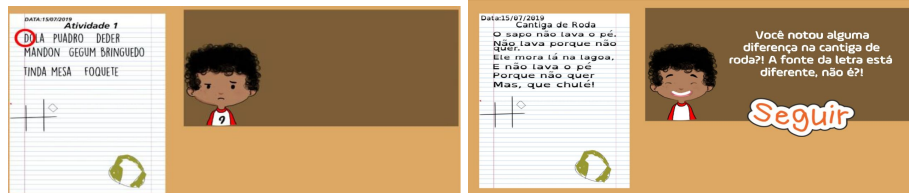


Fig. 2. João's school exercise & Activity screen with *OpenDyslexic* font.

#### 4.1.2 Teachers and Parents Modules

The Parents and Teachers modules aim to guide and raise awareness of dyslexia for important people in João's teaching and learning process. Therefore, in order to guide the parents and the teachers player profile, similar dynamics with different narratives were constructed for them, as shown below:

- **Você Sabia?:** (in English, "Did you know?"), the player will face situations, through characters of the LO, that will guide him to learn about dyslexia. The LO brings the quiz style, and, to bring this information, the player will choose which answer best suits the described situation. Finally, after the quiz answers, a feedback will be shown in relation to the content, and the player will be congratulated for the achievement;
- **Biblioteca:** (in English, "Library") this topic presents an environment in which it is possible to find content about dyslexia. The player will be able to click on books on the screen, which will be directed to websites, articles, booklets, with dyslexia contents. Its noteworthy that, for each module, the contents are specific to the respective audience;
- **Histórias:** (in English, "Stories") in this module, a text is shown about who made history because of their notoriety and talent. Besides presenting the information on these people's contributions to the world, it is also pointed that all of them were dyslexic, creating a sense of representativeness. It is important to present this information to children or students with dyslexia, showing them that, like those people, they have potential and are also capable of carrying out their activities.

In order to help to broadcast dyslexic information, "João em Foco" has an achievement system in Teachers and Parents modules, which shares information on social media (*Facebook* and *Instagram*). Thus, when players finish a stage, they are able to share this information on their social media, reaching friends, family, among other people, being able to inform about dyslexia or encourage people to know more about the subject.

## 4.2 Validation Process

To validate this work, two versions of the LO were provided, one for PC-Desktop and other for Android. Both versions were tested by 15 users (Pedagogy students of the State University of Feira de Santana), with only 18.2% of them with a previously knowledge about dyslexia. The project was also submitted to the Ethics Committee (Presentation Certificate for Ethical Appreciation on Plataforma Brasil: 09091718.6.0000.0053), requiring the definition of a collection of data instruments to be used in the validation phase.

Participants were asked to rate the LO using six criterias about their experience that vary on a five-point scale: Boring vs Stimulant, Tiring vs Entertaining, Useless vs Useful, Disorganized vs Organized, Difficult learning vs Easy learning, and Bad didactic vs Good didactic. The evaluation averages can be seen in Fig. 3. Overall, the LO was well evaluated. The participants considered it stimulating, light, with a good didactic, profitable, organized and conducive to learning dyslexia, all with an average higher than 4. It is noteworthy that the item with the lowest average was tedious x stimulating, obtaining an average of 4.36

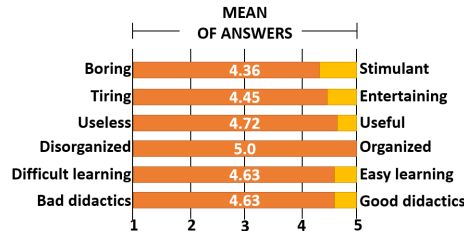


Fig. 3. João em Foco’s user experience graphic.

Besides that, we also used a questionnaire designed with Likert scale to evaluate the LO and the information presented about dyslexia, game characters, interfaces, and feedback. According to the results, over 90% of the users agree with the developed approach to handle the dyslexia information and recommend the game for others. The results reflect that ‘João em Foco’ provides clear interfaces, dialogues and information that permit people to be informed about dyslexia content.

Users considered as a good reward to level accomplishment the share of information in social media, as well as an important approach to spread dyslexia information. Further, when they were asked if they recommend ‘João em Foco’ to other people, all of them agree with this statement, results that can be also related to the large number of users that already installed the app.

## 5 Final Considerations

Researches focused on better alternatives in the dissemination of information about people with a Specific Learning Disorder are extremely important to con-

tribute not only to development of these people, but also to their social inclusion process. In this sense, this paper presented “João em Foco”, a LO developed to help people to increase their knowledge about dyslexia, as well as raising awareness to educators about alternative methods to help their students to overcome different barriers. For parents, “João em Foco” talks about the need of understand their children and provide them a safe environment together with a specialized follow-up. Finally, in a society perspective, “João em Foco” raises empathy about the challenges faced by a dyslexic person, helping them in the process of social inclusion.

“João em Foco” provides through a game environment not only information about dyslexia but also experiences of the learning difficulties that come with it, to approximate not dyslexic people with this reality, and encouraging dyslexic ones to overcome the different barriers.

It is also important to emphasize that João em Foco at this point was used not only by the group of educators who helped in the validation process, but also by parents and specialized professionals of the ABCD Institute. In fact, as the ABCD Institute published the game app on its social media, encouraging users to download it, they helped to get an important feedback about it from parents and professionals who deal directly with dyslexic children. As a result, some of the suggested changes are already available, such as the font size, the use of audio in the game narrative, and some changes in the quiz contents. Nowadays, according to information from the Google Play Store, “João em Foco” has already been installed by more than 2700 people and its evaluation is 4.8/5.0 stars.

As future work, besides a validation of “João em Foco” with dyslexic children, new features are expected, such as: a) add soundtrack and sound effects; b) improve the textual presentation so that the reading content does not become so tiring; c) add voice feedback to present information; d) add a specific session for dyslexic children with suggestions and games to develop their skills; and e) develop an administrator module that allows professors and specialized professionals to easily create storytelling inside the LO.

## References

1. Alves, R.J.R., Lima, R.F., Salgado-Azoni, C.A., Carvalho, M.C., Ciasca, S.M.: Teste para identificação de sinais de dislexia: processo de construção **32**, 383 – 393 (09 2015). <https://doi.org/10.1590/0103-166X2015000300004>
2. Pimenta, D.: Dislexia: um estudo sobre a percepção de professores do ensino fundamental. Centro de Ensino, Pesquisa, Extensão e Atendimento em Educação Especial (Org.), Anais do V Seminário Nacional de Educação Especial, IV Encontro de Pesquisadores em Educação Especial e Inclusão Escolar pp. 1–15 (2012)
3. LIMA, I.: A dislexia e o contexto escolar. *Anhanguera educacional* **10**, 1–15 (2012)
4. Gonçalves, M.A.F.: A dislexia no ensino fundamental. *Revista Eletrônica Acervo Científico* **3**, e648–e648 (2019). <https://doi.org/10.25248/reac.e648.2019>
5. Cidrim, L., Madeiro, F.: Information and Communication Technology (ICT) applied to dyslexia: literature review. *Revista CEFAC* **19**(1), 99–108 (2017). <https://doi.org/10.1590/1982-021620171917916>



6. Zíkl, P., Bartošová, I.K., Víšková, K.J., Havlíčková, K., Kučírková, A., Navrátilová, J., Zetková, B.: The possibilities of ict use for compensation of difficulties with reading in pupils with dyslexia. *Procedia-Social and Behavioral Sciences* **176**, 915–922 (2015). <https://doi.org/10.1016/j.sbspro.2015.01.558>
7. Shaywitz, S.: Entendendo a dislexia: um novo e completo programa para todos os níveis de problemas de leitura. Artmed (2006)
8. Massi, G., Santana, A.P.d.O.: A desconstrução do conceito de dislexia: conflito entre verdades. *Paidéia (Ribeirão Preto)* **21**(50), 403–411 (2011). <https://doi.org/10.1590/S0103-863X2011000300013>
9. Snowling, M.J., Stackhouse, J.: Dyslexia, speech and language: a practitioner's handbook. John Wiley & Sons (2013)
10. Caridá, D.A.P., Mendes, M.H.: A importância do estímulo precoce em casos com risco para dislexia: um enfoque psicopedagógico. *Revista Psicopedagogia* **29**(89), 226–235 (2012)
11. American Psychiatric Association, et al.: Diagnostic and statistical manual of mental disorders (DSM-5®). American Psychiatric Pub (2013)
12. Ianhez, M.E., NICO, M.A.N.: Nem sempre é o que parece. Gulf Professional Publishing (2002)
13. Costa, J.P.F., Júnior, A.B.T., Santos, H.M.P., Mateus, Y., Albuquerque, L., Silva, B.B.T.N., Maciel, G.E.S., et al.: Nível de conhecimento dos professores de escolas públicas e particulares sobre dislexia. *CEP* **52170**, 000 (2013)
14. Cancela, A.L.: As implicações da dislexia no processo de aprendizagem na perspectiva dos professores do 1º ciclo do Ensino Básico. Ph.D. thesis, [Universidade Fernando Pessoa] (2014)
15. Capellini, S.A.: Distúrbios de aprendizagem versus dislexia. *Tratado de fonoaudiologia*. São Paulo: Roca pp. 862–76 (2004)
16. Capellini, S.A., Silva, A.P.d.C., Silva, C., Pinheiro, F.H.: Avaliação e diagnóstico fonoaudiológico nos distúrbios de aprendizagem e dislexias. Zorzi JL, Capellini SA. *Dislexia e outros distúrbios da leitura-escrita*. 2ª. ed. São José dos Campos: Pulso Editorial pp. 95–111 (2009)
17. Schulte-Körne, G.: The prevention, diagnosis, and treatment of dyslexia. *Deutsches Ärzteblatt International* **107**(41), 718 (2010)
18. Carvalho, M.E.P.d.: Modos de educação, gênero e relações escola-família. *Cadernos de pesquisa* **34**(121), 41–58 (2004). <https://doi.org/10.1590/S0100-15742004000100003>
19. Reid, G.: Dyslexia: A practitioner's handbook. John Wiley & Sons (2016)
20. Polonia, A.d.C., Dessen, M.A.: Em busca de uma compreensão das relações entre família escola. *Psicologia escolar e educacional* **9**(2), 303–312 (2005). <https://doi.org/10.1590/S1413-85572005000200012>
21. Reid, G.: Dyslexia and inclusion: classroom approaches for assessment, teaching and learning. Routledge (2019)
22. Alias, N.A., Dahlan, A.: Enduring difficulties: the challenges of mothers in raising children with dyslexia. *Procedia-Social and Behavioral Sciences* **202**, 107–114 (2015)
23. Roberto, T.M.G.: Reconhecimento das letras: considerações sobre espelhamento e variação topológica em fase inicial de aprendizagem da leitura. *Letras de Hoje* **48**(1), 12–20 (2003)