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The use of ICT in the education of students with dysgraphia

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Abstract

In the modern society of technological developments, the various means of technology enter more and more both in daily life and in education. In this context, ICT plays an important role in the school. They are a valuable assistant in the pedagogical and teaching work of all teachers and in the achievement of the cognitive and social goals, determined during the planning of the teaching. In education, ICT can support all subjects and contribute to inquiry and collaborative learning, communication and the development of students' critical thinking and creativity. By integrating various ICT tools into teaching subjects, teachers aim for personalized teaching, place the student at the center of learning and seek their active involvement.

Keywords: ICT; Education; Dyslexia; Dysgraphia; Students

1. Introduction

Learning disabilities are a common educational need. They concern a significant percentage of students and many parents and teachers consider them to be of particular importance. Most students with learning disabilities fail in school—often because they are not identified early enough or do not receive effective educational support (Botsas & Panteliadou, 2007).

The term learning disability was introduced to the public in the 1960s by Kirk. He defined it as a neurological deficit that impairs a child's ability to learn specific academic skills. Since then, various definitions of learning disabilities have been developed (Loizou 2016).

In the US, there is a commission that collects data on learning disabilities. The National Joint Commission on Learning Disabilities defines learning disabilities as an umbrella term that encompasses a wide range of disorders. It states that these disorders are caused by deficits in language, reasoning, listening, reading, and math skills. This innate cause damages the functioning of the nervous system for life (Tzivinikou, 2015). People with learning disabilities have significant difficulties in acquiring, teaching and using language. All students with special educational needs, including those with learning difficulties such as dyslexia or dyscalculia, are considered part of the category of students with disabilities. In addition, students with dysgraphia, dysspelling and dyscalculia are considered part of this category.

It is possible that learning difficulties coexist with social, self-control problems, behavioural, emotional and sensory problems as well as other disorders such as mental retardation or cultural differences. It is important to deal with them in order these students to be included (Tsombanoglou et al., 2003). Learning disabilities are a pre-existing condition in individuals that are not caused by the reported problems, disorders or cultural differences (Vlachos, 2010).

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Students with learning disabilities have normal or above average intelligence. They struggle to understand academic information such as spelling, punctuation, grammar, decoding and comprehension of written works. They also have difficulty learning mathematical reasoning and classroom skills such as reading and writing (Mammarella et al., 2016). Although these students have average intelligence, it is the lack of skills that causes problems in school and in their social life.

Children with learning disabilities display normal intelligence. They require extra time, encouragement and feedback to complete a task. Because of their age and the stress of school, teenagers face more emotional issues related to social interaction. They may have more problems if they fail to meet their responsibilities or expectations (Adam & Tatnall, 2008). This issue becomes permanent but appears differently for each age. However, students can improve with help and accommodations from educational programs designed to help them learn (Katsougri, 2013).

2. The use of ICT in the teaching of students with learning difficulties

In order to improve the education of children with learning disabilities, it is necessary to change the school culture towards a more creative one (Manola et al., 2023; Vouglanis & Driga, 2023; Vouglanis & Drigas, 2022). Providing equal opportunities to participate in the learning process is essential — otherwise students are simply attending classes without actually learning anything. This can be achieved through differentiated teaching based on students' needs (Gelastopoulou & Kourbetis, 2014). This is because children with specific needs require additional accommodations and adaptations. There are differentiated teaching possibilities thanks to ICT tools that are accessible to all. This promotes universal design and accessibility in the creation of educational tools. It also improves the quality of education and seamlessly integrates students with problems into the school community (Palomino, 2017).

Modern teaching methods such as brainstorming and role playing can easily be incorporated into classroom lessons. These techniques help teachers tailor lessons to the specific needs of each student. ICT teachers use contemporary approaches such as brainstorming and role play to develop students' social and learning skills. Students learn how to collaborate when using open and closed software programs to provide immediate feedback. These programs also allow students to develop specialized ICT knowledge and skills necessary for daily life in the 21st century (Styliaras & Dimou, 2015).

By implementing these practices, students learn important social skills and develop essential study habits. In order to help students with special needs succeed in their education, future teachers are encouraged to use ICT in their teaching methods. This is shown in Palomino (2017), where positive views of ICT were found among prospective teachers.

In order to successfully implement electronic communication in their classrooms, teachers require the cooperation of all members of the school — including parents, students, and the school principal. They must also use electronic resources such as computers and the internet. Teachers also need to incorporate different Curriculum and Curriculum materials into each lesson (Adam & Tatnall, 2017) in order to tailor lessons to meet the needs of each student.

3. Benefits of using ICT in teaching students with learning difficulties

Students with learning disabilities struggle to perform basic math and writing tasks. They often have difficulties in social interaction, struggle to participate in the classroom and are often isolated from their peers. More specifically, they need special attention and programs that cover their needs (Katsougri, 2013) in order to improve their school performance and social skills.

The combination of active teaching methods with ICT aids significantly increases the effect of the teacher on his students. This leads to students' attention and excitement which pushes them to become even more motivated to learn (Alabournou & Sidiropoulou, 2016). This is because students who struggle to learn are still actively involved in the educational process. This leads to amazing long-term retention of knowledge for students with learning difficulties— due to effective communication with their peers (Styliaras & Dimou, 2015).

The teacher uses digital tools to facilitate interaction in a learning environment for students with learning disabilities. Specific needs and circumstances influence the difficulties faced by students (Starcic & Bagon, 2014). This integration into society helps students to work together happily and meet their individual needs. They are not cut off from the outside world, but included in it with their classmates who work together to meet everyone's needs (Starcic & Bagon, 2014).

ICT skills are vital to the technological progress of a society. Some people with learning disabilities have less ICT skills than students without learning disabilities (Chen et al., 2014). This is because animations, sounds and drawings help people achieve two goals at once. A productive, engaging and playful learning environment is created that engages and sustains student interest. This leads to increased student engagement and better cognitive and social skills (Alabournou & Sidiropoulou, 2016).

Technology helps students with dyslexia socialize and overcome learning disabilities. Although this is believed to be the case by Benmarrakchi et al. (2017), their research is not supported by other ICT teachers. The use of new technologies in the classroom has improved students' fundamental skills in reading, writing and comprehension. As reported by Drigas et al. (2015), ICT and the collaborative learning environment helped children with memory problems to learn more effectively through a daily program that was organized, supportive and regularly scheduled.

Adam & Tatnall (2017) found through research that computers are an invaluable tool for students with learning disabilities. Their findings showed that ICT improved students' attitudes about learning, communication and self-esteem. It also helped them improve their independence, cognitive skills and academic progress. In 2011, Curcic conducted research on students with learning disabilities through instruction in digital environments. This research was used to support her hypothesis that students with learning disabilities needed help with navigation, reading, writing, information processing and technology use. Curcic's research resulted in improved navigation and writing quality for students, as well as increased reading and length of the texts they wrote.

In addition to conducting research in Special Education schools, Abbott et al. (2004) conducted live video conferences between schools with students with learning disabilities. During these communications, participants learned new ICT skills that improved their language, social and communication skills. They also increased confidence and self-esteem through exposure to the collaborative ICT environment. Faux (2005) studied students with special needs through extensive research. They used multimedia to create stories based on their findings. According to their research, using the software development environment helped students improve their presentations, increase participation in their activities, and develop autonomous learning.

Based on the above data obtained from the literature, the teacher is given the opportunity to support students with learning difficulties by applying differentiated and multi-sensory teaching with the help of ICT in combination with modern pedagogical methods. In this way, it is possible to approach the interest and learning level of each student and develop high-quality skills that are necessary in the society of the 21st century (Loizou, 2016).

4. Types of ICT that contribute to the teaching of children with learning difficulties

Behavioral software takes a closed system approach that helps students learn and teach (Zervou & Sofos, 2017). On their website, they state that they use both sociocultural and constructivist approaches to teaching. They use alternative methods of presenting information to assess knowledge, such as practice activities. Teachers guide students and teach them in a teacher-centered environment. In contrast, alternative educational software programs use more open-ended methods such as constructivism. They encourage students to explore and create new knowledge through teacher-student partnerships. Students also get creative and share their ideas with other students. This encourages students to develop their learning skills and help each other learn (Zervou & Sofos, 2017).

Modern teaching trends justify the use of ICT tools in educational environments. The inclusive use of New Technology helps students with learning disabilities to learn (Starcic & Bagon, 2014). Students use websites like chess or solving puzzles to help them understand the subject of coordinates. These benefits motivate students and make using the internet an important part of their education (Mastrogiannis, 2014). Many websites offer non-educational benefits, such as allowing students to play games and learn new languages.

Specialized software is available to help students with learning disabilities process their spoken words. This includes a word processor for putting written words on paper. Several open source educational programs (Gabri Geometry, Revelation Natural Art, and Concept Mapping) enhance fine motor, categorization, discrimination, and developmental skill development (Mastrogiannis, 2014). Something of a mind game, Geometry Gabri Geometry software allows students to interact with changing images by dragging them. Using concept maps such as CmapTools, teachers can prepare students for collaborative learning, enhanced participation, and learning readiness during instruction (Nikoloudakis, 2010).

By encouraging students to have fun, creating positive attitudes towards new technologies and increased learning effectiveness, using the interactive whiteboard benefits both students and teachers. The board allows students to learn

interactively with pleasure and satisfaction through games. In addition, it encourages more effective learning by promoting skill development and knowledge acquisition. This can be seen through research by Manesis & Kakavas (2016). These findings are supported by other research by Yang et al. (2012). This shows that using the interactive whiteboard in the classroom creates a more dynamic learning experience for both students and teachers. Harlow and his colleagues believe that using an Interactive Whiteboard in the classroom makes students more independent. Teachers have the freedom to use the board to adapt their lessons to the needs, interests and abilities of their students. This leads to more creativity and student engagement in the lesson, as well as an increased sense of autonomy. It is important to understand that using the interactive whiteboard does not create enough collaboration between students. Everyone works separately until the end of the lesson, when they mostly interact with each other (Manesis & Kakavas, 2016).

Additionally, various digital games can contribute positively to the acquisition of new knowledge, problem solving and skill improvement of students with learning disabilities (Brodin, 2010). Digital games are familiar to students since they have been involved with them from an early age and have certain characteristics such as their realistic content, sophisticated graphics, graphical depiction of the world using vivid colors and movement, and their graded level of difficulty, which make them particularly popular in their integration into teaching (Mantzana & Nikolopoulos, 2016). Especially for students with learning difficulties, the use of games in teaching is beneficial, as they approach new knowledge visually, with non-linguistic means, participate actively, do not stress about possible failure and try to win. They are interested in the course and master the new knowledge without the stress of possible failure (Mantzana & Nikolopoulos, 2016).

Finally, various support technologies are used internationally that can help students cope better with the demands of the educational system a. digital pen for students with dyslexia and dysgraphia in organizing notes, writing and reading, b. text to speech-audio reading of digital text on a computer, c. the voice recognition system - software that converts natural speech into digital words that are entered into a text editor, d. virtual tactile hardware-software that supports students with dyscalculia and with difficulties in mathematics (Panagitsas & Papadakis, 2017). Also, according to the same source, the use of portable devices (tablets and smartphones) to integrate assistive technologies and implement activities at school enhances students' interest in learning.

The positive and useful contributions that digital technologies provide to the field of education should be highlighted as a final point. Mobile devices (51–54), a range of ICT apps (55–61), AI, STEM & ROBOTICS (62–65), and games (66–68) are some examples of the technologies that enable and improve educational processes including evaluation, intervention, and learning. Additionally, the use of ICTs in conjunction with theories and models of metacognition, mindfulness, meditation, and the development of emotional intelligence [69–89], accelerates and improves educational practices and outcomes, especially for students with special learning needs, including dysgraphia.

5. Conclusions

There are several software available that can be used by teachers in teaching according to the learning needs of each student, which will create a pleasant and interesting learning environment and motivate struggling students to achieve better school performance and to gain confidence.

All students, and especially students with learning difficulties, are likely to benefit from such a teaching framework, where individualized - adapted teaching is promoted to the ability level of each student and in a pleasant and creative working environment. The course becomes interesting as students interact with the software and develop their creativity and critical thinking by discovering knowledge through searching for information. They also actively participate in work groups, without feeling disadvantaged compared to their peers, depending on their individual abilities and skill level.

Compliance with ethical standards

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Disclosure of conflict of interest

The Authors proclaim no conflict of interest.

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