

DSAi: AI Powered Platform to Support the Use and Mapping of Educational Content for SLDs Students

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1 Background

Learning difficulties concern European researchers in the field of education and their effort to improve the Education System in Europe. They are conducting research and studies, aiming at mapping the problem through data that they can later use to identify potential solutions.

Specific learning disorders (SLDs) are difficulties in acquiring and applying academic skills. They are “specific” because they concern only some learning processes, that is, automatisms that do not develop during the school path.

According to the European Dyslexia Association in Europe, 15% of the population is dealing with dyslexia or some sort of learning disorder. The group of European Citizens with dyslexia and specific learning differences encompasses between 5 and 12 percent of the population, thereby navigating through life in a largely non-‘dys’ friendly world [1]. Dyslexia is the most widespread specific learning difference, making the acquiring and using of reading, spelling and writing skills and other communication-related cultural abilities more difficult for the affected people (commonly known as ‘DYS-differences’). Academic surveys have highlighted that other learning differences as dysphasia, dyscalculia, dyspraxia and attention deficit disorder (ADHD) commonly exist with dyslexia, known as ‘DYS-differences’ (concluded under ‘DYS’). The same person can also accumulate some of these differences. Indeed, dyslexia is associated with dysphasia, dyspraxia, dyscalculia or attention deficit [2].

Several approaches are present across Europe about issues related to SLDs. Different countries adopt different definitions and have different norms concerning diagnosis and regulations regarding support measures for dyslexic and SLDs pupils and students. The scenario is further complicated by the increasing presence of immigrant plurilingual individuals, who are often not granted adequate support.

In Italy, in the 2018/2019 school year, 298,114 students attending Italian schools were diagnosed with a specific learning disorder, equal to 4.9% of the total [3]. In the 2019/2020 school year, Italian students with educational special needs represented 11% of those enrolled in the secondary school and 6.5% in school primary of the first degree. Compared to the 2017/2018 school year, the presence of students with special educational needs within the school has grown by 29% on enrolled students (approximately +60,000) [4].

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2 Research objectives.

Our project aims to analyze the needs of students with specific learning disorders (SLDs). It designs organizational and technological solutions based on artificial intelligence. The keywords around which this project revolves and develops are essentially three: inclusion, accessibility and innovation.

The main intellectual output consists in the development and validation of a digital solution able to suggest the most appropriate supporting methodologies for dyslexic students based on the student-specific issues.

Until now, the use of artificial intelligence and algorithms is still partly limited to diagnostic use, such as for automatic detection of dyslexic children using a 3D Convolutional Neural Network or for Automated Detection of Dyslexia Symptom Based on Handwriting Image for Primary School Children [5].

Therefore, the goal of our project is to become a point of reference and fundamental support for learning, with particular attention to dyslexia. It aims to develop Digital and Artificial Intelligence Integrated Tools to Support Higher Education Students with SLDs in secondary school and university.

Several efforts have been already made to help students with dyslexia by offering adaptive e-learning methods. However, these efforts are completely addressed to children of primary school; no online tool based on AI has been proposed in the university, even though it is recognized that the inclusion of students with dyslexia in higher education is an important issue to solve. An innovative factor of an e-learning platform for dyslexic students is the use of artificial intelligence as the core of the architecture. Moreover, it would be the first example of this technology application in this specific field. The usage of AI will provide an adaptive interface that may support university students with an age substantially greater than the one considered until now in similar studies.

The field of Artificial Intelligence and Machine Learning over the past three decades has developed faster. The expectation is that it can help fill the gaps that exist in learning and education. Looking at a potential growth of 47.5%, there is no doubt that Artificial Intelligence will become part of the education sector soon [6].

The project intends to develop Digital and Artificial Intelligence Integrated Tools to Support Higher Education Students with specific learning disorders and, to do so, we want to collaborate with SLDs students to ideate some possible technological solutions that can improve the quality of their study experience, thereby using a participatory design thinking approach.

The research project hypothesizes that solutions based on NLP [7] can constitute effective aids to allow a dys-friendly and therefore more inclusive education. As we know, the higher levels of NLP, especially the discourse level, can empower an implementation that reduces a larger text into a shorter, yet richly constituted abbreviated narrative representation of the original document.

3 Expected results.

Our research project strives to:

- analyze the actual and latent needs of students with SLDs certificates concerning their experience of studying and participating in lessons;
- deepen the challenges that distance learning has imposed on students with SLDs;
- detect the use or not of enabling technologies in terms of devices and applications;
- explore areas for improvement of existing technologies and devise new possible technological solutions AI based;
- develop a technological solution based on AI and virtual reality; the idea is an immersive system able to offer a dsy-friendly digital environment where the student can find helpful tools for his study;
- bring out the differences and similarities between European students from different countries.

The study aims to obtain the following outputs:

- a mapping of the experiences of SLD students at the European level;
- a detection of the different support strategies and tools;
- the exploitation of some advantages of the sudden and pushed digitization that we experienced during the Covid19 crisis so that they become structural;
- the development of new AI based technologies able to improve the quality of life of SLD students.

Inclusion is a concept that presupposes equity and the task of each institution is to encourage each student to educational success.

The development of the project is still ongoing. However, we believe that further research and development activities in this field are necessary, especially in areas of training not yet considered, such as company training activities.

The development of an AI powered platform to support the training needs of people SLDs may also prove useful for the training of employees and collaborators.

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