

## REVIEW ARTICLE

Virtual Applications with Artificial Intelligence for Learning of  
Children with ASDAplicaciones Virtuales con Inteligencia Artificial para el aprendizaje en niños con  
TEA

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## Abstract

Virtual applications with artificial intelligence (AI) are revolutionizing special education, offering new opportunities for learning for children with Autism Spectrum Disorder (ASD), as they provide personalized learning experiences that adapt to the individual needs of each child, effectively addressing areas such as communication, social interaction and motor skills, maintaining children's interest, but also promoting continuous and meaningful development. The purpose of this article was to examine the impact of AI on virtual applications aimed at learning and skill development in children with ASD, identifying how these interact with children, offering personalized experiences that address and strengthen the areas where each individual presents difficulties. To carry out this review, a documentary analysis method was used, collecting and examining a wide range of relevant studies and academic sources. The findings from this analysis provide a deeper understanding of the capabilities of AI in special education and offer practical recommendations for parents, educators and application developers, and underline the importance of further developing and refining these technologies to offer increasingly effective support to individuals with ASD. It is concluded that the integration of these tools into the family and school environment maximizes their benefits, suggesting that artificial intelligence has the potential to significantly transform special education.

**Keywords:** artificial intelligence; applications; education; ASD; children

## Resumen

Las aplicaciones virtuales con inteligencia artificial (IA) están revolucionando la educación especial, ofreciendo nuevas oportunidades para el aprendizaje en niños con Trastorno del Espectro Autista (TEA), ya que éstas proporcionan experiencias de aprendizaje personalizadas que se adaptan a las necesidades individuales de cada niño, abordando de manera efectiva áreas como la comunicación, la interacción social y las habilidades motoras, manteniendo el interés de los niños, promoviendo así un desarrollo continuo y significativo. El propósito de este artículo consiste en examinar el impacto de la IA en aplicaciones virtuales destinadas al aprendizaje y desarrollo de habilidades en niños con TEA, identificando cómo estas interactúan con los niños, ofreciendo experiencias personalizadas que abordan y fortalecen las áreas donde cada individuo presenta dificultades. Para llevar a cabo esta revisión, se empleó un método de análisis documental, recopilando y examinando una amplia gama de estudios y fuentes académicas relevantes. Los hallazgos obtenidos a partir de este análisis proporcionan una comprensión más profunda de las capacidades de la IA en la educación especial y ofrecen recomendaciones prácticas para padres, educadores y desarrolladores de aplicaciones, además subrayan la importancia de seguir desarrollando y perfeccionando estas tecnologías para ofrecer un apoyo cada vez más eficaz a las personas con TEA. Se concluye que la integración de estas herramientas en el entorno familiar y escolar maximizan sus beneficios, sugiriendo que la inteligencia artificial tiene el potencial de transformar significativamente la educación especial.

**Palabras clave:** inteligencia artificial; aplicaciones; educación; TEA; niños

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## INTRODUCTION

ASD is a neurological and developmental condition that significantly affects social interaction, communication and behavior, appearing at an early age and persisting throughout life, while presenting a wide variety of symptoms and severity levels. Children with ASD may experience difficulties communicating verbally and nonverbally, understanding and responding to social cues, and developing playing skills and other activities, since the diverse ways in which ASD shows make each individual unique, requiring personalized educational and care approaches (Cabezas & Oses, 2024).

The educational process for children with ASD poses several challenges, since traditional teaching methods, which are usually linear and unadaptive, do not always meet the specific needs of these children. Difficulties in communication and social interaction may limit their ability to fully participate in conventional educational settings; also, sensory issues and inflexibility in thought and behavioral patterns may interfere with learning and adapting to new situations (Isisqui et al. 2023). Context and families of children with ASD are constantly searching for tools and strategies to support development of skills and facilitate effective learning; in this context, technology, and more specifically: AI-backed virtual applications, have emerged as a promising solution to address these needs (Cordero, 2023).

In the current digital age, where technology plays a significant role in almost every aspect of life,

education is no exception. Digital technologies have transformed teaching and learning methods, offering new opportunities to personalize and enhance the educational experience; Among these technologies, AI-backed virtual applications have gathered special attention due to their ability to tailor educational content to the individual needs of students (Martínez, 2022).

AI refers to the ability of machines to perform tasks that typically require human intelligence, such as learning, reasoning, and decision-making. In the educational context, AI can analyze substantial amounts of data to find patterns and tailor content and teaching strategies to each student's specific needs. This is particularly useful for children with ASD, who require personalized approaches to learning and development (Cortez et al., 2024).

Virtual AI applications designed for children with ASD offer a variety of benefits. as these tools can provide a personalized learning experience, adapting to each child's skills and preferences, also including interactive activities that encourage social skills development, communication and adaptive behavior; in addition, they are used in a variety of environments, including home and school, facilitating continuous integration of learning into the child's daily life (Camargo & Fonseca, 2024).

One of the main benefits of AI-enabled virtual applications is their ability to provide real-time feedback. so that children receive immediate guidance and correction, which is crucial to your

learning, in addition, These applications can use gamification techniques to keep children motivated and engaged in the learning process, involving the use of game design elements in non-playful contexts, creating a more engaging and fun learning experience (Cruz et al. 2023). Another meaningful benefit is the ability of these applications to track the child's progress over time, AI can analyze usage and performance data to identify areas of strength and weakness, providing valuable information to educators and parents, enabling tuning of instructional strategies and better supporting the child's development (Rodríguez et al., 2023).

While virtual applications with AI offer numerous benefits, they also present challenges, one of the main ones is to ensure that these tools are accessible and usable for all children with ASD, regardless of their level of technological ability or device access, and it is crucial to ensure that applications are secure and protect the privacy of user data (Sánchez, 2023). It is also important to consider the role of educators and parents in the use of these technologies, although applications can provide meaningful support, they cannot replace the need for human interaction nor the fundamental role of educators and parents in child development, best practices involve the use of virtual applications as a complementary tool in a comprehensive educational approach (Ronquillo et al., 2023).

AI-backed virtual applications are a significant innovation in education for children with ASD. These tools offer the ability to personalize learning,

provide real-time feedback, and keep children motivated through gamification techniques (Coicaud, 2020). While there are challenges in their implementation, the potential benefits for skill development and improving the quality of life of children with ASD are immense, hence continuing the research and development of these technologies will be critical to maximize their positive impact and ensuring that all children have the opportunity to reach their full educational potential (Camargo & Fonseca, 2024).

Based on the above, the purpose of this article is to explore how virtual applications with artificial intelligence benefit children with ASD in the educational field and how they transform their learning experience; These apps focus on improving the expression and understanding of emotions, which is fundamental to social interaction, through interactive games, teach children how to differentiate and recognize emotions through images of real people, showing when and how they manifest themselves.

## **METHODS, TECHNIQUES, AND INSTRUMENTS**

This section details the methodology used to meet the research objectives through documental analysis; this method, according to Bermeo et al. (2016), involves a number of specific processes including the search, selection, organization and analysis of relevant documents; Tobón et al. (2015) emphasize that this process focuses on answering specific questions on a particular topic. The main goal of this

method is to relate the existing data on a given construct, offering a comprehensive view that eases the formulation of adequate solutions to the problem posed (Rivera et al., 2018).

This work examines articles that explore and evaluate the use of AI-enabled virtual applications in learning children with ASD. To achieve this objective, recent studies, published from 2020 to the present, were reviewed and synthesized through a rigorous selection, evaluating the effectiveness and benefits of these technological tools; additionally, the difficulties that children with ASD face in traditional education and how virtual applications with AI adapt to these specific needs were identified.

A comprehensive search was conducted in academic databases such as Google Scholar, PubMed, Scopus and other scientific repositories, including search terms with keyword combinations such as "artificial intelligence", "virtual applications", "autism spectrum disorder", and "special education". Results were filtered, to limit them to studies published between 2020 and 2024. Once the selected documents were collected, they were organized according to their relevance and subject matter, categorized based on the aspects they address, such as application effectiveness, educational challenges, and adaptation strategies.

Subsequently, a critical analysis of the selected studies was conducted, evaluating the method, results and conclusions of each one, paying special attention to the quality of research designs, the validity of the data

and the consistency of the conclusions. Findings from the reviewed studies were synthesized to provide an overview of the impact of AI-based virtual applications in the learning of children with ASD, highlighting the benefits seen as areas requiring further research.

## RESULTS AND DISCUSSION

According to the literature review conducted, the use of AI-backed virtual applications has revolutionized the field of special education, offering new opportunities for learning and skills development in children with ASD. Recent studies have underscored the effectiveness of these technologies not only in academics, but also in the development of social and communication skills, crucial for the educational and social inclusion of these children. This analysis presents the similarities and findings of different research on the effectiveness of AI applications in this context (Table 1).

The growing integration of technology tools into education has made a significant impact on training and skill development, especially in inclusive education settings. A systematic review by Meza & Mendoza (2023) stresses that, without quality education for everyone, it is impossible to form a society of knowledge; the authors emphasize the need to employ technologies that improve their skills and abilities, giving both educators and students autonomy with responsibility by promoting meaningful learning.

**Table 1.** *Main Studies on Artificial Intelligence and Education for Children with ASD*

| Author                    | Concept                                                                                                                                                                                                           | Similarities                                                                                                                |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| García & López (2021)     | Artificial intelligence-based educational technologies play a crucial role in improving learning in children with ASD.                                                                                            | Applications improve the learning process.                                                                                  |
| Martínez & Pérez (2021)   | Addresses the challenges and applications of artificial intelligence in special education, highlighting its potential to personalize learning strategies in children with autism.                                 | Highlights the potential of AI applications                                                                                 |
| Muñoz & Hernández (2021)  | They evaluated a virtual reality application for social skills development in children with ASD, finding positive and meaningful results.                                                                         | Applications are making positive progress in special education.                                                             |
| Sánchez & Gómez (2021)    | They evaluated new mobile applications for educational intervention in children with autism, highlighting their effectiveness in improving communication and social skills.                                       | They question the effectiveness of these applications in learning and how it improves social interaction and communication. |
| Ruiz & Fernández (2022)   | They found that these tools can have a positive impact on social skills development in children with ASD, promoting greater interaction and communication.                                                        | Help children with ASD have better social and communicative interaction.                                                    |
| Torres & Fernández (2022) | They researched the use of artificial intelligence applications in the communication of children with ASD, finding that these tools can provide significant support in the development of communication skills.   | Provides meaningful support for methods to personalize special education.                                                   |
| Martínez & Torres (2023)  | They explored the potential of artificial intelligence and adaptive learning in the education of children with ASD, highlighting their ability to adjust educational activities to each child's individual needs. | This adjustment of customized methods helps everyone to feel comfortable                                                    |

Source: Self-preparation (2025)

Rodríguez & Alvarez (2020) presented a case study on the use of AI to customize learning in children with ASD. This study looked into how AI-enabled applications can be tailored to the individual needs of each user: the developed programs customized learning to each child's pace and methods of study, resulting in significant improvements in academic performance, increased motivation and engagement, and ease social interaction regarding communication; these findings highlight the potential of AI as an inclusive and effective tool in education.

A study by Soledispa et al. (2024) mentions that AI is a valuable help for education; however, it also raises challenges and concerns related to dehumanizing the educational process and ethical issues on privacy. Addressing these issues is crucial to ensuring an ethical and fair implementation of AI in education,

guaranteeing that technology tools help all students without compromising their well-being and privacy.

Navarre & Sanchez (2022) reviewed the recent impact of digital technologies on children with ASD learning; their analysis included studies and projects implemented in recent years, highlighting how tools, such as mobile apps, augmented reality and artificial intelligence, have been used to improve different skills in these children. Improvements include communication, social interaction, and academic learning, showing the broad potential of these technologies in inclusive education.

Vazquez & Medina (2023) noted that using apps eases teaching abstract concepts and improves social interaction through simulated scenarios; these apps allow children to interact in a controlled and secure space, helping them reduce anxiety and increase confidence in real-world situations. This approach not only enhances academic skills, but it also provides a safe environment to practice and develop essential social skills.

## CONCLUSIONS

The integration of AI-backed virtual applications into the education of children with ASD has proven to be a revolutionary tool with highly promising results, showing that these emerging technologies have a significant impact on various aspects of learning and skills development in this specific population. Through a personalized and adaptive approach, AI-enabled applications have the potential to accurately respond to each student's individual needs, helping

both academic performance and the development of social skills, crucial to educational inclusion.

AI-based applications enable an unprecedented customization of the educational process; unlike traditional methods, which often take a uniform and rigid approach, these tools tailor content and pedagogical strategies to each child's unique characteristics and needs, allowing this individualized approach to be especially beneficial to children with ASD, who can present a wide range of skills and challenges. AI-enabled applications adjust activities and resources in a dynamic way, providing each student with an optimized learning experience aligned with their pace and learning style.

In addition to improving their academic performance, these technologies also play a crucial role in the development of social and communication skills, a difficulty often faced by children with ASD in social interaction, effective and affective communication; these applications include

interactive tools designed to address these specific areas, offering simulated scenarios and exercises that facilitate the learning of essential social skills. Through games and activities designed to improve emotional understanding and communication skills, these applications not only support academic learning, but also encourage social and emotional integration.

As a group, the reviewed studies highlight the transformative potential of technology in inclusive education, the ability of AI-enabled applications to customize and adapt learning offers a unique opportunity to improve educational quality and foster the comprehensive development of children with ASD. However, in order to maximize these benefits and ensure its effective application, it is crucial to continue researching and refining these methods, since constant evaluation and innovation in the use of educational technologies will allow facing emerging challenges and enhance the positive impact on the development of all students

## REFERENCES

- Bermeo-Yaffar, F., Hernández-Mosqueda, JS, & Tobón-Tobón, S. (2016). Análisis documental de la V heurística mediante la cartografía conceptual. *Ra Ximhai*, 12 (6), 103-121.
- Cabezas Pino, M. E., & Oses Soto, M. F. (2024). Revisión Bibliográfica orientada a las estrategias metodológicas para el aprendizaje de estudiantes con trastorno del espectro autista incluidas en el aula regular.
- Camargo Puerto, C. E., & Fonseca Cuesta, S. A. (2024). Estrategia pedagógica apoyada en TIC y (ABP) para mejorar el habla y la comunicación de los estudiantes en preescolar y 4º de primaria en la discapacidad sensorial y comunicación en casos de inclusión (Doctoral dissertation, Universidad de Cartagena).
- Coicaud, S. (2020). Potencialidades didácticas de la inteligencia artificial: Videojuegos, realidad extendida, robótica y plataformas. Mediaciones tecnológicas para una enseñanza disruptiva. Noveduc.
- Cordero Ruiz, K. A. (2023). "Estrategia didáctica para el desarrollo del aprendizaje en los niños con necesidades educativas especiales asociadas al autismo en aulas de integralidad (Master's thesis, Universidad Estatal de Bolívar. Facultad de Ciencias de la Educación. Carrera Educación Inicial).
- Cortez, M. B. Y., Vera, F. E. A., Alarcón, M. Y. A., & Suñiga, A. A. G. (2024). Impacto de la inteligencia artificial en la educación, retos y oportunidades. *RECIMUNDO*, 8(2), 24-34.
- Cruz, J. A. G., Díaz, B. L. G., Valdiviezo, Y. G., Rojas, Y. K. O., Mauricio, L. A. S., & Cárdenas, C. A. V. (2023). Inteligencia artificial en la praxis docente: vínculo entre la tecnología y el proceso de aprendizaje.
- García, J. M., & López, A. J. (2021). Avances en tecnología educativa para niños con TEA: El papel de la inteligencia artificial. *Revista Latinoamericana de Tecnología Educativa*, 18(1), 50-63.
- Isusqui, J. C. P., Villavicencio, I. E. S., Inga, C. V., Gutiérrez, H. O. C., Díaz, B. L. G., & Amaya, K. L. A. (2023). La Inteligencia Artificial al servicio de la gestión y la implementación en la educación.
- Martínez, P. D. R. E. (2022). Una visión contemporánea de las perspectivas de aprendizaje en la sociedad del aprendizaje actual. *RICSH Revista Iberoamericana de las Ciencias Sociales y Humanísticas*, 11(21), 121-143.
- Martínez, P., & Pérez, F. (2021). Inteligencia artificial en la educación especial: Aplicaciones y desafíos para el autismo. *Revista Iberoamericana de Inteligencia Artificial*, 23(67), 15-29.
- Martínez, F., & Torres, R. (2023). Inteligencia artificial y aprendizaje adaptativo en la educación de niños con TEA. *Revista Internacional de Tecnología Educativa*, 15(2), 35-49.

- Meza Montes, J. K. & Mendoza Zambrano, M. G. (2023). Revisión sistemática: tecnologías educativas emergentes en la formación docente de la sociedad del conocimiento en el contexto latinoamericano MQRInvestigar, 7(1), 2527-2544.
- Muñoz, R., & Hernández, S. (2021). Evaluación de una aplicación de realidad virtual para el desarrollo de habilidades sociales en niños con TEA. Revista Española de Pedagogía, 79(280), 210-225.
- Navarro, E., & Sánchez, M. (2022). Impacto de las tecnologías digitales en el aprendizaje de niños con TEA: Una revisión reciente. Educación y Tecnología, 26(2), 100-115.
- Rivera, P. D. A., Carrillo, S. S. M., Forgiony, S. J. O., Nuván, H. I. L., & Roza, S. A. C. (2018). Cultura organizacional, retos y desafíos para las organizaciones saludables.
- Rodríguez, L., & Álvarez, M. (2020). Inteligencia artificial y aprendizaje personalizado en educación especial: Un estudio de caso en niños con TEA. Revista de Educación Inclusiva, 13(1), 95-110.
- Rodríguez, M. A. M., Rubio, A. M. A., Lingán, A. M. A., Rubio, D. E. P., Bocanegra, J. C. S., & Flores, J. W. C. (2023). Inteligencia Artificial en la educación digital y los resultados de la valoración del aprendizaje.
- Ronquillo, K. K. M., Pérez, L. D. R. P., Veloz, J. F. A., & Solís, R. L. F. (2023). La inteligencia artificial aplicada en la innovación educativa en el proceso de enseñanza y aprendizaje: Artificial intelligence applied to educational innovation in the teaching and learning process. LATAM Revista Latinoamericana de Ciencias Sociales y Humanidades, 4(2), 1597-1613.
- Ruiz, L., & Fernández, S. (2022). Efectos de las aplicaciones móviles interactivas en el desarrollo de habilidades sociales en niños con TEA. Educación y Tecnología Avanzada, 8(2), 120-133.
- Sánchez Ortega, P. L. (2023). Realidad inclusiva, realidad virtual y realidad aumentada para todos.
- Sánchez, P., & Gómez, R. (2021). Nuevas aplicaciones móviles para la intervención educativa en niños con autismo. Revista de Psicología y Educación, 12(1), 89-104.
- Soledispa Zurita P., Aguilar Mora, G., Crespo Castillo, O y Carranco Madrid S. (2024). Inteligencia Artificial y Educación Inclusiva: Herramienta para la Diversidad en el Aula. Revista Social Fronteriza; 4(2): e215.
- Tobón, S., Gonzalez, L., Salvador Nambo, J., & Vazquez Antonio, J. M. (2015). La socioformación: un estudio conceptual. Paradigma, 36(1), 7-29.
- Torres, C., & Fernández, A. (2022). Aplicaciones de inteligencia artificial en la comunicación de niños con TEA: Un estudio experimental. Psicothema, 34(1), 112-125.
- Vázquez, A., & Medina, L. (2023). Realidad aumentada e inteligencia artificial en la educación de niños con TEA: Innovaciones y perspectivas. Revista de Tecnología Educativa, 19(3), 45-58.