SPEECH IMPAIRMENT STUDENTS AND EDUCATIONAL TECHNOLOGY

ESTUDIANTES CON DIFICULTAD DEL HABLA Y LA TECNOLOGÍA EDUCATIVA

Ana A. Made[1*]

[1] https://orcid.org/0000-0003-0864-5228; New York City Department of Education, USA; anamade29@hotmail.com

[*]Autor de correspondencia: Ana Made anamade29@hotmail.com

Abstract: The present research is aimed to review the scientific literature generated between 2010 and 2022, on the implementation of digital educative resources for students with speech disabilities or language disorders. In other words, studies related to the subject are investigated. On the other hand, to supply current information, the search was set up within a twelve-year period. To achieve this aim, a search was conducted in the databases Dialnet, DOAJ, Eric, Scielo, Scopus, Elsevier, Jstor, Oxford Research Encyclopedia and the academic source of Google Scholar, through descriptors that included the variables associated with the object of study. In the first exploration, fifty-three articles were obtained, which when filtered resulted in fifteen articles that met the pursuit criteria. The results showed two clear trends: articles referring to the use of educational technology resources, and those which do not use it. Furthermore, result confirmed the use of technology in two areas: therapeutic and academic. In addition, this research presents issues with the terminology being used for speech impairment and the scarce scientific production in this area, which are associated with the effectiveness in attention and inclusion of students with this disability.

Resumen: La presente investigación tiene como objetivo realizar una revisión de la literatura científica generada entre los años 2010 al 2022, sobre la implementación de la tecnología educativa en estudiantes con dificultad del habla o impedimento del lenguaje. Para lograr dicho objetivo se realizó una búsqueda en las bases de datos Dialnet, DOAJ, Eric, Scielo, Scopus, Elsevier, Jstor, Oxford Research Encyclopedia y el motor de búsqueda Google Académico, a través de descriptores que incluían las variables asociadas al objeto de estudio. En una búsqueda inicial se obtuvieron 53 artículos, que al ser depurados según criterios derivaron en 15 artículos que cumplían con los objetivos. Los resultados mostraron dos tendencias claras en la literatura: artículos referidos al uso de recursos en tecnología educativa, y artículos que consideran recursos didácticos no digitales en la discapacidad del habla. Además, los resultados confirman el uso de la tecnología en dos áreas: terapéutico y académico. Por otra parte, se discuten las imprecisiones conceptuales relacionadas con la dificultad del habla, y la escasa producción científica en el área, lo cual se asocia a la efectividad en los procesos de inclusión de los estudiantes con dicha discapacidad a través de recursos educativos digitales.

Résumé: La présente recherche vise à passer en revue la littérature scientifique générée entre 2010 et 2022, sur la mise en œuvre de ressources éducatives numériques pour les élèves ayant des troubles de la parole ou des troubles du langage. En d'autres termes, des études liées au sujet sont étudiées. En revanche, pour fournir des informations actuelles, la recherche a été mise en place sur une période de douze ans. Pour atteindre cet objectif, une recherche a été menée dans les bases de données Dialnet, DOAJ, Eric, Scielo, Scopus, Elsevier, Jstor, Oxford Research Encyclopedia et la source académique de Google Scholar, à travers des descripteurs incluant les variables associées à l'objet d'étude. Lors de la première exploration, cinquante-trois articles ont été obtenus, qui, une fois filtrés, ont abouti à quinze articles répondant aux critères de recherche. Les résultats ont montré

deux tendances claires : les articles faisant référence à l'utilisation de ressources technologiques éducatives et ceux qui ne les utilisent pas. En outre, les résultats ont confirmé l'utilisation de la technologie dans deux domaines : thérapeutique et académique. De plus, cette recherche présente des problèmes liés à la terminologie utilisée pour les troubles de la parole et à la rareté de la production scientifique dans ce domaine, qui sont associés à l'efficacité de l'attention et de l'inclusion des étudiants atteints de ce handicap.
Key Words: educational technology; special education; speech impairment; systematic review.
Palabras clave: educación especial; impedimento del habla; tecnología educativa; revisión sistemática.
Mots clés: technologie educative; éducation spéciale; troubles de la parole; Revue systématique.

INTRODUCTION

Today, the use of educational technology is one of the greatest impacts on the school community. However, the implementation of Communication Technology and the research that flourishes from them must guarantee a suitable use within the field of inclusive education. According to Marín (2018) the use of Technology of the Information and Communication for inclusive education should be addressed from the point of view of inclusive technology.

Inclusive education sets up that students with disabilities are integrated into the classroom along with the general education. This idea is presently practiced worldwide. In favor of the basic right to education, the United Nations Education Organization, Science and Culture favored the theme of education for all (UNESCO, 1990); In this way, inclusive education is broadly proposed as a reform that welcomes and supports diversity among all students (UNESCO, 2005) this constitutes a necessary axis in the integral formation of human beings, with or without disabilities, as well as in the development and evolution of every society. For this, it is essential to set up guidelines to reduce barriers and guarantee participation in the educational system on equal terms.

Following the international principle of educational inclusion, in the United States each state must ensure a free, proper public education for individuals with disabilities in an unrestricted environment. According to the U.S. federal law, called the Individuals with Disabilities Education Act (IDEA), speech impairment is one of the conditions for a student to be authorized Special Education in American public schools (U.S. Department of Education, 2018). In the United States, Special Education students with the classification of speech impairment must receive speech therapy services and their instruction is based on the same academic curriculum that is used for their peers without disabilities. Therefore, the school community works together (special education teacher, speech therapist and

other school staff) to offer and guarantee the student with this disability a quality education, relying on the use of technology in the teaching-learning process. It should be noted that Speech/Language Impairment is the term used in American public institutions; For this reason, it is the starting point of the present research.

However, even though speech impairment is a documented condition in the field of special education, it has not been sufficiently addressed to facilitate the practice of teachers and therapists, since the amount of research related to language disorders is low in relation to other disorders also present in educational institutions, especially cognitive or sensory deficit (Santos et al., 2015).

Furthermore, some reviews have also detected the use of different terms to refer to speech impairment, which may be conditioning both the way of understanding the problem and the educational approach. Moreover, different constructs have been found that allude to the same process: speech impairment, language disability and language disorder (McGregor, 2020). This conceptual diversity shows the existence of parallel paths that do not necessarily cross: the medical and clinical approach, the occupational approach, and the educational approach to disabilities (Salas & Moreno, 2020), hence the importance of knowing how these investigations can be of help in the educational field and specifically in special education.

Another aspect that stands out is the use of technologies as mediators in the work with students with speech impairments. Currently, in New York schools, digital resources such as ABC mouse, epic!, I *Ready, Brian Pop Jr, Starfall, Harmony, Inspire*, among others, are implemented to include students with this condition. However, according to McGregor (2020), questions persist about the scarce research and implementation of technologies in the condition of speech impairment. Based on what has been proposed, this research is considered necessary to find how speech impairment has been addressed, through the incorporation of educational technologies.

The aim of this study was to conduct a review of the scientific literature of empirical antecedents generated between 2010 and 2022, on the implementation of digital resources in educational inclusion of students with speech disabilities or language disorders.

METHODOLOGY

To meet the aim proposed in the systematic review, documentary research was conducted, it integrated the qualitative approach since it consists of consulting scientific documentary sources to approach the object of study. In this sense, the scientific documents or articles

are the body of information from which the categories and topics that allow responding to the aims set in the research are obtained (Revilla, 2020).

The information was collected through scientific articles extracted from the following databases: Dialnet, DOAJ, Eric, Scielo, Scopus, Elsevier, Jstor Oxford Research Encyclopedia and Google Scholar. These databases ensured that the information collected was properly arbitrated and indexed, this ensured a scientific criterion to the documentary information and the guidelines of the PRISMA model for the registration of systematic reviews were followed (Page *et al.*, 2021).

Table 1. Descriptors and keywords. Source: Own elaboration

SPEECH IMPAIRMENT	AND/OR	EDUCATIONAL TECHNOLOGY
Speech Language Pathology		Educational Technology Tools
		Digital learning Resources
Language Impairment		Digital Educational Tools
		Digital Learning Resources
Communication Disorders		Digital Educational Tools
		Digital Learning Resources
Language-based Disabilities		Instructional Technology
Language Disorder		Educational Technology
Students With Language Disorders		Digital Teaching Resources
Speech Disability		TIC
Students With Speech Delay		Digital Learning Resources
Speech and Language Impairment		Digital educational resources
Speech and language Impairment		Technology-Discipline
Students With Speech & Language Impairments		Educational Digit Resources
Speech Articulation Language		E-learning

The search requirement was set up to retrieve articles prepared between 2010 and 2022 that related the condition of speech impairment with the implementation of digital resources. In this way, studies that touch on the topic were explored. Therefore, keywords were generated in English and Spanish that allowed the search in the selected databases. These descriptors or keywords are shown in Table 1.

As it is shown in table 1, the search for information on the implementation of digital teaching resources in the education of students with speech impairments showed a challenge in the variety of terms to be used in reference to the descriptor "speech impairment". The following figure shows what has already been mentioned.

Figure 1. *Words associated with impairment in English and Spanish.* **Source: Own elaboration**
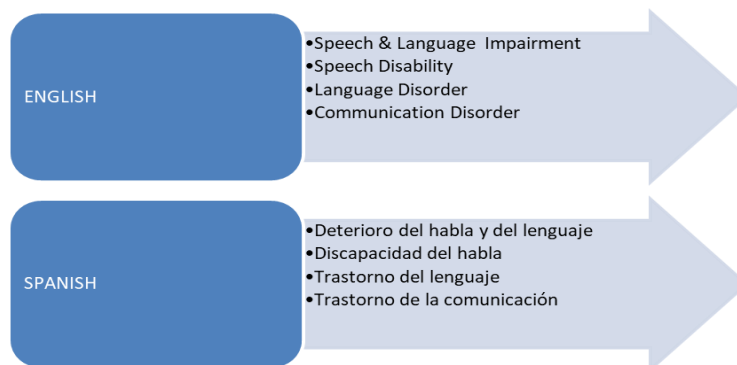
Under these initially established guidelines, fifty-three articles were obtained that included at least one of the keywords and a second filtering process was started as set up by the Prisma method for systematic research.

In the next stage, a first reading draft and classification of all the collected materials, were used to create an Excel table. This table was formed of Topic, Type of document, Aim, and relevant results. The second stage consisted of choosing proper articles for the research.

Based on the selection of articles, a table (table 2) was generated to exclude those which do not qualify for the research. Table 2 shows the reasons for excluding documents.

Table 2. *Criteria to exclude documents.* **Source: Own elaboration**

EXCLUSION CRITERIA
Did not make explicit reference to the notion of speech impairment or disability or language disorder
Articles were prior to 2010
Did not refer to educational environments or classroom applications
Considered adult population
Research from undergraduate, master's or doctoral theses.

By applying the exclusion criteria, a definitive amount of fifteen articles met the requirements. These articles were incorporated into the research as definitive documents to generate the empirical background on the subject under study.

The fifteen documents were analyzed according to affinities in the contents, according to the process of documentary qualitative analysis proposed by Monje (2011).

ANALYSIS AND RESULTS

Based on the systematic review and its analysis conducted in the selected articles, the categories that show the results obtained are expressed:

Origen of the research recovered on the topics under study.

The distribution in figure 2 shows the articles retrieved from the descriptors considered in the study.

Figure 2. *Article distribution per countries.* **Source: Own elaboration**
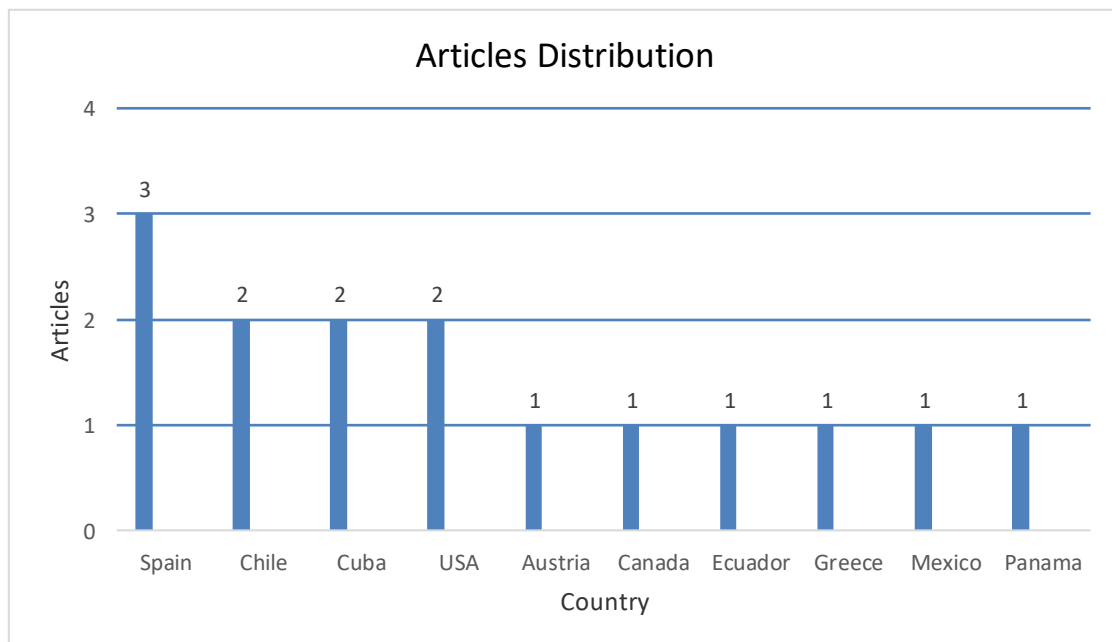
As can be seen, the country with the highest scientific production on the documents consulted was Spain with three articles, followed by Cuba, the United States and Chile, with two articles each. This confirms that the production of articles in exceeds other regions.

In addition, although the search was conducted in international databases, the number of Anglo-Saxon and European publications in English was not a majority, as expected. If the documents are grouped by region, five publications in English are obtained compared to ten publications in Spanish produced in Ibero-America that met the criteria. This result could be interpreted through the fact that Anglo-Saxon and European research have lower production in the field of special education, as the case of production in Latin America.

Topics according to common themes

In the analysis process it was decided to group the articles according to the common themes, obtaining the following:

a. Academic articles, whose theme follows experimental and non-experimental scientific criteria.

b. Therapeutic articles, in which findings focus on the implementation of behavioral changes or improvements in academic functioning.

c. Articles that link both themes, it, they follow scientific and therapeutic criteria proposing behavioral changes under experimental or non-experimental strategies.

d. Articles that implement digital educational technologies or resources in school groups.

e. Articles that theoretically consider digital technologies or resources, but do not explicitly implement them in school groups.

Figure 3. *Comparative analysis of articles according to theme* Source: Own elaboration.

Academic Articles
- Follows experimental and non-experimental scientific criteria

Therapeutic Articles
- Focus on the implementation of behavioral changes or improvements in academic functioning

Digital Technology
- In school groups
- Not explicitly implement them in school groups
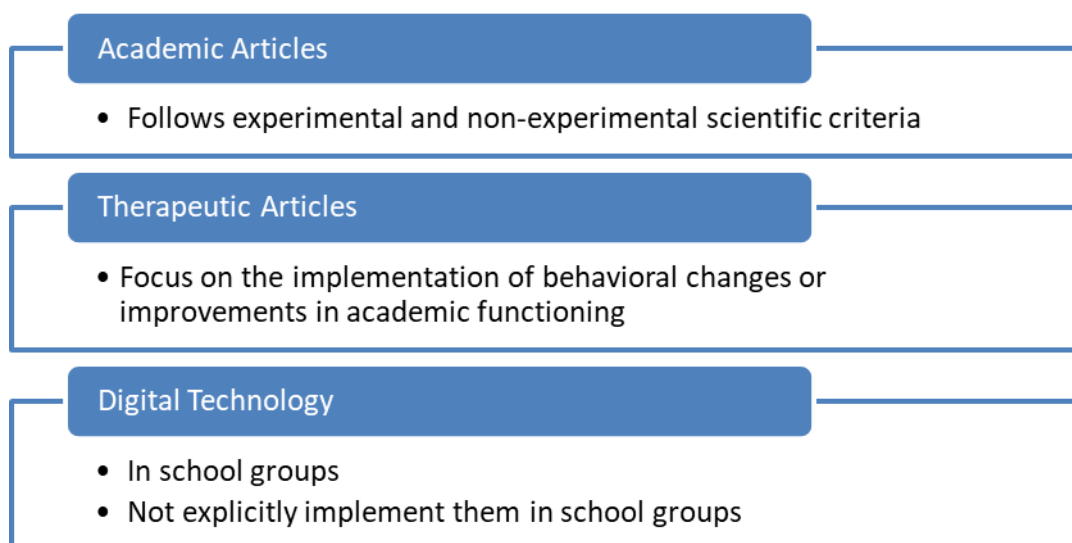
In Figure 3, the organization of the articles according to the theme is visually represented, proposing an explanatory crossing between these topics.

In this regard, nine investigations that apply technology were found, compared to six investigations that consider the importance of technologies, but do not incorporate it as part of educational work strategies. It should be noted that of these nine items only four are used in the classroom. In contrast, at this amount, five articles are seen under the non-use of technology at the academic level. In other words, the search for the articles yielded more without the use of technology. From this comparison we can see that there are more articles referring to the non-use of technology than articles referring to the use of technology. A greater predominance of applied research in technology was expected, given the importance that has been given to digital resources in special education. However, this presence was not decisive. It is worth noting that the applied works were presented in the studies produced in Spain, the United States, Austria, Canada, and Chile.

Another important relationship that can be highlighted is the orientation of research towards the academic or therapeutic field. It can be seen that most of the works produced (nine articles) are in the academic or scientific field, that is, they are reports of experimental or non-experimental studies, while only two investigations are of therapeutic orientation, that is, they report the results of the implementation of technologies to modify behaviors associated with language impairment. It is interesting to highlight four investigations that address a clinical or therapeutic approach under scientific criteria (experimental and non-experimental approach). From these results it can be concluded that research that applies to digital educational resources is the one that manages to combine more effectively the therapeutic processes oriented to change under scientific criteria.

PREDOMINANT DEFINITIONS

The third aspect considered in the recovered articles was the definitions that are overseen in the research on the concept of speech impairment and on the effectiveness of digital educational resources for this disability. Next, the categories are developed:

Speech impairment

In the context of the retrieved articles, speech impairment is not usually considered in isolation but is associated with different physical or neurological conditions, among which autism (Wittke et al., 2017), learning difficulties (Bishop, 2009), cognitive or intellectual deficit (García and Medina, 2017), multiple disabilities (Orr & Mast, 2014), cerebral palsy (Hustad et al., 2020), visual impairment (Brouwer et al., 2015), and traumatic brain injury and emotional disturbances (McGregor, 2020). Figure 3 shows some of the mentioned conditions. According to IDEA (2018), there are thirthteen disabilities: Autism, Deaf-blindness, Developmental delay, Emotional disorders, Hearing impairments, Intellectual disabilities, Multiple disabilities, Orthopedic impairment, Other health impairment, Specific learning disability, Speech or language impairments, Traumatic brain injury and Visual impairments. In this sense, there is little scientific production dedicated solely to studying speech impairment or language disorder as a deficit independent of other conditions.

Figure 4. *Speech Impairment and Other Conditions.* Source: Own elaboration.
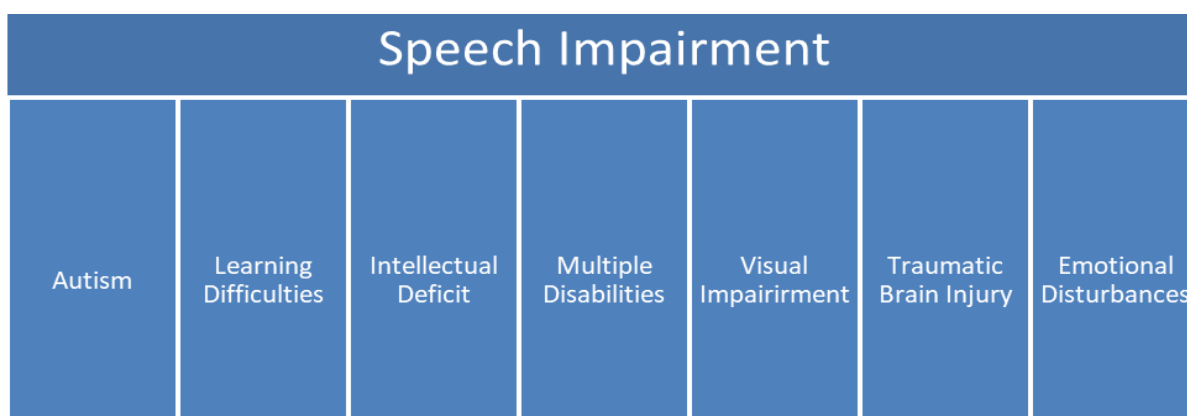
About the definitions of terms, different expressions were also found in the retrieved articles. The terms speech disability, disorder, or impairment dominate in studies retrieved from the United States and Canada (Hustad et al., 2020; Lancione et al., 2020; Orr & Mast, 2014; Tokia & Pangeb, 2010), with experimental and non-experimental research in which technological resources are applied as a tool. In studies conducted in Latin America, the tendency is to use the term disability or language disorder, grouped into the following.

categories: hearing, language, speech and communication (Damico *et al.*, 2010); There is also a tendency to consider it as a disorder of language development linked to other biological and cognitive processes (Shane *et al.*, 2012).

The concept is expanded to language and communication disorder to also refer to the expressive component (Sueldes *et al.*, 2017). Also, Polo Molina *et al.* (2018) and Coloma (2014) use the term specific language disorder, to delimit disability to other associated problems. On the other hand, Quintero *et al.* (2018) and Timbi-Sisalima *et al.* (2015) use the term disorder in speech production, referring to phonetic and articulatory characteristics, thus showing that the trend in terms is far from being unified.

This classification shows that the investigations follow two relevant trends, on the one hand, the Anglo-Saxon research, of experimental cut that goes to the definition of speech impediment from a clinical and neurophysiological perspective. On the other hand, the investigations in Ibero-America, in which different denominations are generated to express the language disorders.

Educational Technology

According to Negre (2003) Computer literacy is of utmost importance since through it, Information and Communication Technologies provide us with educational, economic, social, and cultural benefits. The author points out that teachers must be trained in computer literacy. In a similar way, Cabero *et al.*, (2018) indicate that in addition to the teacher receiving virtual, training, teachers' professional performance in this field must be evaluated. Without doubt, in the field of ICT applied in education, technical and pedagogical training is necessary to ensure an appropriated learning-teaching experience to all students.

Technology has been a useful tool in special education, especially in students with intellectual disabilities. All recovered articles consider this mediation in the condition of speech impediment, considering that in scientific development there is an evolution in the

implementation of technological mediation by generating opportunities for inclusion to traditionally excluded groups (Hernández *et al.*, 2020). However, considering that in most of the documents retrieved, speech impairment is associated with other conditions. There is a greater predominance of research that reports the use of technology in classroom strategies applied to students with autism spectrum (Silva & Rodríguez, 2018) and in students with visual impairment (Archundia & Cerón, 2018). In the research of Lancioni *et al.* (2020) digital resources are implemented in patients with speech impairment with successful results; However, there is evidence of a theme oriented to clinical or therapeutic uses, rather than to educational uses.

When considering technologies and educational resources as mediators in the research consulted, diverse ways of considering this topic were found. First, research was obtained that considers educational technological resources or digital didactic resources implemented in services to children with communication needs, disorders or deficiencies, with a therapeutic contribution (Suelves *et al.*, 2017; Orr & Mast, 2014); applications based on modifications (Quintero *et al.*, 2018) and the implementation of multimedia resources such as animation, sound or interactivity to achieve advances in academic processes (Tokia *et al.*, 2010). Likewise, in the therapeutic utilities, Quintero *et al.* (2018) showed that the use of mobile applications efficiently complements therapies for children with dyslalia. The range of resources is wide, since the research consulted considers different technological resources such as mobile, computers and tablets. In this trend, in which the utilities of apps are considered, research conducted in Spain predominates in which virtual resources are analyzed for an educational purpose for students with language disorder or speech impairment (Montell *et al.*, 2018 & Coloma, 2014).

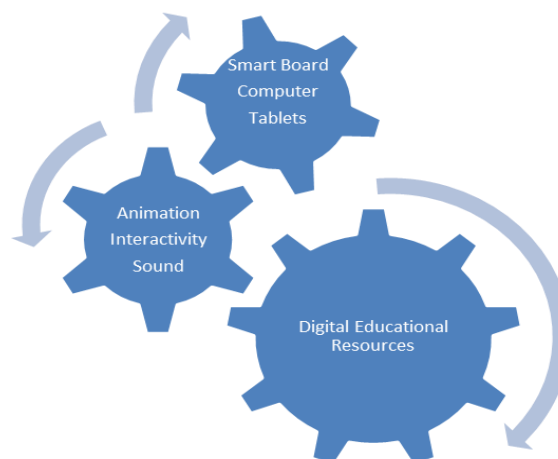**Figure 5.** *Features and Tools* **Source: Own elaboration.**

Figure 5 shows the characteristics of Digital Educational Resources. It is no secret that animation, sounds, and interactivity help the teaching-learning process. As for the examples of the tools can be mentioned, mobile or cell phone, computers, and tablets, among others. The characteristics of these resources call the attention to any individual with or without disability.

DISCUSSION AND CONCLUSIONS

According to the U.S. Department of Education (U.S. Department of Education, 2018), speech/language impairment can refer to a communication, articulation, language, or voice impairment. This definition continues today to address and classify people with disabilities of any kind in special education institutions in the United States of America. As well, the 2013) shows the guidelines for its clinical classification and refers to speech disability as a communication disorder. It should be noted that under the diagnosis of communication disorder are also speech sound disorder, and childhood-onset fluency disorder, also known as stuttering.

In the same order, the American Speech-Language-Hearing Association (ASHA, 1993) guidelines on definitions of communication disorders and variations refer to communication disorders as impairments in the ability to receive, send, process, and understand verbal, nonverbal, and graphic symbol concepts, or systems. This is how you can see the use of the terms: disability, disorder, or impairment in the language itself that is used in different guides that guide special education in the United States. This leads to an important problem that must be addressed, according to Bishop (2014), the use of different labels for language disorder causes confusion in the implementation of educational interventions, and according to his words, this fact also affects the results of research.

As it could be found in the literature consulted in this research, there are two predominant tendencies in the consideration of speech impairment: the Anglo-Saxon and the Ibero-American line. with the characteristics described above and the line of Ibero-American research that is broader in terms of definitions, in which the category called language development disorder predominates. These definitions are not only nominal, but also have implications for the orientations of the research and interventions that are conducted. In the case of the Anglo-Saxon trend, it has been possible to demonstrate the predominance of experimental scientific studies that test digital resources to identify changes or modify behaviors linked to speech deficit (Orr & Mast, 2014), which allows to place the trends as

more focused on the academic field and in the clinical or therapeutic field. in which a utility is looked to implement actions in the classroom aimed at individual improvements.

Furthermore, the trend of Ibero-American research was found, which includes a diversity of countries in the region and greater heterogeneity in the types of research that investigate the relationship between digital educational resources and language disorders. Thus, it was seen that in addition to studies applied in the classroom, there is an interest in considering the usefulness of educational resources, although the impact on specific situations of speech impairment in the classroom is not clear (Montell *et al*., 2018). However, an exception in this group of research that has been called Ibero-American, are the studies conducted in Spain that evaluate the usefulness of mobile apps in individuals with language disorders, which also shows a wide diversity in the types and applications of digital resources for this population.

This allows us to conclude that there is no unified line on studies that deal with the implementation of digital didactic resources in educational inclusion of students with speech disabilities or language disorders. The conceptual difference between scientific-academic approaches and the therapeutic usefulness of digital resources shows such diversity that it is difficult to establish a unified line of approach, which shows the existence of parallel paths that do not necessarily intersect: the medical and clinical approach, the occupational approach, and the educational approach to disabilities (Salas & Moreno, 2020).

However, this is the richness of the contributions in research in special education. Therefore, it can be said that the main contribution of this research is to have highlighted the diversity of approaches to a problem that must be addressed; more than the search to unify criteria, the recommendation is to establish greater efforts to study the problem and be able to have information that favors the work of educators in the area. Finally, it is necessary to contribute that inclusive education must allow intercultural dialogue (UNESCO, 2016). I can relate it to my experience as a special education teacher for more than 20 years in New York city, USA. I have seen that the processes of inclusion for students with speech impairments are treated together with other disabilities and cultural limitations, making it difficult to set up proper lines of action for many students. Therefore, by consulting the approaches recovered in this research, it has been possible to show a starting point for innovative studies with an impact on special education. This will allow

generating a path to understand to a greater extent the possible actions for how students with speech impairment are exposed to the use of educational technology.

REFERENCIAS

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). https://doi:10.1044/policy.RP1993-00208

American Speech-Language-Hearing Association. (1993). Definitions of communication disorders and variations. www.asha.org/policy.

Archundia, E., & Cerón, C. (2018). Objetos de Aprendizaje digital para personas con discapacidad visual en estructuras de datos: grafos (OAGRAF). *RIDE. Revista Iberoamericana para la Investigación y el Desarrollo Educativo, 8*(16), 289-310. https://doi.org/10.23913/ride.v8i16.342

Bishop, B. (2009) Specific language impairment as a language learning disability. *Child Language Teaching and Therapy,* 25(2), 163-165. https://doi.org/10.1177/0265659009105889

Bishop, D. (2014). Ten questions about terminology for children with unexplained language problems. *International Journal of Language & Communication Disorders,* 49(4), 381–415. https://doi.org/10.1111/1460-6984.12101

Brouwer, K. Gordon-Pershey, M. Hoffman, D., &Gunderson, E. (2015) Speech Sound–Production Deficits in Children With Visual Impairment: A Preliminary Investigation of the Nature and Prevalence of Coexisting Conditions. *Contemporary Issues in Communication Science and Disorders,* 42, 33-46. https://pubs.asha.org/doi/pdf/10.1044/cicsd_42_S_33

Cabero, J., Llorente, M. C., & Morales, J.A. (2018). Evaluación del desempeño docente en la formación virtual: ideas para la configuración de un modelo. *RIED. Revista Iberoamericana de Educación a Distancia,* 21(1), 261-279. https://doi.org/10.5944/ried.21.1.17206

Coloma, C. (2014). Discurso narrativo en escolares de 1° básico con Trastorno Específico del Lenguaje (TEL). *Revista Signos, 47*(84), 3-20. https://dx.doi.org/10.4067/S0718-09342014000100001

Damico, J.; Muller, N., & Ball, M. (2010) Social and Practical Considerations in Labeling. In: The Handbook of Language and Speech Disorders (Damico et al., Eds.), 11-37. New Jersey: Blackwell Publishing Ltd.

García, M., & Medina, M. (2017) Comportamiento, lenguaje y cognición de algunos síndromes que cursan con discapacidad intelectual. International Journal of Developmental and Educational Psychology. *INFAD. Revista de Psicología, 4* (1), 55-65. https://doi.org/10.17060/ijodaep.2017.n1.v4.1027

Hernández, B. Vargas, G., González, G., & Sánchez, J. (2020) Discapacidad intelectual y uso de las tecnologías de la información y comunicación. Revisión sistemática. International Journal of Developmental and Educational Psychology. *INFAD. Revista de Psicología, 1*(2), 177-188. https://doi.org/10.17060/ijodaep.2020.n1.v2.1830

Hustad, K., Mahr, T., Broman, A., & Rathouz, P. (2020). Longitudinal Growth in Single-Word Intelligibility Among Children with Cerebral Palsy From 24 to 96 Months of Age: Effects of Speech-Language Profile Group Membership on Outcomes. *Journal of speech, language, and hearing research,* 63(1), 32-48. https://doi.org/10.1044/2019_JSLHR-19-00033

Lancioni, G., Singh, N., O'Reilly, M., Sigafoos, J., D'Amico, F. et al. (2020) Mainstream technology to support basic communication and leisure in people with neurological disorders, motor impairment and lack of speech. *Brain Injury, 34*(7), 921-927. https://doi.org/10.1080/02699052.2020.1763462

Marín, V. (2018). Las TIC inclusivas o la inclusividad de las TIC. *EDMETIC, Revista de Educación Mediática y TIC, 7*(1). https://doi.org/10.21071/edmetic.v7i1.10515

McGregor, K. (2020). How we fail children with Developmental Language Disorder. *Language, Speech, and Hearing Services in Schools, 51*(4), 981-992. https://pubs.asha.org/doi/pdf/10.1044/2020_LSHSS-20-00003

Monje, C. (2011). *Metodología de la Investigación cuantitativa y cualitativa. Guía Didáctica.* https://www.uv.mx/rmipe/files/2017/02/Guia-didactica-metodologia-de-la-investigacion.pdf

Montell, I., Pons Rodríguez, M., & Hernández Sánchez, J. (2018). Los recursos tecnológicos para la atención a los trastornos del lenguaje y la comunicación. Requerimientos didáctico-metodológicos. Opuntia Brava, 10(1), 155-170. https://opuntiabrava.ult.edu.cu/index.php/opuntiabrava/article/view/64

Negre, F. (2003). TIC y discapacidad: implicaciones del proceso de tecnificación en la práctica educativa, en la formación docente y en la sociedad. *Pixel-Bit. Revista De Medios Y Educación*, (21), 5–14. https://recyt.fecyt.es/index.php/pixel/article/view/61208

Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura-UNESCO (2005). Guidelines for inclusion: Ensuring Access to Education for All. Paris. http://unesco.org/educacion/inclusive

Orr, A., & Mast, M. (2014). Tablet-based communication and children with multiple disabilities: Lessons from the clinical setting. *Procedia-Social and Behavioral Sciences, 141,*138-142. https://doi.org/10.1016/j.sbspro.2014.05.025

Page, M., McKenzie, J., Bossuyt, P., Boutron, I. Hoffmann, T., Mulrow, C., Shaseer, L., Tetzlaff, J., Akl, E., Brennan, S., Chou, R., Glanville, J., Grimshaw, J., Hróbjartsson, A., Lalu, M., Li, T., Loder, E., Wison, E., McDonald, S…& Moher, D. (2021). Declaración PRISMA 2020: una guía actualizada para la publicación de revisiones sistemáticas. *Revista Española de cardiología, 74*(9), 790-799. https://doi.org/10.1016/j.recesp.2021.06.016

Polo, F,, & Acuña, X. (2018). Estrategias didácticas para desarrollar el discurso narrativo en preescolares con Trastorno Específico del Lenguaje (TEL). *Revista Signos, 51*(98), 410-429. https://dx.doi.org/10.4067/S0718-09342018000300410

Quintero, E., Romaña, T., Vargas, J., & Tsang, R. (2018). *Experiencia con estudiantes: Creando recursos tecnológicos para niños con trastornos del habla.* Memorias De Congresos UTP, 1(1), 65-72. https://revistas.utp.ac.pa/index.php/memoutp/article/view/1853

Revilla, D. (2020) El método de investigación documental. In A. Sánchez (Coord.), Los métodos de investigación para la elaboración de las tesis de maestría en educación (pp. 7-22). Pontificia Universidad Católica del Perú.

Santos, P., Macedo, L., & Aguiar, S. (2015) Language development and hearing impairment: literature review. *Revista CEFAC, 17*(6) 2044-2055. https://www.scielo.br/j/rcefac/a/rbPWpdtQYGWrsmcVHkY8MQg/?lang=en&format=pdf

Salas, M., & Moreno, R. (2020). Aportes de la Psicología a la Educación Especial y su atención en las aulas venezolanas. In María G. Escobar (Coord.), *Psicología. Aportes a la educación y al aprendizaje*(pp. 152-188). Sello editorial del Vicerrectorado Académico. Universidad de Los Andes. http://bdigital2.ula.ve:8080/xmlui/654321/8928

Shane, H., Laubscher, E, Schlosser, R. , Flynn, S., Sorce, J.F., & Abramson, J. (2012) Applying Technology to Visually Support Language and Communication in Individuals with Autism Spectrum Disorders. Journal of Autism and Developmental Disorders 42, 1228–1235 https://doi.org/10.1007/s10803-011-1304-z

Silva, G., y Rodríguez, F. (2018). Una mirada hacia las TIC en la educación de las personas con discapacidad y con trastorno del espectro autista: análisis temático y bibliográfico. EDMETIC, 7(1), 43-65. https://doi.org/10.21071/edmetic.v7i1.10030

Simón, N., De Cisneros, J., & Gértrudix, F. (2018). Valoración y uso de las TIC para una transformación e inclusión educomunicativa. *Index.comunicación: Revista científica en el ámbito de la Comunicación Aplicada, 8*(2), 255-273. https://dialnet.unirioja.es/servlet/articulo?codigo=6459841

Suelves, D.M., Porca, L.L., & López, C.G. (2017). Aplicaciones para la inclusión exitosa de alumnos escolarizados en unidades específicas de Comunicación y Lenguaje. *Comunicación y Pedagogía. Nuevas tecnologías, 297-298.* http://www.centrocp.com/comunicacion-pedagogia-297-298-inclusion-tic/

The Individuals with Disabilities Education Act. (2018). Sec.300.8 Child with a disability. https://sites.ed.gov/idea/regs/b/a/300.8

Timbi-Sisalima, C., Robles-Bykbaev, V., Guiñansaca-Zhagüi, E., Capón-Albarracín, M., & Ochoa-Arévalo, G. (2015). ADACOF: una aproximación educativa basada en TIC para el aprendizaje digital de la articulación del código fonético en niños con discapacidad. *Perfiles educativos, 37*(149), 187-202. http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S0185-26982015000300011&lng=es&tlng=es.

Tokia E., & Pangeb J. (2010) E-learning activities for articulation in speech language therapy and learning for preschool children. *Procedia - Social and Behavioral Sciences, 2*(2), 4274-4278. https://doi.org/10.1016/j.sbspro.2010.03.678

U.S. Department of Education (2018) Building the Legacy: IDEA. http://sites.ed.gov/idea/building -the-legacy-idea-204/

UNESCO (2016). Educación 2030. Declaración de Incheon y Marco de Acción para la realización del Objetivo de Desarrollo sostenible 4. https://unesdoc.unesco.org/ark:/48223/pf0000245656_spa

UNESCO (1990) Declaración mundial sobre educación para todos y Marco de acción para satisfacer las necesidades básicas de aprendizaje. Conferencia Mundial sobre educación para todos. Jomtien. https://www.gob.mx/cms/uploads/attachment/file/138254/educ_para_todos_jomtien1990.pdf

Wittke, K., Mastergeorge, A., Ozonoff, S., Rogers, S., & Naigles, L. (2017) Grammatical Language Impairment in Autism Spectrum Disorder: Exploring Language Phenotypes Beyond Standardized Testing. *Frontiers in Psychology. 8*, art. 532, 1-12. https://doi.org/10.3389/fpsyg.2017.00532