LITERATURE REVIEW. EUROPEAN PERSPECTIVES ON CURRENT KNOWLEDGE AND PRACTICES OF TEACHERS IN USING DIGITAL TOOLS AND SOCIAL STORIES FOR TEACHING CHILDREN WITH ASD

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INTRODUCTION

The literature review focuses on understanding current knowledge and practices related to the use of digital tools and social stories by preservice Early Childhood Education and Care (ECEC) teachers in teaching children with autism spectrum disorder (ASD) to improve their social communication skills and support their social and emotional development to help establish a framework for developing a course for preservice ECEC teachers on effectively using these tools.

The first focus of the literature review is on European perspective for teaching children with ASD within the context of the rights of all individuals for education and the inclusive aspects of education. Social and Emotional Development of Children with ASD and Educational Interventions in the European context are the second focal point while the third focus dwells on the use of social stories as an early intervention to the education of children with ASD.

The literature on teaching of children with ASD mostly concentrates on diagnosis of ASD, intervention and early intervention ways, intervention areas, social and communication skill deficits and problem behaviours, parents' awareness and support, and teachers' professional development. This literature review excludes research on diagnosis of ASD, intervention practices related to diagnosis processes, speech development, academic achievement and parents' awareness and involvement.

Early social communication skills are of crucial importance for children with ASD since they are the most critical areas that these children struggle with. Along with that, putting together such practices in a manner that it approaches social inclusion: support the preservice teachers to utilise digital tools while promoting social emotional well-being and inclusion of children with ASD within the classroom in their future teaching. The literature review, in this regard, can help in reconciling the gap that exists between research and practice in the field of education, and also address the overarching challenges of inclusion education.

The scope of the review regarding the European context is limited to European Commission's reports related to the review's focus and works from Europe written in English. The scope of the country-based reviews is limited to the research in partner universities' regions and countries and in their local language and in English. Peer-reviewed publications from 2010, academic articles, research reports, meta-analyses, books, ministerial reports, policy documents and case studies, scientifically acceptable sources, European-level and region-specific literature relevant to each partner university are examined in this study.

LITERATURE REVIEW

European Perspective on Teaching of Children with ASD

Every child has the right to education, and children with autism spectrum disorder (ASD) are no exception. The Convention on the Rights of Persons with Disabilities and the Universal Declaration on Human Rights play significant roles in developing policies that guarantee the accessibility of education to children with ASD across Europe (Van Kessel, R., et al. 2019). The European Parliament resolution of 4 October 2023 (2023/2728 -RSP) emphasises that there is a need to harmonise the rights of autistic individuals and ensure they have equal opportunities in education in keeping with wider international efforts to ensure an inclusive education for children with autism. These documents also promote the right to education for all and have been incorporated into the national policies of several European countries (Roleska, M., et al. 2018) aligned with specific needs and contexts of each country.

The growing recognition of the need for inclusive education policies also caters to the unique needs of autistic individuals across Europe. For example, the countries like the United Kingdom, France, and Spain have developed specific strategies to support children with ASD in education and those strategies dwell on inclusive education that allows children with ASD to reach their full potential (Roleska, M., et al. 2018).

The existing legislation on inclusive education and its interpretation by European and international law is centred on full mainstream inclusion. However, this approach has its shortcomings, and there is a push for more neurodiverse and rights-based alternatives. This creates a situation where not only must states bring these children in a more supportive and inclusive mainstream settings, but also provide alternative educational options when necessary (Ducarre, L. 2023).

European countries look for various strategies to implement sustainable policies for supporting teachers working with students with ASD and the literature review by Folostina et al. (2022), shows that there is a lack of adequate preparation in evidence-based educational practices for children with ASD in the European context. Furthermore, a meta-analysis conducted on 23 case studies on teacher evaluation designs for teachers working with children with ASD has revealed some significantly important aspects of teacher's training needs that should be considered in order to enhance the child's social and communication skills (Alexander, J.L.; Ayres, K.M.; Smith, K.A. 2014). The needs teachers articulated in these education gaps strongly indicates the need for an appropriate teacher education on theory, practical methods, and coaching strategies for working with children with ASD.

Social and Emotional Development of Children with ASD and Educational Interventions.

Children with ASD often exhibit poorer socio-emotional understanding and regulation compared to their typically developing peers, consequently affecting their social competence. Interventions targeting socio-emotional development are crucial for improving social interactions of children with ASD (Reyes, N., Factor, R., & Scarpa, A. 2020; Xanthopoulou, M., Kokalia, G., & Drigas, A. 2019)

Some of those interventions include collaborative approaches involving families, schools, and researchers, utilizing specialized materials that demonstrate positive effects on social and emotional skills development (Lozano Martínez et al., 2017); picture exchange communication system (PECS) (Flippin et al., 2010); psychodynamic interventions Midgley, N., Mortimer, R., Cirasola, A., Batra, P., & Kennedy, E., 2021); peer-mediated interventions that involve typically developing peers to facilitate social interactions of children with ASD (Martinez, J., Waters, C., Conroy, M., & Reichow, B. 2019); and Social and Emotional Learning (SEL) Interventions that incorporate SEL goals into Individualized Education Programs (IEPs) (Dale, B., Rispoli, K., & Ruble, L. 2022).
Technology-involved interventions are one of those interventions that have the potential to support social communication skills of children with ASD. Those interventions using animation videos or video games on mediums such as mobile applications, tablets, computers, social robots (Grynszpan et al., 2014; Mazurek et al., 2015), or artificial intelligence powered applications (Marzano, G., & Zorzi, S. 2022) attract the attention of children with ASD and provide a motivating environment for individuals thanks to the organised and predictable nature of the tasks they offer (Scarcella, et al., 2023).

ICT tools can ensure improvement in various aspects of social skills of children with ASD compared to traditional face to face therapies as Xanthopoulou, M., Kokalia, G., & Drigas, A. (2019) revealed in their study that focused on 14 randomised controlled trials, 12 of which demonstrated the significant influence of ICT in improving social communication skills in children with ASD. In a meta-analysis, Sandgreen, H., Frederiksen, L. H., & Bilenberg, N. (2021), reviewed 16 studies on the effect of technology-involved interventions on children with ASD showed that the overall effect size of the technology-involved interventions was positive, however small, emphasising the need for more practices in this regard. Transformative role of digital technologies, robotics, and artificial intelligence in enhancing the social communication skills of children with ASD also suggests the need for creative, professional training and digital competence development for teachers to effectively support inclusive teaching practices (Marzano, G., & Zorzi, S. 2022).

The technology-involved interventions in Europe mainly include robot-based interventions that use advanced educational humanoid robots to help children with ASD recognize and express basic emotions such as happiness, sadness, fear, and anger (Bartl-Pokorny, K., et al, 2021); virtual reality interventions that demonstrate various improvement levels in social communication skills (Mesa-Gresa, P. & et al, 2018; Bradley and Newbutt, 2018; Dechsling et al., 2021; Parsons et al., 2017); mobile applications and digital games, effective in training metacognitive skills in children with ASD (Mitsea et al., 2022) and digital storytelling through 2D or 3D animation videos that emerge as a promising tool, especially for teaching children with ASD. By using optical triggers, educational animation videos enhance memory and engagement, and offer an affordable and effective method for interventions (Sakellariou, M., & Sakellariou, M. 2022)

In their study, Syriopoulou-Delli, C. K., & Gkiolnta, E. (2022), reviewed literature and assessed the main components and findings of 13 selected scientific papers on the effectiveness of robots in improving social skills of children with ASD. They found that the social robots had a positive effect on specifically in the areas of attention, speech, and imitative behaviour, as well as the diminishment of certain stereotypical behavioural patterns. Moreover, the analysis from the 13 studies indicated that robots produce immediate impacts on some communication functions of children with ASD. Another study by Scassellati et al. (2018) pointed to significant and noticeable improvements in social communication, social motivation, and social cognition, and demonstrated a decrease in restricted interests and repetitive behaviours.

Mobile applications have recently started to be used in the education of children with ASD and the development of their social skills (Mintz, J., Gyori, M., & Aagaard, M., 2012). The research suggests that these applications are beneficial to support individuals with ASD in the areas they fall behind (Moraiti, I., Fotoglou, A., & Drigas, A. 2023).

Social Stories as an Early Educational Intervention

Several studies in Europe have shown that social stories can improve social skills in children with ASD with varying effectiveness, including social understanding (Riga, A., Ioannidi, V., & Papayiannis, N. 2021); perspective-taking, initiating and recognizing emotions (Wongkittirungrueang, S., Sanrattana, U., & Warnset, S. 2024); maintaining social interactions (Karal, M. A., & Wolfe, P.S. 2018), social responsiveness (Wright, B., et al, 2024); and social skills (Talas, S., & Kurt, O. 2019). They constitute an effective method to enhance social skills of children with ASD and especially, contribute to increasing social interactions and social learning processes (Fortuny-Guasch, R., Sanahuja-Gavaldà, J. M., & Pérez-Romero, A. 2024).

Social stories can be delivered in various formats such as written, visualised, audio, video, or computer-based programmes. The format can be chosen according to the needs and preferences of children with ASD to enhance engagement and understanding (Karal, M.A., & Wolfe, P.S. 2018).
In Europe, there are few studies that show the effectiveness of social stories in digital format. For example, Smith (2020), suggests that digitally-mediated social story interventions (delivered by teachers) can improve behaviour and understanding, and reduce anxiety in children with ASD in mainstream school settings. Hanrahan et al., (2020), also state that digitally-mediated social stories are found to be effective in producing beneficial changes in behaviour outcomes for children on the autism spectrum.

Conclusion and Need for Further Research

While digital social stories show promise, there is a need for further research and educational practices to understand how preschool children with ASD benefit from those digital social stories, how well these stories improve socio-emotional skills and how well young children can generalize them to other settings and are maintained over time.

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