

C-Pen Exam Reader and Reading in Basic Education: Will it be a good partnership?

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Abstract—There is an increasing number of students in basic education schools with difficulties in reading, and consequently, in writing. Our exploratory study aims to understand if the C-Pen Exam Reader (C-Pen) helps in the learning process of students with language and writing difficulties. The methodology chosen was interviews with elementary school teachers, no special education teachers, and a speech therapist, as well as the support of CRTICee of the Amato Lusitano School Grouping. Thus, it was possible to assess the added value for students, not only in terms of their autonomy, since it is a reading pen, but also their self-esteem and inclusion in the school environment. It was also possible to clarify which points to improve in the use of this instrument to maximize its effectiveness and, thus, improve the quality of life of these students, such as prosody (accentuation, intonation, duration, rhythm of words and phrases).

Keywords—C-Pen Exam Reader, Reading disabilities, Learning disabilities, Elementary education, Special education, Digital Resources.

I. INTRODUCTION

In recent years, more and more students have been identified as having difficulties in their learning throughout their school career, and only a timely intervention can help these students to overcome their difficulties [4]. With this study, we intend to assess whether the C-Pen can help in the learning process of children in the 1st cycle of Basic Education with reading deficits. To this end, we carried out structured interviews, before and after presenting this resource to those who work directly with students and, consequently, have a better perspective of the impact that the C-Pen may have on students who need it. We will start the article with a brief theoretical framework on specific learning disorders and alternative and augmentative communication and support technologies (TACAA). We will also describe the C-Pen and its features, as well as our methodology, results and discussion. In the end, we will present the benefits, as well as the obstacles, that the C-Pen represents for these students.

II. THEORETICAL FRAMEWORK

A. Inclusive Education

Decree-Law 54/2018 [14] asserts that every student has the right “to an inclusive education that responds to their potential, expectations and needs within the scope of a common and plural educational project that provides everyone with participation and the sense of belonging in effective conditions of equity”. To this end, it refers to some guiding principles, in order to achieve the desired inclusive education, among which, according to its article 3: equity, the guarantee

that all children and students have access to the necessary support in order to realize their learning and development potential; personalization, educational planning centered on the student, so that measures are decided on a case-by-case basis according to their needs, potential, interests and preferences, through a multilevel approach; inclusion, the right of all children and students to fully and effectively access and participate in the same educational contexts.

There are still, however, many barriers in Portuguese schools, which condition the proper implementation of inclusive education. For this to become a reality, it is urgent, from the perspective of [15], to consider the three dimensions that it incorporates: the ethical dimension, referring to the principles and values that are in its genesis; the dimension related to the implementation of educational policy measures that promote and frame the action of schools and their educational communities and the dimension regarding educational practices, none of which can be neglected and/or devalued. Looking at the reality of a truly inclusive school, this study presents a digital support, the C-Pen Exam Reader, which, as we will show, will be a support for students of the 1st cycle of Basic Education (EB) with Learning Disabilities. Specific (PAE) in the reading process. These students, who mostly participate in standardized assessments, are allowed to use test accommodations, such as extended time, having test items read aloud, or taking the test in a separate environment. During the teaching-learning process, they can count on the support of the regular teacher and the special education teacher. The digital support presented can fill certain needs inherent to the mentioned human support and avoid the exclusion of the student in moments of evaluation.

B. Specific Learning Disorder: Reading Difficulty

As [2] states, “there are several reasons for a child not to learn, and the presence of a specific learning difficulty is one of them. About half of students with special educational needs suffer from Specific Learning Disabilities”. Within the AED we have the specific learning disorders (SAP), which do not have a cognitive origin, but a neurodevelopmental one. According to [1], the EAPs are a single entity, with three specifiers according to the affected areas: reading deficit (dyslexia), writing deficit and math deficit. Regarding reading, its mastery is extremely important for school learning, since it can be a determining factor in the emergence of learning difficulties of a more general scope [12]. As mentioned by [16], the major obstacle to the success and school performance of students is the difficulties in the act of reading, as they cause difficulties in other areas, reflecting throughout the child's school career. [7] mention the existence

of four factors, among others, that delay the development of reading regardless of the subject's ecological environment. These factors involve, according to the same authors, “deficit in phonemic awareness and in the development of the alphabetic principle, deficit in the acquisition of reading comprehension strategies and their application, deficit in motivation to learn to read and inadequate preparation of teachers” [5]. That is, when there is a deficit in phonemic awareness, which is related to the perception, identification and manipulation of spoken language sounds, there is a difficulty in relating speech sounds with letters [5]. In this way, the decoding processes will be affected and the reading will become slow and difficult to understand. Also according to the same author, most reading difficulties presuppose difficulties in the decoding and word recognition processes, normally associated with deficits in phonemic awareness and delays in the development of the alphabetic principle. Phonemic awareness alone is not sufficient for learning to read, so understanding the meaning of the sounds to be decoded is also important. Learning to read presupposes three principles: reading fluency, vocabulary knowledge and content knowledge [5]. According to [7], when it is not possible to extract the meaning of what was read, there is a difficulty in reading comprehension. Thus, the difficulties in learning to read can be manifested in the acquisition of basic skills, especially in the phase of decoding the letters, and also in the phase of understanding and interpreting texts [6]. On the other hand, in the point of view of [6] “this difficulty can lead to a deficit in the development and maintenance of the motivation to learn to read, which, in turn, can lead to refusal behaviors, which will be reflected in the learning to read, because success in this task depends on its systematic practice”. Therefore, this work focused on analyzing whether the C-Pen can support EB 1st cycle students with PAE, namely in the reading process. Will the C-Pen be an ally for these students when it comes to identifying phonemes, rhymes and syllables, as well as understanding sounds?

C. Supporting Technologies and Alternative and Augmentative Communication in Inclusive Education

What do you mean when you mention Supportive Technology and Alternative and Augmentative Communication? It is any “product, instrument, strategy, service and practice, used by people with disabilities and older people, specially produced or generally available to prevent, compensate, alleviate or neutralize a disability, disability or disadvantage and to improve the autonomy and quality of life”. [10]. Why is its introduction into Portuguese schools important?

Students with learning difficulties, whatever they may be, overcome barriers and challenges by having equal opportunities, following the guiding principles of Decree-Law 54/2018 [18]. It is the obligation of the EMAEI (Multidisciplinary Team for Supporting Inclusive Education) of each grouping of schools, in cooperation with the head teacher, the EE teacher, the parents and the student, to understand the support that must be made available to them. In this way, it will be possible to minimize the barriers arising from their difficulties and maximize their potential, since these students find it difficult to show all their knowledge and skills, especially with regard to reading with fluency, accuracy and understanding. [19]. This challenge is overcome when these students are provided with accommodations that guarantee them equal access to instruction and assessment. The most frequently researched type of accommodation, as

mentioned [3], “is reading aloud accommodation”, in which the C-Pen fits. Currently, students with learning difficulties are entitled to use assistive technologies in the classroom, like any other type of support, as long as their need and usefulness are proven. Thus, “the addition of assistive technology, such as the C-Pen, can be used to break down barriers and help improve the abilities of students with learning difficulties”, as stated [9]. Digital inclusion does not only refer to access to the computer or the Internet, but also to its efficient use, since children, in general, stimulated by curiosity and creativity, acquire these skills naturally [20]. Thus, these means, such as the C-Pen, should be used in a school context, in order to captivate students with the topics to be addressed, as well as to support them in overcoming their difficulties and enhancing their abilities. According to [17], “interactivity is one of the great phenomena of the information society, which changes passivity towards the media, and marks a growing autonomy of the user in relation to the information and content to which one has access, in addition to stimulating the exploration of multiple windows and tasks, simultaneously”. Likewise, [8] concludes that “educational software should ensure that continuous intellectual activity is promoted so that students’ initiative and autonomy can be promoted and, at the same time, that adaptation and interdisciplinarity can be promoted”. It should be noted that the C-Pen is not considered an educational software, however, it is a digital resource that has this software and, for this reason, it is still an asset to achieve the goals described.

Digital pens have shown positive effects as a learning aid. As [9] and [11] have noted, reading pens help students with reading difficulties improve reading, accuracy and comprehension.

D. C-Pen Exam Reader

The C-Pen is a portable, lightweight reading pen that can read aloud single words or printed sentences with a digital human voice (Figure 1). The C-Pen can be a valuable tool to help people with dyslexia, reading or vision difficulties, or who simply need help with reading. It is applied by scanning one word or one line of text at a time. Identifies and reads 12 different languages, such as Portuguese, English, French, Spanish, Chinese or German, while presenting the scanned text on your screen, with the word being pronounced highlighted, allowing the association of what is transmitted orally with what is written. Audio can be played through speakers built into the pen or headphones. The C-Pen can store up to one gigabyte of scanned text files, and has a rechargeable battery that can last for several hours. Through the settings menu, not only the scanning and reading language can be changed, but also the voice speed and sound volume. The speech speed feature allows you to set the speed at which the text is transmitted in order to optimize its understanding. The volume functionality allows you to select a lower volume, when used in a classroom context, so as not to disturb the normal course of the same, or higher if there are no inconveniences. On the other hand, the possibility of using headphones allows the use of the C-Pen during assessments and also during classes, if the teacher considers it more relevant. The C-Pen also allows the same word or phrase to be read as many times as the student deems necessary, without repeating its scanning, moving the cursor on the screen to the point where the student wants to resume reading [13].

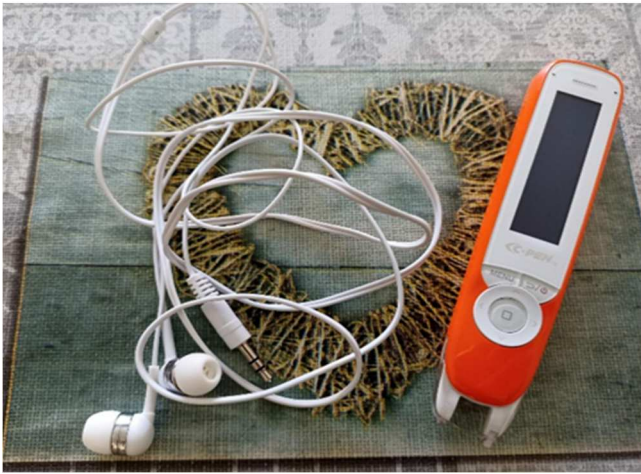


Fig. 1. C-Pen Exam Reader

III. METHODOLOGY

To carry out this qualitative exploratory study, we used surveys in the form of structured interviews, combined according to the availability of the participants.

The C-Pen is an instrument that was made available to us by the CRTICee of Agrupamento de Escolas Amato Lusitano, from Castelo Branco, to carry out this study. As such, we also interviewed CRTICee representatives to understand more about the C-Pen, its advantages, points to improve and what is the purpose of its use. The remaining interviews were divided into three moments: in the first moment we explained what the C-Pen was and what it was used for. Afterwards, interviews were carried out, asking questions in order to understand their expectations regarding the use of the instrument. In a second moment, we delivered several texts so that they could handle the C-Pen freely. After that moment, at the last moment of the experience, the participants shared their opinion about it, answering the questions posed by the researchers.

To carry out this study, we count on the participation of: three EB 1st cycle teachers, aged between 45 and 55, and between 20 and 30 years of experience; three EE teachers, aged between 45 and 50, and between 10 and 15 years of experience; a speech therapist in her 40s and 15 years of professional experience. The seven participants are currently working in the Castelo Branco district.

IV. MAIN RESULTS AND DISCUSSION

In the opinion of the CRTICee of the Amato Lusitano School Group, the C-Pen helps to identify students who have specific learning disorders, namely reading difficulties (dyslexia), the application of this resource focuses on automatic reading of printed text. By properly adjusting the reading speed of the C-Pen, the student will obtain the auditory feedback of the correct way of pronunciation of the words, complemented by the visual enhancement of each word when it is uttered. However, the added value for EB 1st Cycle students comes from the supervision of the teacher, capable of detecting and correcting the failures that occasionally occur.

None of the teachers, either from the 1st cycle of EB or EE, had previously handled the C-Pen. However, the general opinion was that they believed it to be a useful resource in helping students with Dyslexia, Aphasia, Language Disorder or Visual Impairments, being a facilitator at the time of

reading. After handling the C-Pen, the participants, with regard to students with PAE, more specifically with reading deficits, state that the C-Pen can facilitate the work of these students when they do not have the support of a teacher. Unfortunately, this support is increasingly difficult to provide as class sizes and students with educational needs increase. In this case, the resource dispenses with reading by a teacher during the classes and promotes autonomous work (Figure 2). The teachers stated that students, in individual and autonomous work, are often unable to perform the proposed tasks due to the reading difficulties they manifest, and in this way, the C-Pen will help the student to overcome this obstacle. On the other hand, and not least, it should be noted that a student who has difficulties in reading and solving exercises, even though he has the knowledge and ability to do so, loses self-esteem and self-confidence. However, with the help of the C-Pen in reading texts and statements, the child is able to focus on solving exercises, giving adequate answers, according to all their abilities. Thus, the C-Pen promotes students' self-concept.



Fig. 2. C-Pen Exam Reader: na exemplo of scanning.

The speech therapist, who was unaware of the C-Pen, said that it can be a support for children with difficulties in decoding the message, so that they can follow the material while developing their reading skills. In the classroom context, the therapist believes that the C-Pen can help children who are unable to perform phoneme-grapheme correspondence and decoding, giving a little help at an early stage, while the child develops skills. However, she considers that there is a possibility of becoming a support for too long, making the mistake of neglecting the development of the child's skills.

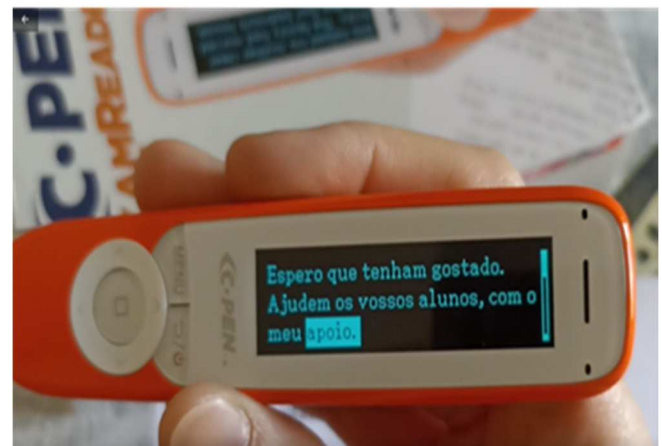


Fig. 3. C-Pen Exam Reader: screen display.

With regard to the moments of evaluation, the responses of the teachers are identical. They consider that the C-Pen should be a resource to be made available to students with reading difficulties, however, they differ as to the reasons presented to justify this opinion. According to the EE teachers, it makes it possible for the student to feel included in the class, since, until now, he is obliged to carry out his assessment in another room, so that the test can be read to him. On the other hand, according to the teachers of the 1st cycle of the EB, the student will make the most of the time to solve the assessment, since less effort will be required in reading, he will be less tired and it will no longer be necessary to provide a teacher to read the test in a separate room, which is not always possible (Figure 3). However, as indicated by the EE teachers, that moment should always count with the presence of a teacher, since, although the C-Pen had an empathic voice, it is sometimes too mechanical, with little prosody (accentuation, intonation, duration, rhythm of words and phrases). Additionally, in addition to not having many voice models that allow the transmission of emotions or moods, the device does not distinguish between direct and indirect speech, which, in an assessment test, can be penalizing for the student. On the other hand, the speech therapist considers that the C-Pen can be used as a support measure, as there is the reading of the tests, even so, she emphasizes that, with this resource, there are breaks in the reading rhythm and lack of intonation, that can lead to difficulties in understanding the message read.

As for the context outside the school, the speech therapist considers that the reading and help given by an adult is always more positive, since the breaks in reading rhythm, expressiveness and intonation are important for the child not to get confused. Furthermore, the development of reading skills is the most important and can be put aside due to the presence of this feature. When questioned about the support that the C-Pen can provide to students with reading difficulties, in the consolidation of learning outside the school context, the teachers are unanimous, considering that it can be fundamental. The interviewees mentioned that students do not always benefit from family support in school tasks, which is extremely important, especially in the first years of schooling. This resource can make up for this lack of assistance. Phonological exercises are extremely important in learning to read and write and are often performed by the EB 1st cycle teacher in the classroom. However, it would be important for these students to have tutoring at home, which could be carried out with the support of the C-Pen. It could also be used in recreational reading because, as is known, children with reading difficulties quickly give up reading, not being assiduous readers. Thus, the C-Pen can facilitate the student's work, offering a more recreational way of reading, thus avoiding the creation of an aversion to reading, which often happens with children who have difficulties at this level. As already mentioned, it can also increase their self-esteem, as the student will feel more capable. Self-esteem is very important in the motivation of students and, consequently, in the teaching-learning process. Thus, as CRTICee indicated, any support product prescribed by CRTICee, such as the C-Pen, is student property and should be used in different learning contexts, both inside and outside school, in teaching situations. -learning (Figure 4).

In general, the teachers interviewed concluded that the C-Pen is an excellent support for children with reading

difficulties and that it should be made available to all schools and all referred children. However, they mention that there should be moderation in its use, running the risk of accommodation, loss of acquisitions and preventing the development of their reading skills (due to lack of reading practice).

The speech therapist, despite the negative aspects she mentioned, considers that the C-Pen, by decoding the text, helps children with reading and writing difficulties who are not able to follow the subjects given in the classroom. Even so, she reinforces that this device requires moderation and that she gives preference to the support provided by an adult, teacher, therapist or family member.



Fig. 4. C-Pen Exam Reader outside of school conte. Source: <https://www.tts-group.co.uk>

We can then identify as main positive points the fact that it is portable, easy to handle, presents a harmonious voice and allows the use of headphones. Regarding its practical application, the participants refer as positive the fact that it reduces the effort in the reading process, allows to keep the focus on the essential of what is read, facilitates the accomplishment of exercises in a faster way (since reading sometimes takes time), create work autonomy, increase self-esteem and promote reading, comprehension and learning.

As negative points, the seven participants mention the modulation of the voice, the intonation of words, the punctuation of the sentences and the expressiveness of reading. CRTICee also identifies some negative points to be improved, with regard to the instrument itself, not only its functionality, such as the effectiveness of automatic character recognition, which is not unanimous for any typeface, the fact that it works being conditioned by the gloss of the paper and not responding properly when faced with text wrapping.

IV. MAIN CONCLUSIONS

With this article we can conclude that the C-Pen, in fact, can help in the learning process of students with language and writing difficulties, as it can be a support and an asset inside and outside the classroom. It is a resource that can represent true inclusion for these students, since, for example, in the case of dyslexic students, they have to take the test in a different room from their colleagues so that the test can be read aloud by a teacher. This instrument not only symbolizes a means for inclusion, but also a clear improvement in the

learning process and, consequently, an improvement in the quality of life of these students. Thus, the possibility of carrying out more studies should be considered in order to understand, among students, the impact that this digital resource will have on their daily lives as students, as well as ways to overcome the less positive points that need to be addressed. be improved, in order to enhance the use of this instrument in the most positive and fruitful way.

Last but not least, we also consider that this resource should be distributed, free of charge, to all students who need it, since this is a way of encouraging and encouraging students to continue with their studies, facing learning as a natural and positive process.

REFERENCES

- [1] American Psychiatric Association, Manual de diagnóstico e estatística de transtornos mentais: DSM-5, 5 ed., Artmed, 2013.
- [2] Antunes, N. L. e a equipa técnica do PIN, Sentidos: o grande livro das perturbações do desenvolvimento e comportamento, do autismo, à hiperatividade, da adição à Internet à dislexia, 5 ed., lua de papel, 2018.
- [3] Buzick, H.M. and Stone, E.A., "A Comment on Li: The Same Side of a Different Coin". Educational Measurement: Issues and Practice, v. 33, n. 3, p. 34-35, 2014.
- [4] Costa, L., Melo, A. S., Ribeiro, I., & Viana, F. L. A monitorização no quadro dos modelos multinível. Contributos para a identificação e intervenção atempada de alunos em risco. In I. Viana, L. Palhares, & F. Macedo (Orgs.), Práticas de flexibilidade curricular em diálogo, Braga: Universidade do Minho: Centro de Investigação em Estudos da Criança, p. 47-54, 2019. <https://repositorium.sdum.uminho.pt/handle/1822/62584>
- [5] Cruz, V., Uma Abordagem Cognitiva da Leitura, Lidel, 2007.
- [6] Ferreira, M., Horta, I. V., Leitura: Dificuldades de aprendizagem, ensino e estratégias para o desenvolvimento de competências. Invest. Práticas, v. 5, n. 2, p. 144-154, 2015. http://scielo.pt/scielo.php?script=sci_arttext&pid=S2182-13722015000200009&lng=pt&nrm=iso
- [7] Fletcher, J. M., Lyon, G. R., Fuchs, L. S., & Barnes, M. A., Learning Disabilities: From Identification to Intervention, in Journal of Attention Disorders, v. 11, n. 3, p. 412-415, 2007.
- [8] Gil, H., Menezes, H., Software educativo e a importância de uma «métrica», In 6º Simpósio Internacional de Informática Educativa. Cáceres: Universidad de Extremadura, Departamento de Informática, p. 16-18, nov. 2004.
- [9] Higgins, E. L., Raskind, M. H., "The compensatory effectiveness of the Quicktionary reading pen II on the reading comprehension of students with learning disabilities", Journal of Special Education Technology, v. 20, n. 1, pp. 31-40, 2005.
- [10] ISO 9999, Norma Internacional, 1998. http://www.siva.it/ftp/en_iso_9999.zip
- [11] Johnson, I., "Does the Oxford Reading Pen enhance reading accuracy and comprehension for students with reading difficulties in a classroom environment? An implementation trial", Kairaranga, v. 9, n. 1, p. 36-43, 2008.
- [12] Lerner, J., Learning disabilities: Theories, diagnosis, and teaching strategies, Houghton Mifflin Publisher: Houghton Mifflin College Div; 9 ed., 2003.
- [13] McKenzie, K., Evaluation and Implementation of the C-Pen on the Reading Level, Comprehension, and Oral Reading Fluency of Third-Grade Students with Learning Disabilities: An Action Research Study, Tese Doutorado em Education in Curriculum and Instruction, College of Education, University of South Carolina, 2021. <https://scholarcommons.sc.edu/etd/6487>
- [14] Ministério da Educação, Decreto-Lei 54/2018, 2018.
- [15] Pereira, F., Educação Inclusiva: que desafios para a escola de hoje? Região Autónoma da Madeira, Secretaria Regional de Educação, Direção Regional de Educação, In Revista A Inclusão na Diversidades, 53, 6-8, julho-dezembro 2018. www.madeira-edu.pt/dre, ISSN 1646-1819
- [16] Rebelo, J. A. S., Dificuldades da Leitura e da Escrita, Porto: Edições Asa, 1993.
- [17] Silva, M., Sala de aula interativa: Educação, comunicação, mídia clássica, internet, tecnologias digitais, arte, mercado, sociedade, cidadania, Capa comum – 19 abril, Edições Loyola, 2010.
- [18] Sousa, C., A comunicação Aumentativa e as Tecnologias de Apoio, in Cadernos: A acessibilidade de recursos digitais, Ministério da Educação e Ciência, p. 51-63, 2011.
- [19] Thurlow, M., Laitusis, C. C., Dillon, D. R., Cook, L. L., Moen, R. E., Abedi, J., & O'Brien, D. G., Accessibility principles for reading assessments. Minneapolis, MN: National Accessible Reading Assessment Projects, 2009. <https://nceo.umn.edu/docs/OnlinePubs/NARAP/NARAPprinciples.pdf>
- [20] Wagner, F. R., Habilidade e inclusão digital - o papel das escolas, In CGI.br (Comitê Gestor da Internet no Brasil), Pesquisa sobre o uso das tecnologias da informação e da comunicação 2009, p. 47-51, 2010.
- [21] Wright, P. W. D. The individuals with disabilities education improvement act of 2004. Wrightslaw, 2004. www.wrightslaw.com/idea/idea