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USING GRM AND PECS FOR IMPROVING READING SKILLS IN STUDENTS WITH AUTISM SPECTRUM DISORDER

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Abstract/Izvleček

This case study analysed the impact of GRM and PECS on the reading skills of two children with ASD with severity levels I and II. A descriptive cross-sectional quantitative approach was used with a pre-experimental, pre-test, post-test, and single-group design. The PROLEC-R Battery was applied before and after using these strategies to measure the students' reading ability. Results showed that although both participants improved in the initial and lexical reading processes, only the participant with severity level I reached a medium reading level. It was concluded that these methods were successful, but longer exposure to them will likely yield better outcomes.

Uporaba metod GRM in PECS za izboljšanje bralnih sposobnosti pri učencih z motnjo avtističnega spektra

V študiji primera smo analizirali vpliv metod GRM in PECS na bralne sposobnosti dveh otrok z motnjo avtističnega spektra stopnje I in II. Uporabljen je bil opisni presečni kvantitativni pristop s predeksperimentalno, predtestno, posttestno in enoskupinsko zasnovo. Baterija PROLEC-R je bila uporabljena pred uvedbo zgoraj omenjenih strategij za merjenje bralne sposobnosti učencev in po tem. Rezultati so pokazali, da čeprav sta se oba udeleženca izboljšala v začetnem in leksikalnem procesu branja, je le udeleženec z motnjo avtističnega spektra I dosegel srednjo raven branja. Ugotovljeno je bilo, da so bile uporabljene metode uspešne, vendar bodo z dolgotrajnejšo uporabo rezultati verjetno še boljši.

Keywords:
Autism Spectrum Disorder (ASD), Global Reading Method (GRM), Inclusive Education, Picture Exchange Communication System (PECS), PROLEC-R.

Ključne besede:
inkluzivno izobraževanje, komunikacijski sistem za izmenjavo slik (PECS), metoda globalnega branja (GRM), motnje avtističnega spektra (ASD), PROLEC-R.

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Introduction

Inclusion has become a topic of global interest, in reaction to which many countries have been modifying their policies and making room for this in different contexts in which society operates, including various actors who contribute to changes in these policies that respond effectively to the needs of Students with Disabilities (SWD) (Rosa and Lima, 2022). However, inclusion has faced many setbacks in its path that have somehow contributed to inclusive policies not being developed properly within society. Therefore, exclusion still prevails in many contexts, specifically, in education, which still has shortcomings related to the processes that are carried out within Educational Institutions (EI); hence, no state actor, institution, social group, or family can think about inclusion as if it were a topic unrelated to their reality (Alfageme et al., 2016).

Although multiple international organizations have promoted and protected the right to education since the United Nations General Assembly stipulated it (1948) as one of the fundamental rights, it is necessary to ensure an optimal training process in which fundamental skills are potentiated in people regardless of their disabilities. In some countries, there are still gaps in the ideal approach to teaching SWD since teachers receive little or inappropriate training in diversity acknowledgement (García, 2017; Ramirez, 2017), a situation which interferes when trying to offer quality education (Cooc, 2019; UNESCO, 2020).

Unfortunately, although EI have worked on the implementation of new projects and approaches, without ignoring needs that vary with each context and population (Jiménez and Ortega, 2018), the acquisition of knowledge in SWD is nowadays becoming difficult because in some cases, it is not properly taught what should be learned; instead, entertainment or socialization activities prevail. Additionally, there might be banal thoughts and barriers within school processes, so it is necessary to stop catastrophizing the implementation of inclusive programs; instead, we must emphasize the importance of "seeing inclusion as a means that seeks to lead children to be freer" (Ramirez, 2017, p. 222), thus opening the way to the implementation of improvement plans and promoting efficient teacher training on the topic.

Now, considering that a person with a disability is understood as one with impairments at any level that influence their optimal interaction with others (United Nations, 2006), effective strategies and competent teachers will be required to

provide these students with a quality education that promotes their full development in society. Currently, attention is directed to autism spectrum disorder (ASD) because it has been claimed that 1 in 160 children present this spectrum (World Health Organization, 2022). These students experience deficiencies at the level of communication and social interaction, emphasizing those that correspond to socio-emotional reciprocity (American Psychiatric Association, 2013). Moreover, they relate to others in a particular way because they have difficulties with language and imagination (United Kingdom Government, 2014).

However, ASD affects not only the field of communication but also that of behaviour, and taking into account that the symptoms related can manifest during the sensorimotor stage according to Piaget, it is also known as a "developmental disorder" (National Institute of Mental Health, 2022). Therefore, it can be arduous to carry out a detailed description of these students, leaving aside the possibility of establishing a single profile (Espinosa et al., 2018), resulting in a high workload for teaching staff who are unaware of the proper way in which ASD students should be taught. Hence, this study arises from the need to know the most effective strategies for the development of reading skills in children with ASD, and that can be a useful resource for teachers when teaching these skills to this population since many educators do not know how to do it or what strategies really work.

Literature review

Knowledge about ASD has evolved over the years and has therefore been directed towards a constant search for educational strategies that adequately respond to the needs or particularities that these students present at the behavioural, social, and communicative levels, and the reduced number of activities and interests they have (Schmidt, 2017; Varela and Machado, 2016). The literature focuses on the communicative dimension, alluding to the deficiencies that children with autism show in the acquisition and development of language, speech articulation, and reading difficulties. Hence, the literature claims that some strategies such as Dialogic Reading (DR) and Augmented Reality (AR) aim to strengthen language and improve executive and cognitive functions, while serving as a motivational complement (Baixauli et al., 2020). Likewise, the use of platforms such as AbaPlanet, Autism iHelp, Las Pelusas and Gaido Autismo have contributed to the teaching of reading to children with ASD (García et al., 2016).

Nevertheless, two reading methods and one visual strategy based on the Alternative and Augmentative Communication Systems (SAAC) were recognized as the most effective.

Reading methods

The most relevant methods for improving reading skills are the Global Reading Method (GRM) and the Treatment and Education of Autistic Related Communication Handicapped Children (TEACCH), which yielded efficient results in the processes of acquisition, development, and improvement of reading in children with autism. The TEACCH method stands out for being a fairly structured method where the learner recognizes the steps to follow (Toledo, 2015); moreover, thanks to its breadth and generalizability, it also contributes to different aspects of life (Vélez, 2017), covering not only the academic area in the improvement of reading skills in students with ASD (Martínez, 2017), and motor skills but also other aspects such as motivation and autonomy (Pinto, 2020).

TEACCH is closely related to the GRM since it is effective in the development of reading because it is a generalized and representative method that associates images with words and is based on the pairing of a photograph or drawing with its respective word (Rodríguez et al., 2018) as well as the use of graphic signs (Barreda, 2020). Additionally, the GRM is attractive to students because of its natural and general way of acquiring the meaning of words at the user's own pace, which has helped to address reading difficulties in students characterized by the Reading Process Assessment Battery-Revised (PROLEC-R) (Arteaga et al., 2019).

Visual strategies

One of the characteristics of children with ASD is an alteration in the sensory perception of things (Araujo and Araújo, 2021). Therefore, these students acquire and assimilate information better visually and require SAAC, specifically PECS, which is a unique augmentative and alternative teaching system that consists of showing an image of the desired element to a receiver, working on the association between the acoustic image and its meaning, looking for the child to identify the word exposed in any context (Ripalda et al., 2016). Now, considering the age of the participants in this study, from Piaget's theory, the preoperational stage of cognitive development applies, where language development begins in the child through symbolic representation (Piaget, 1964).

So, most of the time, PECS will significantly contribute to the reading process (Muñumel, 2017) because it includes visual agendas and pictograms that promote the acquisition of reading (Cáceres, 2017) and enrich the GRM (Afonso, 2020). Thus, the PECS and GRM methods, when used together, can enhance reading skills in children with autism.

Methodology

This investigation was developed through a case study method that analyses from an external perspective the current academic reality regarding certain cognitive processes of children with autism. The main objective of this study was to analyse the impact of GRM and PECS strategies on the reading skills of two children with ASD at severity levels of I and II, belonging to the first and third grades of primary school, respectively. Accordingly, we came up with the following research questions: 1) which strategies mentioned in the literature review are the most promising for the improvement of ASD learners' reading skills? 2) what are the differences in the participants' reading processes before and after applying the strategies? 3) to what extent do the given strategies impact the participants' reading ability development? Hence, this study implemented a descriptive, cross-sectional quantitative approach since this establishes a logical process of analysis of initial and final data, through the application of standardized tests, obtaining their respective results and conclusions (Newby, 2014). In addition, the design used was pre-experimental, including a pretest-post-test with a single group, in which the PROLEC-R Battery was used as a data collection instrument (Cuetos et al., 2014). The reading level of the children was evaluated by the researchers prior to the experimental treatment, giving way to the application of the GRM and PECS strategies, and culminating with a subsequent application of the test (Hernández et al., 2018).

Procedure

This study was carried out in nine stages to achieve its objective. In the first place, the research topic was chosen based on the difficulties exhibited by children with ASD when acquiring cognitive skills related to reading. Next, we carried out the literature review and the collection of information on the strategies that positively contribute to the reading development of students with ASD.

Then, two strategies, the GRM and PECS, were selected based on the multiple successful results that demonstrate their effectiveness when implemented together. Additionally, the sample that was taken for the application of the PROLEC-R Battery was selected, using a non-probabilistic sampling for convenience.
Later, the authorization and consent of the parents were obtained, along with the assent of the children selected for the study. Subsequently, the PROLEC-R was applied to the selected sample in the pre-test phase; once this was applied, the results were reviewed and analysed. Afterward, the GRM and PECS strategies were implemented for 30 consecutive days in one-hour interventions. Subsequently, the assessment instrument was reapplied, and later the results of this were analysed after implementation of the selected strategies. Finally, the results were reviewed to establish the conclusions of this study.

Instrument: reading processes evaluation battery, revised PROLEC-R

The instrument used was psychometric, known as the PROLEC-R Battery since its objective is to identify reading shortcomings. This test evaluates reading processes through 9 tasks that assess from the most basic to the most complex reading processes, and its application must be individual to students from 6 to 12 years. The first two tasks, Identification of Letters (IL) and Equal-Different (ED) are intended for the initial processes of letter identification. The following tasks, Word Reading (WR) and Pseudoword Reading (PWR) are intended for lexical processes. The next two, Grammatical Structures (GS) and Punctuation Marks (PM) aim to assess syntactic processes, and finally, the last three, Comprehension of Sentences (CS), Text Comprehension (TC) and Oral Comprehension (OC) are directed to higher processes or semantic processes (Cuetos et al., 2014). This instrument is scored with zero and one, the first for the wrong answer and the second for the correct one (Cayhualla et al., 2013).
Regarding the values obtained in the main indicators, the instrument has specific scores to determine the category in which the evaluated person has been placed with respect to their reading skills. In this way, the reading skills of students can be measured to indicate their degree of difficulty in one of the following categories: Severe Difficulty (SD), Difficulty (D) and Normal (N).

These data are presented according to the school grade of the evaluated person, according to the test scales; thus, only the data corresponding to the first and third grades of primary school was considered (see Table 1).

Table 1. Scales that determine the category for reading ability

	First Grade			Third Grade		
Tasks	**SD**	**D**	**N**	**SD**	**D**	**N**
IL	0-18	19-45	46 or more	0-33	34-69	70 or more
ED	0-2	3-9	10 or more	0-7	8-17	18 or more
WR	0	1-23	24 or more	0-29	30-60	61 or more
PWR	0-5	6-20	21 or more	0-19	20-37	38 or more
GS	0-6	7-10	11-16	0-9	10-12	13-16
PM	0	1-2	3 or more	0-5	6-11	12 or more
CS	0-10	11-13	14-16	0-13	14-15	16
TC	0	1-5	6-16	0-5	6-9	10-16
OC	-	0-1	2-8	-	0-2	3-8

Note. Reading process evaluation battery, revised PROLEC-R (Cuetos et al., 2014, p. 50)

Table 2. Scales determining the category for the accuracy indicator

	First Grade				Third Grade			
Tasks	**SD**	**D**	**?**	**N**	**SD**	**D**	**?**	**N**
IL	0-12	13-14	15-16	17-20	0-15	16	17-18	19-20
ED	0-12	13-14	15-16	17-20	0-14	15	16-18	19-20
WR	0-27	28-30	31-34	35-40	0-35	36	37-38	39-40
PWR	0-22	23-26	27-30	31-40	0-28	29-30	31-34	35-40
PM	-	0-1	2-4	5-11	0-5	6	7-9	10-11

Note. Reading process evaluation battery, revised PROLEC-R (Cuetos et al., 2014, p. 51)

In the same way, regarding the accuracy indicator produced by the instrument, the scales that are defined for this are established to select the category of difficulty

pertaining to the evaluated person, these being Severe Difficulty (SD), Difficulty (D), Doubts (?) and Normal (N) (see Table 2).

Likewise, regarding the speed indicators obtained after the application of the instrument, categories are established based on the time each subject takes to carry out each of its items, these being Very Slow (VS), Slow (S), Normal (N), Fast (F) and Very Fast (VF) (see Table 3).

Table 3. Scales determining the category for the speed indicator in seconds

	First Grade					Third Grade				
Tasks	**VS**	**S**	**N**	**F**	**VF**	**VS**	**S**	**N**	**F**	**VF**
IL	51 or	40-	17- 39	6-16	0-5	38 or	29- 37	13- 28	5-12	0-4
ED	225	177-	82-	35- 81	0-34	140 or	108-	45-	13- 44	0-12
WR	194	147-	52-	5-51	0-4	83 or	66- 82	31- 65	14- 30	0-13
PWR	208	162-	69-	23- 08	0-22	117 or	95-	52- 94	30- 51	0-29
PM	249	189-	69-	9-68	0-8	102 or	82-	43- 81	23- 42	0-22

Note. Reading process evaluation battery, revised PROLEC-R (Cuetos et al., 2014, p. 52)

Table 4. Reading ability indicators by school grade

	First Grade			Third Grade		
Tasks	**L**	**M**	**H**	**L**	**M**	**H**
IL	46-57	58-104	105 or	70-84	85-143	144 or
ED	10-11	12-23	24 or more	18-22	23-41	42 or more
WR	24-29	30-75	76 or more	61-73	74-126	127 or
PWR	21-25	26-51	52 or more	38-44	45-75	76 or more
PM	3	4-11	12 or more	12-14	15-24	25 or more

Note. Reading process evaluation battery, revised PROLEC-R (Cuetos et al., 2014, p. 54)

Finally, considering the accuracy and speed indicators, which yield the scores that are reflected in the main ones, the level of reading ability is categorized according to

the points obtained and the current school grade; thus: Low (L), Medium (M) and High (H) (see Table 4).

Instrument validity

The reliability of the PROLEC-R is supported by the criterion, content, and construct validity indices, which demonstrate the efficiency and effectiveness of this test, considering that it measures the specific aspects that are intended to be evaluated. Therefore, the psychometric properties do indeed show adequate reliability indices, and this allows us to affirm that the test values are satisfactory, given that most such tests show their maximum reliability corresponding to a total Cronbach's Alpha of 0.79 even though some test scales present lower values (Cuetos et al., 2014).

Results

Initial and final test analysis

Main indicators

To establish the initial state of the participants' reading skills, the PROLEC-R battery was applied for the first time, without yet having implemented the GRM and PECS strategies; in this order, the following results were obtained regarding the main indicators.

Both participants obtained scores placing them in category D for the OC task, and SD for the other ones (see Table 5). However, even though participant 1 was located in these categories, he achieved higher scores than participant 2; this could be related to the ASD level of severity. These first results might demonstrate that being in the SD category may happen because the teachers in charge of these children at school did not use the appropriate strategies to work with them or did not consider their distinct paces and learning styles, leading to poor or underdeveloped reading skills for the age and school grade of the participants.

Table 5. Main indicators: initial and final test

	Participant 1				Participant 2			
	Initial Test		Final Test		Initial Test		Final Test	
Tasks	**Score**	**Cat.**	**Score**	**Cat.**	**Score**	**Cat.**	**Score**	**Cat.**
IL	3.3	SD	63.3	D	0.6	SD	48.6	D
ED	0.6	SD	18.3	N	0	SD	12.0	D
WR	0.4	SD	46.3	N	0	SD	33.6	D
PWR	0	SD	11.4	D	0	SD	32.6	D
GS	0	SD	2	SD	0	SD	1	SD
PM	0	SD	0	SD	0	SD	0	SD
CS	0	SD	0	SD	0	SD	0	SD
TC	0	SD	0	SD	0	SD	0	SD
OC	0	D	0	D	0	D	0	D

Note. Cat. refers to Category.

After the application of the GRM and PECS strategies, the PROLEC-R battery was applied again to assess the potential impact on these students. Differential results were found concerning those initially obtained in each of the tasks evaluated, corresponding to the main indicators. Although neither participant showed progress in the GS, PM, CS, TC and OC tasks, they did improve in the IL, ED, WR and PWR, being located in the categories D, N, N, and D for participant 1, respectively, and D in the same tasks for participant 2 (see Table 5).

This indicated that participant 1 gave a higher performance in terms of reading skills compared to participant 2, who despite having obtained more favourable results on the initial test, did not place himself in any of the main indicators within category N. This could have been related to the test requirements that claim higher or greater values to those in higher school grades, which significantly influenced the results.

This might prove that teachers should not generalize that because a child with ASD is in a higher school grade, greater requirements must be applied. This could end by hampering the learning process of these children, leading the student to develop frustration with or conflicts in learning, so barriers may appear when achieving efficient development of their reading skills.

Therefore, it would be pertinent that the necessary adjustments be made so that any student with autism that requires these achieves the proposed objectives considering their specific abilities.

Accuracy indicators

Regarding the accuracy indicators in the initial application of the test, it was found that participant 1 achieved a greater number of hits or hits in the IL, ED and WR tasks than participant 2. Nevertheless, neither achieved any hits in the PWR and PM tasks (see Table 6). Although there is a difference concerning the number of hits between the participants, both were again classified in the SD category, which shows shortcomings in the initial, lexical, and syntactic processes of each one. These results could be related to the fact that they attend EI with different approaches, prioritizing different objectives in their curriculum from the aforementioned reading processes, or perhaps that these institutions did not adapt their objectives to the characteristics of students with ASD.

In the final application of the test, it was found that the requirement in terms of the number of hits for the school grade according to the standardized values of the test influenced the accuracy results for each participant, where even though both obtained a similar number of hits, participant 2 did not reach category N but did go up one category compared to his initial results since he was left in the ? category for the IL, ED and PWR tasks, and D in WR (see Table 6).

Table 6. Accuracy indicators for the initial and final tests

	Participant 1				Participant 2			
	Initial Test		Final Test		Initial Test		Final Test	
Tasks	**Hits**	**Cat.**	**Hits**	**Cat.**	**Hits**	**Cat.**	**Hits**	**Cat.**
IL	7	SD	19	N	4	SD	18	?
ED	2	SD	18	N	0	SD	17	?
WR	3	SD	38	N	0	SD	36	D
PWR	0	SD	36	N	0	SD	32	?
PM	0	SD	2	SD	0	SD	0	SD

Note. Cat. refers to Category.

However, the category ? does not imply that the reading ability of the participant is deficient since this is presented as an intermediate point between normality and difficulty. Therefore, it should be interpreted as aspects to be reinforced in the assessed participant. On the other hand, participant 1 made a significant advance regarding the accuracy of his reading skills, going from the SD to the N category in the IL, ED, WR and PWR tasks. This could show that the use of the GRM and PECS strategies is a fundamental support in improving accuracy in children with autism. However, syntactic processes turned out to be more challenging for both participants since they remained in the SD category in the PM task.

Speed indicators

Considering the results of the speed indicators before the application of the strategies, we observed that participant 2 took more time to complete the tasks corresponding to these indicators as compared to participant 1. Nonetheless, both were placed in the VS category in most tasks, except in PM, where participant 1 was classified in the S category. In addition, regarding the WR and PWR tasks, in the first one, participant 2 took 579 seconds, and 822 seconds in the second, while participant 1 took 745 and 2174 seconds, respectively (see Table 7).

These tasks max have been more difficult for participant 1 because he took more time compared to his peer. Now, in general terms of this indicator, the fact that participant 2 spent more time could be directly related to its level of severity.

Table 7. Speed indicators for the initial and final tests

	Participant 1				**Participant 2**			
	Initial Test		**Final Test**		**Initial Test**		**Final Test**	
Tasks	**Sec.**	**Cat.**	**Sec.**	**Cat.**	**Sec.**	**Cat.**	**Sec.**	**Cat.**
IL	212	VS	123	VS	623	VS	37	S
ED	313	VS	158	N	713	VS	141	VS
WR	745	VS	262	VS	579	VS	107	VS
PWR	2174	VS	314	VS	822	VS	98	S
PM	184	S	101	N	441	VS	253	VS

Note. Cat. refers to Category; Secs. refers to Seconds.

After having used the reading strategies and obtained the results of the final test, it was observed that both participants spent less time on the tasks. Therefore, participant 1 was placed in the N category in the ED and PM tasks, and participant 2 in the S category in the IL and PWR ones. However, they remained in VS in some tasks; participant 1 in IL, WR and PWR and participant 2 in ED, WR and PM (see Table 7). However, it is necessary to highlight here the participants' level of severity because although it is believed that the greater the severity, the greater the time spent on certain tasks, it was found that this was not a reason to slow down the development of the tasks since both participants improved their time on all the speed tasks in relation to the initial test. This could support the use of the GRM and PECS strategies implemented during the intervention.

Initial and final reading skill

Finally, considering the scores obtained by tabulating the accuracy and speed indicators in each of the two applications of the test, it was evident that neither participant could place themselves within the parameters for classifying their level of reading ability since they obtained low scores on the initial test. However, after the application of the GRM and PECS strategies, Participant 1 (P.1) gave a better performance on the IL (63.3), ED (18.3) and WR (46.3) tasks, reaching a medium level (M) of reading ability. In contrast, Participant 2 (P.2), despite showing improvement in some tasks, remained below the established criteria for all tasks in both applications of the test. That is, he did not meet the criteria established by the test to be placed in higher categories that support an optimal level of his reading skills (see Table 4). In this way, it was possible to compare the initial level of reading ability with the final one for each participant, which was positively influenced in the final application of the test, possibly thanks to the strategies implemented (see Figure 1)

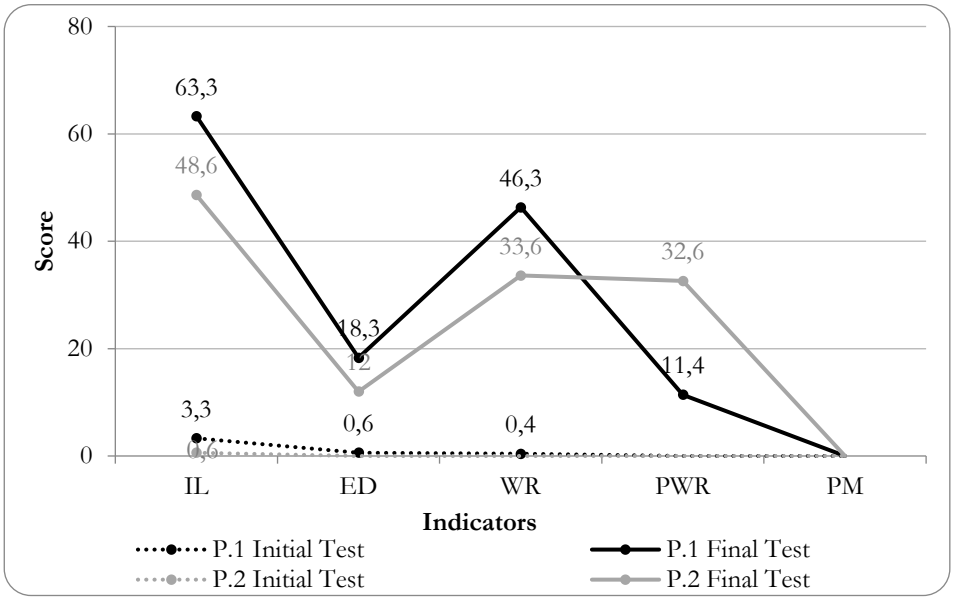

Figure 1. Initial and final reading skills.

Discussion

Based on the need to use effective strategies that respond in a timely manner to the particularities of students with ASD, who are quite visual and therefore rely on visual teaching materials, the use of SAAC plays an important role since this enhances oral language in these students (Fortea et al., 2015), specifically PECS, which, together with the GRM method, once again gave positive and promising results.

The effectiveness of the selected strategies was demonstrated, validating the progress the participants made with respect to their initial reading skills (Rodríguez et al., 2018). Also, thanks to the uninterrupted exposure to the strategies and graphic signs, reading skills were influenced positively (Barreda, 2020). However, it should also be mentioned that the participants' EI lacked teachers trained in inclusive teaching, or maybe these institutions did not prioritize the development of reading processes in ASD students. Also, participants' automaticity could have affected the results even when they demonstrated awareness of certain basic linguistic knowledge.

Finally, two limitations were recognized that arose throughout the study and that could have affected the results. In the first place, there was little time for implementation of the strategies, as can be seen in the case of participant 2, who

could have obtained better results considering that GRM and PECS are effective as long as the student's learning style and pace are considered (Arteaga et al., 2019). The second limitation concerns the need to develop this study through an experimental design with more participants, so that clear results can be generalized, offering high validity to the study (Montoya et al., 2011). Nevertheless, ASD presents a wide spectrum of particular and innate cognitive styles that prevent a generalization regarding traits or skills (Villa, 2014).

Conclusions

Considering the difficulties experienced by children with ASD in the communicative field (Echeguia, 2016), and recognizing their visual learning particularities, we concluded that the use of GRM and PECS strategies were effective for developing and improving the reading skills of students with autism, mainly those with a severity level of I. Nevertheless, those with a severity level of II should be exposed to these strategies for a longer time so that they can achieve better results. Similarly, we concluded that students with ASD reached a medium level in initial and lexical processes, but failed to advance in syntactic and semantic processes since the latter two are more complex and demanding according to the scales of the PROLEC-R test for the school grade and the chronological age of the participants. Therefore, students' needs must be considered to provide them with quality reading instruction. Given the positive results obtained in this study, GRM and PECS are proposed within EI as strategies that teachers can implement in reasonable adjustments for those students who require it.

For this reason, it would be important to put aside the traditional method of teaching reading, which focuses on learning through phonemes and syllables isolated from their meaning or image, and instead use attractive strategies such as those applied in this study because these have demonstrated greater effectiveness in a short time, proving suitable for the development of reading skills in ASD students.

References

Afonso, P. (2020). *Programa de intervención en lectura globalizada en un niño de 5 años de edad con Trastorno del Espectro Autista* [Tesis de grado, Universidad de La Laguna]. Retrieved from https://riull.ull.es/xmlui/handle/915/19741

Alfageme, M., González, M., Martínez, B., Nieto, J., Rodríguez, M., and Vallejo, M. (2016). *Inclusión y exclusión educativa: Realidades, miradas y propuestas*. Nau Llibres.

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders: *DSM-5*(5). Retrieved from https://dsm.psychiatryonline.org/doi/book/10.1176/appi.bo–oks.9780890425596

Araujo, L., and Araújo, A. (2021). As experiências nos espaços-tempos da escola sob o olhar de uma criança com Transtorno do Espectro do Autismo. *Revista brasileira de educacao*, 26(e260026). Retrieved from https://doi.org/10.1590/S1413-24782021260026

Arteaga, M., Luna, H., Ramírez, C., and Navarrete, M. (2019). Importancia del método en la enseñanza de la lectura a niños con dificultades de aprendizaje. *Revista UNIANDES Episteme*, *6*(4), 595–606. Retrieved from https://revista.uniandes.edu.ec/ojs/index.php/EPISTEME/art–icle/view/1363

Baixauli, I., Gómez, S., Sebastiá, M., and Berenguer, C. (2020). Una propuesta de intervención para niños con trastorno del espectro autista a través de la lectura dialógica y la realidad aumentada. Edetania. *Estudios Y Propuestas Socioeducativas*, 56, 135–150. Retrieved from https://doi.org/10.46583/edetania_2019.56.483

Barreda, T. (2020). *El proceso de la lectura en el alumnado de Educación Infantil con TEA* [Tesis de grado, Universidad de La Laguna]. Retrieved from https://riull.ull.es/xmlui/hand–le/915/20199

Cáceres, O. (2017). *El uso del pictograma en el proceso de enseñanza-aprendizaje del niño con autismo* [Tésis de doctorado, Universidad de las Palmas de Gran Canaria]. Retrieved from https://accedacris.ulpgc.es/handle/10553/54026

Cayhualla, N., Chilón, D., and Espíritu, R. (2013). Adaptación psicométrica de la Batería de Evaluación de los Procesos Lectores Revisada (PROLEC-R). *Propósitos Y Representaciones*, *1*(1), 39–57. Retrieved from https://doi.org/10.20511/pyr2013.v1n1.3

Cooc, N. (2019). Teaching students with special needs: International trends in school capacity and the need for teacher professional development. *Teaching and Teacher Education*, *83*(27–41). Retrieved from https://doi.org/10.1016/j.tate.2019.03.021

Cuetos, F., Rodriguez, B., Ruano, E., and Arribas, D. (2014). *PROLEC-R: Batería de evaluación de los procesos lectores, revisada*. TEA ediciones.

Echeguia, J. (2016). Sistemas alternativos y aumentativos de comunicación para el tratamiento de niños con trastorno del espectro autista. *Diálogos Pedagógicos*, *14*(28), 104–126. Retrieved from https://doi.org/10.22529/dp.2016.14(28)07

Espinosa, E., Mera, P., and Toledo, D. (2018). Trastorno del espectro autista: caracterización clínica en pacientes de dos centros de referencia en Bogotá, Colombia. *Revista Med*, *26*(1), 34–44. Retrieved from https://doi.org/10.18359/rmed.3990

Fortea, M., Escandell, M., Castro, J., and Martos, J. (2015). Desarrollo temprano del lenguaje en niños pequeños con trastorno del espectro autista mediante el uso de sistemas alternativos. *Revista de Neurología*, *60*(S01), 31–35. Retrieved from https://doi.org/10.33588/rn.60S01.2014566

García, A. (2017). Las necesidades educativas especiales: un lastre conceptual para la inclusión educativa en España. *Ensaio: Avaliação e Políticas Públicas em Educação*, *25*(96), 721–742. Retrieved from https://doi.org/10.1590/S0104-40362017002500809

García, S., Garrote, D., and Jiménez, S. (2016). Uso de las TIC en el Trastorno de Espectro Autista: aplicaciones. *EDMETIC*, *5*(2), 134–157. Retrieved from https://doi.org/10.21071/edmeti–c.v5i2.5780

Hernández, R., Fernández, C., Baptista, M. del P., et al. (2018). *Metodología de la investigación. Las rutas cuantitativa, cualitativa y mixta*, Ciudad de México, México: Editorial Mc Graw Hill Education. Retrieved from https://doi.org/10.22201/fesc.20072236e.2019.10.18.6

Jiménez, M., and Ortega, P. (2018). Referentes sobre inclusión educativa para personas con discapacidad: líneas para pensar su potencial en el ámbito escolar. *Civilizar*, *18*(34), 85–104. Retrieved from https://doi.org/10.22518/usergioa/jour/ccsh/2018.1/a06

Martínez, M. (2017). Cómo favorecer el proceso de lectura emergente en niños con TEA escolarizados en aulas abiertas específicas en centros ordinarios a través del Método TEACCH. *Publicaciones Didácticas*, 80, 461–482. Retrieved from https://publicacionesdidacticas.co–m/hem-eroteca/articulo/080077

Montoya, J., Sánchez, L., and Torres, P. (2011). Diseños experimentales ¿qué son y cómo se utilizan en las ciencias acuáticas? *Ciencia Y Mar*, *15*(43), 61–70. Retrieved from http://ciencia–ymar.mx/Revista/index.php/cienciaymar/issue/view/22/DIV43_2

Muñumel, A. (2017). *Estrategias comunicativas en niños con trastorno del espectro del autismo* [Trabajo de grado, Universidad de Valladolid]. Retrieved from https://uvadoc.uva.es/han–dle/10324/24180

National Institute of Mental Health. (2022). *Autism spectrum disorder*. NIH Publication. Retrieved from https://www.nimh.nih.gov/health/publications/autism-spectrum-disorder/index.s–html

Newby, P. (2014). *Research methods for education* (Vol. 2). Routledge. Retrieved from https://doi.org/10.4324/9781315758763

Piaget, J. (1964). Part I: Cognitive development in children: Piaget development and learning. *Journal of Research in Science Teaching, 2*(3), 176–186. Retrieved from https://doi.org/10.10–02/tea.3660020306

Pinto, C. (2020). Estrategias de lectura para la enseñanza de las habilidades lectoras en las personas con TEA de alto funcionamiento. *MLS Educational Research*, *4*(1), 57–72. Retrieved from https://doi.org/10.29314/mlser.v4i1.299

Ramirez, W. (2017). La inclusión: una historia de exclusión en el proceso de enseñanza aprendizaje. *Cuadernos de Lingüística Hispánica*, 30, 211–230. Retrieved from https://doi.org/10.1905–3/0121053x.n30.0.6195

Ripalda, D., Grijalva, J., and Gallar, Y. (2016). Sistema de comunicación con intercambio de imágenes PECS, a través de una interfaz nui como parte de la terapia de lenguaje en el trastorno de espectro autista. *Revista Órbita Pedagógica*, *3*(1), 31–48. Retrieved from https://core.a–c.uk/download/pdf/268044016.pdf

Rodríguez, Y., Rodríguez, O., and García, X. (2018). La lectura globalizada como método de aprendizaje de la lecto-escritura en niños con trastorno del espectro del autismo. *Revista Conrado*, *14*(63), 274–275. Retrieved from https://conrado.ucf.edu.cu/index.php/conra–do/article/view/763

Rosa, J., and Lima, L. (2022). Muda o governo, mudam as políticas? O caso da política nacional de educação especial. *Revista Brasileira De Educação*, 27. Retrieved from https://doi.org/1–0.1590/S1413-24782022270026

Schmidt, C. (2017). Transtorno do espectro autista: onde estamos e para onde vamos. *Psicologia em estudo*, *22*(2), 221–230. Retrieved from https://doi.org/10.4025/psicolestud.v22i2.34651

Toledo, S. (2015). *Valoración cualitativa de estrategias de intervención educativa para un niño con TEA: Estudio de casos* [Tesis de grado, Universidad de Málaga]. Retrieved from https://riuma.uma.es/x-mlui/handle/10630/10800

UNESCO. (2020). *Global Education Monitoring Report 2020: Inclusion and Education - All Means All*. United Nations. Retrieved from https://www.right-to-education.org/sites/right-to-education.org/-files/resource-attachments/GEM_Report_Inclusion_2020_En.pdf

United Kingdom Government. (2014*). Special educational needs and disability code of practice 0–25 years*. Routledge. Retrieved from https://assets.publishing.service.gov.uk/government/up–loads/system/uploads/attachment_data/file/398815/SEND_Code_of_Practice_January_2015.pdf

United Nations. (2006). *Convention on the Rights of Persons with Disabilities (CRPD)*. Retrieved from https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html

United Nations General Assembly. (1948). *Universal Declaration of Human Rights*. Retrieved from https://www.un.org/es/about-us/universal-declaration-of-human-rights

Varela, B., and Machado, P. (2016). Uma breve introdução sobre autismo. Cadernos Da Escola de Educação E Humanidades, *Curitiba*, *1*(11), 25–39. Retrieved from https://portalde–periodicos.unibrasil.com.br/index.php/cadernoseducacaoehumanidades/article/view/2121

Vélez, M. I. (2017). *Programa TEACCH: propuesta de intervención psicoeducativa en el alumnado con TEA* [Tesis de grado, Universidad de Cádiz]. Retrieved from https://ro–din.uca.es/handle/1049-8/19702

Villa, Y. (2014). *Estudio de caso sobre los indicadores de estilo cognitivo en Jóvenes con Trastornos del Espectro Autista* (TEA) [Maestría en Educación, Universidad Pedagógica Nacional]. Retrieved from http://repository.pedagogica.edu.co/handle/20.500.12209/9781

World Health Organization. (2022). *Autism*. WHO. Retrieved from https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders

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