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ORIGINAL

Digital tools and their use in the education of children with ASD

Las herramientas digitales y su utilización en la educación de niños con TEA

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ABSTRACT

The general objective of this work was to distinguish the digital tools used in the education of children with ASD in Argentina, in order to identify the most used. For this purpose, exploratory research was carried out in three institutions and a private workshop of AMBA on a population of children aged 3 to 18, using a qualitative approach. Sampling was intentional non-probabilistic and data collection was conducted through open and neutral interviews. The data obtained were coded and categorized considering their type and implementation. This work also included background on the digital technology used in other countries, as tools for evolution and inclusion in people with this type of disability.

Keywords: ASD; Digital Tools; Special Education; Pedagogical Method; Inclusion.

RESUMEN

El objetivo general de este trabajo fue distinguir las herramientas digitales que se utilizan en la educación de los niños con TEA, en la Argentina, con el fin de identificar las más empleadas. Para ello se hizo una investigación de tipo exploratorio, en tres instituciones y un taller, del ámbito privado, del AMBA, sobre una población de niños de 3 a 18 años, empleando un enfoque cualitativo. El muestreo fue no probabilístico intencional y la recolección de datos se realizó mediante entrevistas abiertas y neutras. Los datos obtenidos fueron codificados y categorizados teniendo en cuenta su tipo e implementación. En este trabajo también se incluyeron antecedentes sobre la tecnología digital utilizada, en otros países, como herramientas de evolución e inclusión en personas con este tipo de discapacidad.

Palabras clave: TEA; Herramientas Digitales; Educación Especial; Método Pedagógico; Inclusión.

INTRODUCTION

Currently, the use of Information and Communication Technologies (ICT) has become established as a fundamental tool in educational processes, generating new possibilities for teaching and learning that transcend traditional limits. However, when it comes to the education of children and young people with Autism Spectrum Disorder (ASD), the challenge becomes even greater, as it requires careful selection of tools that are adapted to the individual needs of each student.[(1)]

ASD is characterized by heterogeneity in its manifestations, meaning that no two profiles are identical; consequently, educational strategies must be adapted to multiple realities. In this sense, digital tools have begun to gain relevance as a bridge to inclusion, communication, and the development of cognitive, social, and functional skills.[(2)]

In Argentina, research on the application of digital resources in the education of children with ASD is scarce, making it necessary to open up a field of study that allows for the recognition of current experiences

and the evaluation of the benefits and limitations of these practices. The outbreak of the COVID-19 pandemic accelerated the incorporation of digital platforms and technological devices in educational contexts, including those aimed at children with ASD, creating a scenario of exploration that deserves to be analyzed. This study aims to investigate how various institutions and professionals in the Buenos Aires Metropolitan Area (AMBA) are integrating digital tools into their therapeutic and educational programs, and which of these tools are most widely used.

What digital tools are currently used by institutions and professionals in the AMBA in the treatment and/or education of children with ASD, and which of them are the most widely used?

The aim of the study was to identify the digital tools used in the treatment and/or education of children with ASD in the AMBA, and to distinguish which ones are most commonly used in different institutional and professional contexts.

METHOD

Design

The scope of the research was exploratory because it is a subject that has not been extensively explored, as indicated by the findings, and there is no record of previous research, as noted by Hernández Sampieri et al.[3]

The approach was qualitative, as the data obtained were non-numerical, arising from the formulation of the initial hypothesis, which varied as the research process and user experience developed.

The design used was non-experimental and cross-sectional because, as indicated by Hernández Sampieri et al.[3], there was no manipulation of the variables, and the phenomena were observed as they occur in their natural environment and then subjected to analysis. It is worth noting that the data were collected at a single point in time.

Participants

The population consisted of institutions, spaces in the AMBA (Buenos Aires Metropolitan Area), and professionals who work in the education of children aged 3 to 18 with ASD, using digital tools. The sample was taken from three institutions and one workshop, all located in the AMBA and specializing in the subject, and all in the private sector.

Considering that treatments for this type of pathology are carried out through different therapeutic approaches, the following were chosen as sources of information: a long-standing, cutting-edge therapeutic center with an approach based on an individualized educational project that emphasizes the areas of communication, socialization, personal autonomy, self-reliance, and functional cognitive skills; an association of parents dedicated, among other things, to designing and developing support and monitoring formats that aim at non-discrimination, participation, and learning, with opportunities for everyone in the school environment to be inclusive and fruitful; another therapeutic center dedicated to the comprehensive, individual, and group education of children with ASD, based on communication and the development of both cognitive and physical skills; and a workshop on new technologies in education, covering early childhood, primary, secondary, tertiary, and special education, with advice on teaching materials for teachers, professionals, and educational institutions.

The sampling was non-probabilistic and intentional, as participants were selected based on specific characteristics that make them representative of the population and that differ in the way they develop and apply their educational therapies.

As the interviews were conducted with individuals, authorities from specialized spaces and institutions, their informed consent was requested in writing.

Data collection materials and instruments

The data were collected through open-ended interviews at the beginning, via telephone and virtual platforms, and, as the research progressed, through interviews guided by open-ended and neutral questions. The guide used is attached in Annex 2 of this paper.

Data analysis

Based on the qualitative data analysis, we sought to identify the digital tools that different institutions in the AMBA use for the treatment and/or education of children with ASD. The breakdown of this information allowed us to analyze which of these tools is used most frequently.

The analysis confirmed the initial hypothesis that different digital tools are currently being used in the education of children with ASD and that some are used more than others. To conclude, the following variables were analyzed by comparing experiences, grouping the digital tools used by type, and categorizing them:

Digital tools implemented by institutions in the education of children with ASD

As has been explained, the use of digital tools can be a positive and inclusive factor in both the treatment

and education of children with ASD. There are various basic technologies and digital devices that serve as real bridges to effective learning, as well as other ways of implementing them.

According to Hernández Sampieri et al.[3], in their Research Methodology, qualitative research is based on collecting the experiences and points of view of individuals, and the theory generated is based on the participants' perspective. On the other hand, Mertens[4] considers qualitative research proper when the phenomenon of interest has not been previously measured. Given that there are no recorded precedents on this research topic in Argentina, it was essential to survey professionals who currently implement e-learning in the education of children on the autism spectrum.

The data obtained from the interviews allowed us to distinguish digital tools as units of analysis, which were categorized according to their type and implementation.

Most commonly used digital tools in the education of children with ASD

Cross-referencing the data obtained in the first variable made it possible to highlight the types of tools used. Analysis of this categorization revealed another that allowed for distinguishing which ICTs, devices, applications, and other digital tools are most commonly used for teaching children with autism.

RESULTS

This research sought to meet the general objective of identifying the digital tools used in the treatment and/or education of children with ASD and distinguishing the most commonly used ones.

When asked what types of tools are used in the treatment and/or education of autistic children, professionals from APAdeA (Argentine Association of Autistic Parents) in the Autonomous City of Buenos Aires, an institution that provides school inclusion and cognitive behavioral treatment services at home, assessment, and diagnosis, and also has a Supported Employment Program, integrating neurotypical children with people with ASD (Autism Spectrum Disorder) in formal education schools, stated that they use tools such as Zoom, Meet, YouTube videos, Google Classroom-type platforms, and Wumbox (interactive educational). Additionally, they hold video conferences where activities that can be completed interactively are shared.

For their part, the specialists at the San Martín de Porres Therapeutic Education Center, at all its locations (Palermo, in CABA; Isidro Casanova, Pilar, and San Isidro in Greater Buenos Aires, and in Yerba Buena, Tucumán), with two special education schools, three Therapeutic Education Centers, a Day Center, and a Rehabilitation Center, revealed that they use the Santillana Encyclopedia educational platform, many others based on YouTube for different subjects, and Khan Academy. They are replacing blackboards with digital screens that update automatically. Communication with students and families is conducted via WhatsApp, cell phones using the "red notebook" program, Zoom, and Webinars.

The response from professionals at CETTA (Therapeutic Center for Autism Disorder) in Olivos, Buenos Aires province, was that they use Wordwall, nine letras, Genially, and Educaplay, and that they evaluate which platform to use according to each child or objective to be worked on.

Finally, Rosa Kaufman, head of the Rosa Kaufman Computer Laboratory in the Autonomous City of Buenos Aires, which offers computer and technology courses for children, young people, and teachers, integrating neurotypical children with those on the autism spectrum, responded that they use applications such as graphics programs, 3D modelers, office automation programs (spreadsheets, word processors, presentation software, databases), programming languages, and work with microcontrollers and an introduction to robotics, the Internet of Things (particularly with textiles), geotechnologies, and educational video games.

The categorization of the digital tools used reveals that 75 % of participants primarily utilize digital platforms to implement their education systems for children with ASD, and to a lesser extent, they also use websites, blogs, software, or computer programs.

The Zoom digital platform and YouTube videos are the most widely used (50 % of participants agree on their use).

Two types of digital tools can also be classified: those that teachers use to create their materials, such as Wordwall, Nine Letters, Genially, and Educaplay; and others exclusively for children's learning, such as Khan Academy and Wumbox. Those from Rosa Kaufman's laboratory are educational computer programs.

This analysis also reveals that video telephony services are utilized through applications like WhatsApp.

DISCUSSION

This research aims to identify which digital tools are used in the treatment and/or education of children with ASD and to distinguish those that are most commonly used. To answer these questions, fieldwork was conducted in three institutions and a workshop specializing in children, all of which were representative of the topic on which the research was focused.

Both Hebron et al.[5] and Humphrey et al.[6] argue that ICTs are a handy tool, especially in the case of autistic students, as they enable the creation of new alternative communication channels, leading to improvements in

education in general. However, there are different ways of accessing ICT, a variety of applications, and digital resources that can be used to facilitate learning, depending on the chosen pedagogical method and the needs of the students. This research helped to highlight this last aspect.

According to the results of the interviews conducted, there is no single pattern that unifies the choice of digital tools to be used; rather, the opposite is true. APAdeA[7] bases its pedagogical strategy on the use of ICTs that are useful for planning and developing virtual classes, as well as for communication between parents, teachers, and children. The San Martín de Porres Therapy Center carries out its pedagogical work by integrating platforms that help teachers and also promote learning for children with ASD. Communication with students and families is established through applications and video call platforms.

CETTA professionals utilize platforms to generate content, and then, depending on the needs of each child, select the digital tool to use.

The case of Rosa Kaufman's Computer Laboratory is different, where programs are used that children access according to their abilities.

It has been challenging to identify the most commonly used digital tools, despite a certain tendency toward the use of one platform or another, due to the variety and differences in the choice and use of tools by institutions and the needs of each child involved in learning. This way of selecting and using digital resources for children with ASD is similar to what Sanromá-Giménez et al.[8] say about applications, arguing that there are as many applications as there are different profiles of children with ASD and that, therefore, it is essential to select those that will be used in educational intervention carefully.

The fieldwork conducted reveals that professionals, children (as users), and family members are all involved in the selection process. Also, as Sanromá-Giménez et al.[8] argue, there are no agreed or official classification systems, so institutions need to determine a set of pedagogical and technological criteria to assess their quality and suitability for the development of children with ASD, hence the variety and difference between the tools used in the education of these patients. These authors also note that digital technologies promote more meaningful and personalized learning situations, and that they are motivating for autistic children, given that they process information received through multisensory stimuli, preferably visual, more effectively.

This research shows that to choose the right tools, it is essential to develop criteria based on pedagogical and technological capabilities, such as the ability to adapt to the needs of each individual, simplicity of development, absence of distracting stimuli, and functionality that takes into account the methodologies used in the intervention of children with ASD: help options in videos, icons, writing, auditions, i.e., different media; clear instructions in other formats (verbal, written, or auditory); and various levels of difficulty. Therefore, as Tortosa[9] stated, the path to effective ICT implementation requires moving from a generalized and often disorganized implementation of these tools to integrating them into the curriculum, understanding them as a resource where educational needs, fundamentally human ones, prevail over the available technology.

In conclusion, considering the limited background on this type of research in Argentina and bearing in mind what *Daymon (2010)*, as cited by Hernández Sampieri et al.[3], stated, qualitative samples should not be used to represent a population. This work represents a first step that will lead to continued, intensified, and expanded research on this topic. It is also important to note that the incorporation of digital tools in the treatment and/or education of children with ASD is not widespread, a fact that emerged from the preliminary exploration conducted to identify specialized institutions that utilize digital tools in their learning programs.

Half of the participants revealed that they began to apply these tools after the Covid-19 pandemic, in remote sessions, and that, in everyday situations, and as a result of the new experience in which they discovered many resources that capture the attention of children with autism, motivating them and generating curiosity and expectation, they will continue with face-to-face therapeutic programs, which they will complement with the use of digital technology. It should be noted that, according to the professionals interviewed, both in the treatment and education of children with ASD, interaction between the patient and the therapist, without a mediator, is essential to achieve a meaningful learning situation. For these children, it is also vital to manipulate concrete materials, and many are unfamiliar with using a PC. For some, its use can be dangerous because they may break it. These results indicate that the use of digital tools in the education of children with autism is at a stage of exploration and experimentation. Therefore, this research is at the beginning of a series that will allow us to accompany and evaluate the process of incorporating e-learning into the teaching and learning of children within this spectrum.

On the other hand, Autism Spectrum Disorder encompasses a heterogeneous set of neurodevelopmental disorders that includes, in addition to a socio-communicative development disorder and a restricted pattern of interests and repetitive behaviors, other types of clinical manifestations that vary significantly from one individual to another (American Psychiatric Association, 2013). Some of these individuals may have intellectual disabilities, others may have language development disorders, or, conversely, they may have strong language skills or high intellectual potential. These characteristics can vary from person to person and within the life cycle of the same individual.

Since no two autistic children have the same profile, it is more complex to find digital tools that are useful to everyone. Consequently, many more tools will likely be used, making it impossible to determine which is most useful or efficient.

One limitation of this research was the inability to conduct interviews and directly observe the tools and learning processes due to the COVID-19 pandemic and the respective quarantine, which would have generated new questions and answers.[12,13] Also, due to this situation, the scope of the research could not be extended to other therapeutic centers in the AMBA. These actions could have provided more data and expanded the information on the subject.

However, the absence of research on the application of digital tools in the education of children with ASD in Argentina means that the contribution of this work can be considered valid due to its original proposal and because it leaves open new questions and a new path for future research.[14]

Furthermore, the presentation of how digital technology can aid in the education of people with this type of disability and facilitate progress in their development enables them to be placed on a level playing field of inclusion and equality in terms of learning and improving their quality of life.

For all these reasons, this research's response to the question of which digital tools are currently used and which are the most widely used provides partial data, which in turn may change at the speed at which new technology is generated and applied to education in general and in particular, and as different institutions incorporate them as part of their daily therapeutic educational work.

CONCLUSIONS

Finally, as a recommendation, it is suggested that educational institutions, workshops, and professionals specializing in children with ASD be open to receiving training and constant, up-to-date information on the various digital tools emerging to support teaching and learning. It would also be productive for professionals with experience in the field to work alongside computer developers so that the products created can be tailored to the needs of this type of learner. Continuing this line of research would provide further insight into the use of e-learning in the education of autistic children and help identify and improve the effectiveness of the tools used.

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