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The use of ICT in the education of students with alexia/acquired dyslexia

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Abstract

In the modern era, new technologies are an integral part of our daily lives. The use of the PC provides a great educational material, which is an important tool for modern education as it can change the entire landscape in education. The performance of dyslexic students can be greatly improved by using computers in school. With the introduction of computers and new technologies in the classroom that have a wide range of applications, it is an effective tool for learning, because it can help students gain a better understanding of the curriculum.

Keywords: ICT; Education; Acquired dyslexia; Alexia; Special Education; Learning Disabilities; Mobile Apps; AI; Mindfulness.

1. Introduction

Students with Special Learning Difficulties face significant reading challenges as part of their schooling. Dyslexia is the most common learning disability (Tzivinikou, 2015; Snowling et al., 2020) and an inherent and lifelong developmental disorder of neurobiological origin. It has been discovered and studied for the last hundred years and is one of the most distinct learning disabilities whose consequences are seen in various areas of academic performance. As a neurological, psychological and educational disorder related to the learning of written language, it is characterized by many inconsistencies and is still a challenge for the research field (Thambirajah, 2010).

Dyslexia is a specific learning disorder that affects the lives of millions of children. Children with dyslexia show deficits in the cognitive, learning and psychosocial domains. The characteristics that are part of the cognitive domain are related to visual and auditory perception, memory, phonological processing, automaticity and metacognitive skills (Vassiliou et al., 2018).

2. Dyslexia

Before the introduction of the term "dyslexia", this learning disability was known as "lexical blindness" (Tzivinikou, 2015). This disorder affects students' phonological awareness, decoding, and reading fluency and comprehension, despite their typical levels of intelligence, adequate auditory and visual acuity, and the absence of other mental or neurological disorders. Equally, it occurs despite their adequate psychosocial, educational and sociocultural opportunities (Büttner & Hasselhorn, 2011; Hulme & Snowling, 2011; Tunmer & Greaney, 2010).

Dyslexia or more fully "specific (specific) or developmental (developmental) dyslexia" as is the full term, occupied and occupies the sciences of medicine, psychology and education. It was and still is the subject of confusion and dispute among its scholars, resulting in the reflection not only in the formulation of a commonly accepted definition but also in

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addition in finding the causes that cause this specific disorder as well as the intervention strategies to deal with it (Riddick, 2001).

According to Elias (2014), difficulties are found in problems with word recognition, poor writing, difficulties with reading comprehension or mathematical reasoning. The conclusion that follows from the above definitions is that dyslexia is not a disease, but a peculiar behavior that creates difficulties in handling words, symbols, numbers, time sequence, etc. The occurrence of developmental or developmental dyslexia has often been associated with a greater degree of involvement of right hemisphere functions in these individuals, compared to the left (Shaywitz & Shaywitz, 2020; Tso et al., 2020). Thus, it is of particular interest to identify not only the areas where people with dyslexia show deficits and difficulties, but also the areas where they may show particular abilities or talents (Chapman, 2019).

It has also been called the "disease of gifted children", as children with dyslexia often show greater creativity and ingenuity than the rest (Spencer, 2018). After all, the brains of dyslexic children are usually more intelligent, more creative and more inventive. We have many examples of dyslexics who excelled at the global level, such as e.g. Edison and Einstein. That is why dyslexia can also be characterized as a "pathology of superiority" if it is diagnosed in time and treated successfully (Spencer, 2018). Research shows that many children have managed to overcome this difficulty due to the plasticity of the brain and the correct treatment of dyslexia by parents and teachers (Rahim et al., 2018).

3. Acquired dyslexia

Acquired dyslexia, which is sometimes called "alexia" and "traumatic dyslexia" occurs in adults with an estimated frequency ranging from 3 to 18% (Tamboer et al., 2014). It is the result of damage to the mature and developed reading system, manifests as impairment in the comprehension of written language, and is caused by an acquired central nervous system disorder such as stroke or damage due to brain trauma (Reid, 2006). Several subtypes of acquired dyslexia have been reported. Five of them are: a) surface dyslexia, b) deep dyslexia, c) phonological dyslexia, d) direct dyslexia and e) visual dyslexia) (Snowling & Doyle, 2008).

4. The use of new technologies in students with dyslexia

Of course, although research data proves the lack of autonomy or adequate time on the part of teachers to develop flexible and supportive approaches to dyslexia (Didaskalou & Vlachou, 2004), the adoption of inclusive and child-centered directions, including differentiation and personalizing instruction, encouraging student interaction, providing additional instructional support, rewarding and encouraging student efforts, "using" a patient student as a facilitator, adopting special-general educator co-teaching models, teaching concepts of diversity and human rights, the strengthening of students' self-esteem but also in general the cultivation of an inclusive and unconditional cooperative culture are some effective strategies, which can contribute to the social-cognitive encouragement of children with dyslexia, at the same time mitigating potential social pressures and academic exclusion (Angelidis, 2011; Stasinou, 2015). This is important also for the social inclusion (Tsombanoglou et al., 2003).

At the same time, the teacher, balancing the thread of strengths and weaknesses of the children concerned (Jonson & Myklebust, 1967), should provide them with more time when performing written tasks or even focus on exercises that require oral participation them, thereby reducing the range of written requirements. Also, the exercises related to strengthening the phonological awareness of the child with dyslexia are considered important, which describes his ability to understand that speech is composed of sentences, sentences are composed of words, words are composed of syllables, syllables are composed of phonemes, i.e., from distinctive sound parts represented by letters. In fact, the researches of Tafa (2000) and Mouzaki et al. (2008) point out that phonological awareness is a decisive skill that affects the fluency of the child's abilities in the areas of reading, writing and spelling. Activities such as finding rhyming words, producing rhyming words, breaking sentences into words, syllables and phonemes and reconstructing them, detecting words starting with the same letter, repeating the reading of a short text are some representative exercises for strengthening the phonological awareness of the dyslexic child.

At the same time, the teacher should encourage the establishment of cooperative activities in the context of which it is possible to achieve not only the cognitive encouragement of students with dyslexia, but also the social-emotional one, which is often left behind compared to that of typically developing students. The study by Hellendoorn & Ruijsenaars (2000) is typical, who pointed out that students with dyslexia had clearly fewer friendships and social interactions than their classmates, who were not characterized by the experience of said difficulties.

To strengthen the social argument, Westling-Allodi (2002) in his study pointed out that the cultivation of good social relations between students with and without dyslexia is a cornerstone for enhancing the academic skills of dyslexic children. He, in fact, suggested that the effective treatment of these difficulties requires the "activation" of the relationships between students with and without the difficulties of the same name, that is, the investment of educational zeal in the field of social skills rather than in scholastic achievements (Westling - Allodi, 2002).

Angelidis (2011) suggest that in the context of cooperation between students with and without alterities, the recognition and acceptance of alterity, the feeling of belonging, the establishment of friendly relations, fruitful interactions are promoted, the social skills of the students as well as the unconditional cooperative climate, which is an essential variable for the generalization of the inclusive culture. At the same time, Slavin et al. (2008) emphasized that cooperative activities can contribute to improving students' phonological awareness, as they ensure conditions for effective cooperation of children with reading difficulties with the rest of their classmates who score better than them performances.

However, in any case the teacher should harmonize the teaching practice to the dominant way of learning of the dyslexic child, using it as a constant indicator of the way the child perceives and interacts with the learning environment. Abbott & Berningen (1999) even argued that the child with dyslexia through this strategy can cultivate further skills as well as gain perspectives of independent work and learning both inside and outside the school classroom. Apart from the above directions, however, the inclusive management of the difficulties of children with dyslexia also requires the harmonization of the modern school with further previous psychopedagogical approaches. In particular, the multi-sensory teaching method and the Information and Communication Technologies (ICT) can be used by the teacher and integrated into his teaching practice with the ultimate goal of the accessible contact of dyslexic children in appropriate software and voice programs through which coding and decoding skills will be taught (Stasinis, 2015).

In the literature it is pointed out that the multi-sensory approach is one of the most effective teaching methods for dealing with the difficulties of familiar children, given that through the stimulation of their visual, auditory and kinesthetic senses, their ability to retain and process information is enhanced, a goal that cannot be achieved with traditional teaching methods, which rely exclusively on the visual-auditory dipole (Baines, 2008). ICT, on the other hand, can be used by the teacher as a complementary and supportive teaching tool, which combined with traditional teaching will be able to create better conditions for overcoming existing difficulties (Stasinis, 2015).

The main advantage of the computer is that it adapts its use based on the needs of a dyslexic student. The various forms of dyslexia that exist require different handling and implementation of a specialized intervention program. The computer provides a large number of applications that are adapted based on the needs of each child, in order to seek and acquire knowledge in their own way (Zafeiri, 2019). The process of a student learning with the use of computers arouses his interest and makes the whole educational process more interesting (Manola et al., 2023; Vouglanis & Driga, 2023; Vouglanis & Drigas, 2022). Based on research, students with dyslexia problems are more attracted to new technologies, as they see this process as a fun game (Zafeiri, 2019). Through the new technologies and the use of the applications that provide us, the fact that it enhances the senses of the dyslexic student is important, which is difficult to happen in the context of conventional education (Zafeiri, 2019). But the most important thing for the psychology of the dyslexic student is that there is a friendly environment between him and the computer, because by using it he can express himself freely and without the fear of making mistakes, elements that would be difficult for him to express in the school environment (Zafeiri, 2019).

A negative of using the PC is that you lose the physical contact between the teacher and the student. A computer could not replace the teacher, but neither could the human relationships and bonds between teacher and student. It is a machine that works without consciousness and feelings, adding the elements of immediacy and spontaneity (Zafeiri, 2019).

It is particularly important to choose the right program, because dyslexia has many forms and should correspond to the needs of each student. That is, a software may be adequate and suitable for one student, but for another dyslexic student it may be inadequate, due to the different problem he may be facing. The need for comprehensive knowledge and continuous information, from the teacher, regarding the course and development of the educational programs is considered particularly imperative, just as it is also particularly important to test and control each software before it "enters" the classroom (Zafeiri, 2019). Equally important should be considered the relationship between the teacher, the child, the parents, as well as the companies providing educational programs, so that the computers and the specific software can become more effective and offer a substantial help in the educational process (Zafeiri, 2019). Ultimately, computers are a useful tool for teachers to deal with dyslexia, but this should not act as a substitute for the teacher (Zafeiri, 2019).

5. Discussion for digital technologies

Finally, we emphasize the significance of all digital technologies in the field of education and in dyslexia training, which is highly effective, productive, facilitates and improves assessment, intervention, and educational procedures via mobile devices that bring educational activities everywhere [56-58], various ICTs applications that are the main supporters of education [59-68], and AI, STEM, Games and ROBOTICS that raise educational procedures to new performance levers [69-74]. Additionally, the development and integration of ICTs with theories and models of metacognition, mindfulness, meditation, and the cultivation of emotional intelligence [75-90], accelerates and improves more than educational practices and results, especially in children with dyslexia, treating domain and its practices like assessment and intervention.

6. Conclusions

The multi-prismatic character of dyslexia, as well as the recognition of the prospects for dealing with it in the modern educational reality, confirms that dyslexia is not a disease or an individual "problem" that needs medical intervention.[13, 14, 33-49] On the contrary, overcoming the difficulties of children with dyslexia requires the inclusive mediation of the modern teacher with the ultimate goal of creating a welcoming, friendly and socially just environment with rich and meaningful opportunities to learn and participate in school activities. In the context of the inclusive ideal, the work of the modern teacher is a work of "understanding" and "collegiality", which focuses on the preparation of individual student-centered actions, the establishment of peer collaborations, the utilization of multi-sensory teaching methods and ICT, in building a cooperative climate with the parental and interdisciplinary potential as well as with the local community in order to strengthen and complement the school project.

Compliance with ethical standards

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Disclosure of conflict of interest

The Authors proclaim no conflict of interest.

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