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Scientific articles

Nivel de desempeño lector de niños de primero a cuarto grado de primaria de la zona metropolitana de Guadalajara

Assessing children's reading performance from first to fourth grade in the Guadalajara metropolitan area

Nível de desempenho em leitura de crianças do primeiro ao quarto ano do ensino fundamental da área metropolitana de Guadalajara

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Resumen

Introducción: Actualmente, el bajo desempeño lector de los niños es un motivo de preocupación en el mundo, sobre todo después del confinamiento por la pandemia por el COVID-19, por las implicaciones que un pobre desempeño lector pudiera tener para el desarrollo cognitivo y el progreso académico de los niños. Se considera que, si los niños no logran alcanzar competencias básicas en lectura y matemáticas, es muy difícil que alcancen otras metas educativas. Objetivo: determinar el nivel actual de desempeño en tareas de lectura, conciencia fonémica y velocidad de denominación en niños de la zona metropolitana

de Guadalajara, México. Metodología: participaron 762 niños de primero a cuarto grado de primaria de escuelas públicas, en quienes se evaluó la velocidad, eficiencia y comprensión de la lectura en voz alta, la conciencia fonémica y la velocidad de denominación de letras y números. Resultados: En la evaluación de lectura se encontró que el promedio de velocidad lectora de los niños en los 4 grados se ubica dentro de los estándares esperados, sin embargo, estos resultados provienen sólo de aquellos que sí habían aprendido a leer. Se encontró un elevado porcentaje de niños que aún no podían leer y escribir, para el final de primer grado un 39 % de los niños apenas podía identificar algunas letras de manera aislada y otro 8 % presentó un nivel de lectura muy bajo; en los grados posteriores más del 20 % no sabía leer o se ubicaba en un nivel que requería apoyo. Adicionalmente, los resultados obtenidos en tareas de conciencia fonémica y de velocidad de denominación reflejan que las habilidades de los niños para el procesamiento fonológico están disminuidas en comparación con lo reportado en investigaciones previas. Se discuten los posibles factores que pudieran estar relacionados con el bajo rendimiento lector de los niños, entre ellos la falta de oportunidades adecuadas de aprendizaje por el confinamiento por el COVID-19 y la influencia del tipo de metodología de enseñanza que se emplea en las escuelas públicas del país.

Palabras clave: lectura, aprendizaje, método de enseñanza, pandemia, conciencia fonémica.

Abstract

Concerns have arisen about the poor reading performance of children, especially after the confinement due to the COVID-19 lockdown period. This poor performance could significantly affect children's cognitive development and academic progress. It has been considered that if children fail to achieve basic reading and mathematics skills, achieving other educational goals will be challenging. This research evaluated 762 children from first to fourth grade in public elementary schools in Guadalajara metropolitan area, Mexico, to assess their reading performance, phonological awareness, and naming speed. The average reading speed of children in the four grades was within expected standards, but these results were based only on children who had already acquired reading skills. By the end of first grade, 39 % of children could barely identify a few letters, and another 8 % had a very low reading level; in later grades, more than 20 % could not read at all or were reading at a level that required support. Furthermore, the results in phonological awareness and naming speed

tasks reflected that children's phonological processing skills were diminished compared to previous research findings. The possible factors contributing to children's poor reading performance are discussed, including the lack of adequate learning opportunities due to COVID-19 confinement and the impact of teaching methodologies used in public schools in the country.

Keywords: reading, learning, teaching method, pandemic, phonological awareness.

Resumo

Introdução: Atualmente, o baixo desempenho em leitura das crianças é motivo de preocupação no mundo, principalmente após o confinamento devido à pandemia da COVID-19, devido às implicações que o baixo desempenho em leitura pode ter no desenvolvimento cognitivo e no progresso acadêmico das crianças. Considera-se que se as crianças não adquirirem habilidades básicas em leitura e matemática, será muito difícil para elas atingirem outros objetivos educacionais. **Objetivo:** Determinar o nível atual de desempenho em tarefas de leitura, consciência fonêmica e velocidade de nomeação em crianças da área metropolitana de Guadalajara, México. **Metodologia:** Participaram 762 crianças do primeiro ao quarto ano do ensino fundamental público, sendo avaliadas a velocidade, eficiência e compreensão da leitura em voz alta, a consciência fonêmica e a velocidade de nomeação de letras e números. **Resultados:** Na avaliação de leitura, constatou-se que a velocidade média de leitura das crianças das 4 séries estava dentro dos padrões esperados, porém, esses resultados vieram apenas daquelas que já sabiam ler. Foi encontrada uma alta porcentagem de crianças que ainda não sabiam ler e escrever; no final do primeiro ano, 39% das crianças mal conseguiam identificar algumas letras isoladamente e outros 8% tinham um nível de leitura muito baixo; Nas séries posteriores, mais de 20% não sabiam ler ou estavam em um nível que exigia apoio. Além disso, os resultados obtidos em tarefas de consciência fonêmica e velocidade de nomeação refletem que as habilidades das crianças para processamento fonológico são diminuídas em comparação ao que foi relatado em pesquisas anteriores. São discutidos os possíveis fatores que podem estar relacionados ao baixo desempenho de leitura das crianças, incluindo a falta de oportunidades adequadas de aprendizagem devido ao confinamento da COVID-19 e a influência do tipo de metodologia de ensino utilizada nas escolas. autoridades públicas do país.

Palavras-chave: leitura, aprendizagem, método de ensino, pandemia, consciência fonêmica.

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Introduction

Learning to read is very important in the cognitive development and academic adaptation of the child, since it is the main means of acquiring information. Learning to read involves the creation of a new neural network in which highly specialized areas are incorporated in the recognition of visual words in close association with their meaning thanks to reading experience (Dehaene *et al.* , 2010; Berninger and Richards, 2002). Reading is a language modality that, through visual codes, allows the understanding of a written verbal message (Matute, 2001). Learning these visual codes requires explicit, progressive and systematic teaching of the correspondence between grapheme and phoneme, as well as clear instruction on how they are combined to form syllables, words and sentences. Repeated practice in writing and reading (coding and decoding) makes reading progressively faster, effortlessly and automatically. This frees up attention and memory resources that can be used to understand and analyze what is read.

In Mexico, literacy instruction formally begins in the first grade of primary school. Unfortunately, during the years 2020, 2021 and part of 2022, many children had to start or continue learning this complex process from home, due to the period of confinement we faced due to the COVID-19 pandemic. This confinement seriously affected the academic development of many students, particularly those who had to learn to read remotely.

In the initial stage of learning to read, the child requires the guidance, orientation and close support of his or her teacher to begin this very important process. Unfortunately, learning conditions were not optimal for many children during the pandemic. In the survey by the National Institute of Statistics and Geography for measuring the impact of COVID-19 on education in Mexico (INEGI, 2021), it is mentioned that during virtual classes, the number of hours that children dedicated to classes and academic activities decreased. It is noted that the people who supported the children in these activities recognized that they lacked the technical-pedagogical competence to help children in their learning . In addition, it is reported that most people perceive that less is learned at home than at school.

The lack of adequate opportunities for learning to read during this period is compounded by the discrepancy that exists among educational authorities about the best way

to teach reading and writing, whether the alphabetic code should be taught explicitly or starting with the teaching of whole words within communicative activities relevant to the child. However, scientific evidence has shown that the acquisition of reading in Spanish is based on the same thing as other alphabetic orthographies, that is, on the development of the skills to hold and manipulate phonemes (phonemic awareness), to learn the sound-symbol representation and to fluently recognize letters, syllables and words (Defior and Serrano, 2011). Thus, explicit and systematic teaching of letters in correspondence with the phonemes they represent, as well as the stimulation of phonological awareness, are considered the basis for the successful acquisition of the reading process and favor the development of reading fluency, that is, fast, efficient reading with adequate intonation (National Early Literacy Panel, 2008) .

Fluent reading involves a speed (number of words read per minute), efficiency (number of errors) and comprehension (answers to questions about what has been read) appropriate to the grade level, so the measurement of each of these aspects is essential for establishing a child's reading level. In this sense, the Secretariat of Public Education (SEP) of Mexico published the National Standards of Reading Skill in 2010, indicating that reading must be fluent in order for a sentence to be retained long enough to be understood, and so it defined the range of words per minute that a child should read aloud at the end of each grade level. These parameters have proven to be very useful for the evaluation of reading in normal children and in children with reading difficulties (Gómez-Velázquez *et al.* , 2010; Gómez-Velázquez *et al.* , 2013).

Acquiring a reading level appropriate to their grade level allows children to understand increasingly complex texts and acquire information from them. However, the lack of appropriate learning opportunities during the distance learning period, coupled with the lack of clarity among teachers about what specific activities children should do at home to learn to read and write, could seriously compromise the academic development of children who had to learn to read and write during this period of confinement due to the COVID-19 pandemic.

The need to have a diagnosis of the current reading development of children who began or continued learning to read and write during this difficult period motivated the realization of this research, with the objective of evaluating the reading performance level of children from 1st to 4th grade of primary school in the metropolitan area of Guadalajara, Mexico. Having this information could contribute to the design of strategies to improve the

reading process, in order to minimize the academic, social and emotional impact that poor reading performance could cause in children.

Methods

In order to assess reading performance in the period following the COVID-19 lockdown, a representative sample of children from the Guadalajara metropolitan area was chosen, who were in first, second, third and fourth grade of primary school in the morning shift in public schools. Based on the information provided directly by the Jalisco Ministry of Education (SEJ) for the 2021-2022 school year, the sample size was calculated with a margin of error of 5% and a confidence level of 95%. The total population of children in public schools in the 4 municipalities, in all grades (1 to 6) and modalities (morning, afternoon, night and discontinuous) was 346,628 children. With this information, a representative sample of the metropolitan area of 1,064 children was estimated, including the 6 grades, that is, approximately 177 children per grade. Therefore, a minimum of 708 children were scheduled to be evaluated, only from first to fourth grade, since it was considered that they would be the children with the greatest impairment in the reading process after confinement. Six public schools were randomly selected according to the percentage distribution of children per municipality: two from the municipality of Guadalajara (33% of the population), two from Zapopan (32% of the population), one from Tlaquepaque (18% of the population) and one from Tonalá (17% of the population).

The final sample consisted of 762 children: 195 in first grade, 188 in second grade, 192 in third grade, and 186 in fourth grade; 48% were girls and the rest were boys. The number of children evaluated from each municipality was proportional to the size of the population of children in public schools in each municipality in the metropolitan area.

To carry out the research, permissions were previously obtained from the Primary Education Directorate of the Jalisco Education Secretariat, as well as the approval of the supervisors of the areas, the school principals and the parents of the students evaluated. The evaluation of the children was carried out by three psychologists with experience in child neuropsychological evaluation, with the support of seven students in the last year of the bachelor's degree in psychology and four master's students who were trained in the application and grading of the tests, as well as in ethical and respectful behavior with children, to ensure that the research was conducted under the ethical principles established

in the World Medical Association Declaration of Helsinki (Ethical principles of medical research involving human subjects, 2013) and by the criteria established by the American Psychological Association (Ethical principles of Psychologists and code of conduct, 2017).

The evaluation period ran from April to June 2022. Tests were administered within the facilities of each school to all students present during that period. Each child's reading performance, phonemic awareness, and naming speed were assessed individually. Reading performance was assessed by reading aloud the short 85-word narrative text “Perseguida por un perro” (Taken from the HELPS program, Spanish version, Begeny, 2009; Begeny *et al*, 2012), in which the words read per minute (speed), the number of errors not spontaneously corrected (efficiency), and the score obtained in a reading comprehension questionnaire were quantified. Each child was asked to read aloud as quickly as possible, taking care not to make mistakes and paying close attention because at the end they would be asked questions about what they read. While the child was reading, each evaluator marked all errors on a copy of the text with codes indicating the type of error. The reading comprehension questionnaire included 5 questions, four textual and one inferential, which were scored with 2, 1 or 0 points depending on the quality of the response. Additionally, phonemic awareness was assessed through three tasks: initial sound substitution, initial sound deletion, and phoneme counting. Naming speed was measured in two tasks: letter naming and number naming. The tests were obtained from the Phonological Skills Batteries and the Naming Speed Battery (Gómez-Velázquez *et al.* , 2010). Additionally, a semi-structured interview was conducted with some teachers who agreed to answer questions related to the teaching method they use and the activities to stimulate reading that they sent to their students during the pandemic.

Once the evaluation process was completed, a preliminary analysis of the data was carried out and a preliminary report with the general and individual results was submitted to the Primary Education Department of the Jalisco Education Secretariat . Likewise, the director of each school was given a report with the results of each of the students in their school and an anonymous comparison with the rest of the other schools.

Following the preliminary analysis of the results, a thorough review of all the records was conducted to verify that there were no errors in the grading of the tests and that the results had been correctly entered into the database, and inconsistent data was eliminated.

Results

Below are the results of the evaluation of reading performance, phonemic awareness and naming speed, applied to the children in the sample at the end of the school year.

Reading performance by grade level

In the reading aloud assessment, reading speed (number of words read per minute) was measured and compared with the Reading Skill Standards published by the Ministry of Public Education of Mexico (2010). In these standards, the SEP defined four performance levels to which two others were added (does not know how to read and very low level), in order to better represent the spectrum of the results obtained. Thus, children were classified into six levels; Table 1 shows the distribution of children in each level and grade.

Table 1. Level of performance in reading speed

Degree	He can't read	Very low level	Requires support	Close to the Standard	Standard	Advanced	Average reading speed (words/minute)
First			< 15	15 - 34	35 - 59	> 59	
n = 195	76 39 %		16 8 %	35 18 %	42 22 %	26 13 %	44.1 (22.4)
Second			< 35	35 - 59	60 - 84	> 84	
n = 188	20 11 %		29 15 %	61 32 %	39 21 %	39 21 %	64.1 (31.3)
Third		< 35	35 - 59	60 - 84	85 - 99	> 99	
n = 192	11 6 %	8 4 %	28 15 %	51 26 %	32 17 %	62 32 %	87.2 (30.8)
Room		< 60	60 - 84	85 - 99	100 - 114	> 114	
n = 186	5 3 %	22 12 %	28 15 %	22 12 %	39 21 %	70 37 %	109.5 (40.9)

Note: For comparison purposes, the shaded rows show the word per minute ranges established in the SEP National Reading Skill Standards (2010) for each grade level. The table shows the number of students at each reading speed level and the percentage that it represents with respect to the total for their grade. The final column shows the average speed obtained by the study sample in each grade and the standard deviation in parentheses.

In addition to the levels defined by the SEP, two more were added: “Does not know how to read” (children who only identify isolated letters) and “Very low level” (reading speed in two grades below the standard).

It was found that a high number of children (39%) by the end of the first grade of primary education were unable to read and write, which, added to the percentage of children who required support, represents almost 50% of the proportion of children with a reading level well below that expected. By the end of second grade, there was still a significant number of children who could not read, which decreased by the end of third and fourth grade. It is relevant to note that, in addition to the percentage of children who could not read or who had a very low level, another 15% of children in second, third and fourth grade were at a reading speed level that requires support, that is, they have not reached an adequate level of automation to ensure adequate development of the reading process and its adaptation to the school demands of their grade.

When analyzing the average reading speed in comparison with the National Reading Skill Standards (Secretariat of Public Education, 2010), the average number of words read per minute (see the last column of Table 1) corresponds to the standard expected for each of the grades, for example, the average in first grade was 44.1 words read per minute and the expected standard range is between 35 and 59, the same was observed in the following grades where the average is within the expected standard range. However, it must be taken into account that in order to obtain this data, only the children who knew how to read were averaged, since those who could only identify isolated letters were eliminated, this implies that of the total of 195 children evaluated in first grade, the reading of only 119 could be averaged. Although the average reading speed corresponds to what is expected for each grade, there is a great interindividual variability, as demonstrated by the standard deviations in each grade, which means that within each grade there is a great diversity of reading profiles.

Subsequently, since the data presented normal distributions, the performance of the four grades in reading speed, efficiency and comprehension was compared (Table 2), using a one-factor ANOVA (grade) for each parameter, multiple comparisons were made with the Tukey method to determine the direction of the differences. In the case of reading speed, a significant increase was observed in the number of words read per minute ($F_{3,648} = 112.2, p < 0.001, \eta = .586$), with a very high effect size, this increase was progressive between each grade, from first to fourth grade ($p < 0.01$); the number of reading errors between grades

decreased significantly ($F_{3,648} = 10.95, p < 0.001, \eta = .220$), in the a posteriori comparisons it was found that this decrease was only significant between second and third ($p < 0.05$); In the analysis of reading comprehension, a significant increase was observed in the score obtained between grades ($F_{3,648} = 39.26, p < 0.001, \eta = .393$), this increase was progressive from first to third ($p < 0.01$), but no differences were observed between third and fourth grade.

Table 2. Reading performance by grade

Degree	Reading speed (words read per minute)	Efficiency (number of errors when reading)	Reading comprehension (% correct answers)
First (n = 119)	44.1 (22.4)	7.4 (9.3)	43.0 (26.2)
Second (n = 168)	64.1 (31.3)	6.0 (7.6)	55.1 (25.6)
Third (n = 181)	87.2 (30.8)	4.0 (4.1)	69.0 (20.1)
Fourth (n = 181)	109.5 (40.9)	3.8 (3.6)	67.8 (21.8)

Note: Children who could not read were excluded from the total number of participants in each grade. The mean is presented, with the standard deviation of each parameter in parentheses.

Relationship between reading speed, phonemic awareness and naming speed

The children's performance was also analyzed in three tasks that assess phonemic awareness and two naming speed tasks (Table 3); these skills are considered the basis for learning to read. The results obtained in the children show an overall performance below the pre-pandemic values found in our research (Gómez-Velázquez *et al.*, 2010; Valle-Márquez, 2022), suggesting that the impact on these skills has been very important, particularly in phonemic awareness. For example, a marked difficulty was observed in first grade children in counting phonemes in words, that is, in recognizing the sounds that make up spoken words.

Table 3. Phonemic awareness and naming speed tasks

Degree	Initial Sound Replacement	Initial Sound Suppression	Phoneme Counting	Denomination Letters	Denomination Numbers
First (n=170)	3.4 (3.7)	5.0 (4.3)	5.0 (3.6)	60.6 (28.8)	49.5 (17.1)
Second (n=185)	5.7 (3.6)	7.6 (3.3)	6.7 (3.1)	46.4 (19.8)	39.9 (11.8)
Third (n=190)	6.4 (3.1)	8.5 (2.5)	7.3 (2.9)	37.2 (11.9)	35.3 (9.8)
Fourth (n=186)	6.9 (2.7)	8.6 (2.3)	7.7 (2.3)	33.3 (10.2)	30.5 (7.8)

Note: The first three columns show the correct answers in the phonemic awareness tasks and the last two columns show the naming times in seconds. The standard deviation is shown in parentheses.

Additionally, the relationship between reading speed and reading efficiency and comprehension was analyzed using a Pearson correlation analysis (Table 4). We confirmed what has been repeatedly reported in the literature: the faster children read, the less errors they tend to make and the better they understand what they read. The relationship between reading performance and phonemic awareness and naming speed was also sought. It was found that phonemic awareness (total correct answers on the three tasks) showed a greater correlation with reading speed than with efficiency or comprehension, particularly in second, third, and fourth grade. Naming speed also showed the same pattern, with a greater correlation with reading speed than with efficiency or reading comprehension from second to fourth grade.

Table 4. Correlation between reading performance, phonemic awareness and naming speed

Degree	Parameter	Words per minute	Errors	Comprehension	Phonemic awareness	Denomination of letters	Naming numbers
First	Words per minute	1	-.395**	.553**	.300**	-.408**	-.262**
	Errors	-.395**	1	-.358**	-.360**	.153	.105
	Comprehension	.553**	-.358**	1	.515**	-.401**	-.343**
	Phonemic awareness	.300**	-.360**	.515**	1	-.486**	-.532**
	Naming of letters	-.408**	.153	-.401**	-.486**	1	.709**
	Naming numbers	-.262**	.105	-.343**	-.532**	.709**	1
Second	Words per minute	1	-.393**	.408**	.495**	-.419**	-.336**
	Errors	-.393**	1	-.250**	-.446**	.259**	.118
	Comprehension	.408**	-.250**	1	.298**	-.198*	-.219**
	Phonemic awareness	.495**	-.446**	.298**	1	-.483**	-.486**
	Naming of letters	-.419**	.259**	-.198*	-.483**	1	.610**
	Naming numbers	-.336**	.118	-.219**	-.486**	.610**	1
Third	Words per minute	1	-.399**	.321**	.360**	-.461**	-.499**
	Errors	-.399**	1	-.221**	-.158*	.334**	.270**
	Comprehension	.321**	-.221**	1	.275**	-.089	-.163*
	Phonemic awareness	.360**	-.158*	.275**	1	-.463**	-.512**
	Naming of letters	-.461**	.334**	-.089	-.463**	1	.707**
	Naming numbers	-.499**	.270**	-.163*	-.512**	.707**	1
Room	Words per minute	1	-.351**	.295**	.379**	-.537**	-.501**
	Errors	-.351**	1	-.109	-.257**	.209**	.185*
	Comprehension	.295**	-.109	1	.209**	-.162*	-.114
	Phonemic awareness	.379**	-.257**	.209**	1	-.393**	-.522**
	Naming of letters	-.537**	.209**	-.162*	-.393**	1	.717**
	Naming numbers	-.501**	.185*	-.114	-.522**	.717**	1

** The correlation is significant at the 0.01 level (two-tailed). * The correlation is significant at the 0.05 level (two-tailed).

Impact of school of origin

Finally, in relation to the school of origin, the general reading performance was compared between the six schools evaluated, using a one-way ANOVA (school). In reading speed ($F_{5,643} = 1.047$, $p = 0.389$, $\eta = .090$) no significant differences were found; in reading efficiency ($F_{5,643} = 2.509$, $p = 0.029$, $\eta = .138$) a marginal difference was found, which when making the multiple comparisons a posteriori did not show significant differences in the number of errors when reading between the schools. In reading comprehension, significant differences were found ($F_{5,643} = 7.383$, $p < 0.01$, $\eta = .233$); in the subsequent exploration of the differences it was found that only in one school the children obtained a significantly higher average score of comprehension compared to the other schools, with no differences between the rest of them.

Discussion

Learning to read and write is essential for children's cognitive and academic development. Early acquisition of the process favors the learning of different curricular contents. Adequate learning to read may depend on different factors such as the sociocultural environment in which the child develops, receiving early instruction or the teaching method that has been used. In addition to these factors, in recent years the confinement due to the COVID-19 pandemic was added as an element that negatively affected education globally.

This study presents the results of the evaluation of reading performance in 762 children from public primary schools in the metropolitan area of Guadalajara, Mexico, after the COVID-19 lockdown, that is, between April and June 2022. It is very difficult, of course, to determine whether the results obtained in this research are mainly due to the confinement due to the pandemic, since there is no recent pre-pandemic data to make a comparison. For this reason, we will try to analyze the different factors that could be contributing to the children's current reading performance.

The main reading parameter analyzed in this research was reading speed, because it reflects the degree of automation (speed in identifying words) that children have achieved (Castle and Nation, 2006). Of course, reading comprehension is the main objective, but in order to understand it is necessary to be able to read and do so with a level of speed and

efficiency in accordance with the demands of the texts for each grade level (Abadzi, 2008). For this reason, the children's reading speed was compared with the National Reading Skill Standards published by the SEP in 2010. Although they are no longer used in public schools, they are considered very useful and have been shown to correspond to what is expected for children who receive explicit phonological teaching of grapheme-phoneme correspondence. The results showed that the average number of words read per minute in each grade level is within the range established in these standards and is similar to that reported in previous research in similar populations (Gómez-Velázquez *et al.*, 2010; Gómez-Velázquez *et al.*, 2013), which at first glance would seem to indicate that there is no affectation in the reading speed of the children in this sample; however, the average was obtained only from children who knew how to read in each grade. We found that an alarming 39% of children at the end of first grade did not know how to read, that is, they could only identify some letters by their name in isolation, but could not integrate their phonemes to read or write words. From second to fourth grade, a high percentage of children were also found who do not know how to read or who have a reading speed at a level that requires support. This low reading performance could be affecting the ability of these children to understand school texts or to abstract information from them, which will eventually generate a general delay in the acquisition of knowledge.

The underlying causes of this poor performance may be several, one of them may be related to the period of confinement due to the COVID-19 pandemic, which affected the academic performance of children around the world. In the case of reading, a very large study in the United States showed a significant drop in reading test scores in children from third to fifth grade (Kuhfeld *et al.* , 2023), other studies have also shown a decline in reading performance in primary school children after the pandemic (Ludewig *et al.*, 2022; Relyea *et al.* , 2023). In the case of Mexico, the results of the latest evaluation of the Program for International Student Assessment (PISA, OECD 2023), showed a low performance in reading comprehension of secondary school students. However, there are no studies of reading performance in primary school children before the pandemic that could help determine whether the reading performance of the children in this sample is worse or better. However, it is feasible to consider that factors such as poor access to information through digital media, lack of time available from parents or caregivers to support with schoolwork, or the type of activities that teachers sent home during the pandemic, may have contributed to many of the children not learning to read or doing so in a very limited way.

Another reason that could help explain the low reading performance is the teaching method that is being used. To find out about this, some of the teachers were informally asked about the type of activities they sent to the children during the pandemic or about the methods they used to teach reading. The teachers reported that they searched mainly on the Internet for information on different content, including reading activities or programs to teach reading. Several teachers mentioned having used the “20-day method,” the “eclectic method,” the “syllabic method,” or various materials they found on Internet pages. They mentioned that they did not explicitly teach the alphabet. Unfortunately, none of these methods or activities have a scientific basis. It is striking that none of the teachers surveyed mentioned having used the SEP textbook program.

The current method in Mexico proposed in textbooks for teaching reading (Mother Tongue. Spanish, SEP, 2019), is based on the proposal of Ferreiro and Teberosky (1979). In the books for teachers, literacy processes are presented as a *didactics of the written language*, where it is mentioned that the plan and study programs of basic education put the social practices of language in the foreground and abandon the teaching of linguistic units (letters, words and statements). It is described that the program is structured based on the social practices of language, which brings together and organizes relevant communicative situations that allow students to read and write a variety of texts in an increasingly autonomous way, it is assumed that they learn to read and write, reading, writing and reflecting on these activities, even before being able to do so in a conventional way. It could be assumed that the “conventional” learning referred to in the SEP book is the learning of the alphabetic code, which is consistent with the teachers’ claim that they do not teach the letters of the alphabet to children. In the SEP proposal there is no structured, progressive and systematic program that allows the teacher to guide his or her activities to explicitly teach the grapheme-phoneme correspondence (phonological decoding), which is the basis for learning to read and the global recognition of words, as has been scientifically demonstrated.

The type of activities included in the first grade book are based on the global recognition of complete words. The use of global methods of teaching reading dates back to the beginning of the 18th century, with a proposal by Ovide Decroly based on the education of children with learning problems, which proposed teaching based on the needs of children, organizing information into centers of interest such as food, shelter, defense or work and from there teaching the relevant words. These theoretical approaches could be very interesting for teaching science content, but they are not considered efficient for teaching reading and

writing. There is a wealth of scientific evidence from different areas such as psychology, pedagogy, and neuroscience that has shown that teaching grapheme-phoneme correspondence is very important for children to learn to read (Examples: Goswami & Bryant, 1990; Liberman & Shankweiler, 1991; Ehri, 2014; Morais, 1995; Defior, 2011; National Reading Panel, 2000), both for transparent languages such as Spanish and for more opaque orthographies such as English. The lack of explicit instruction on grapheme-phoneme correspondence and the use of inappropriate methods for Spanish may have influenced a high percentage of the children in this study not learning to read and write.

The method of teaching reading must be adapted to the characteristics of the spelling to be learned. Spanish is considered transparent due to the high consistency between graphemes and phonemes, so teaching reading using a phonological decoding method is the most appropriate, effective and fastest way. English, on the other hand, has a high grapheme-phoneme inconsistency and orthographic ambiguity that make reading teaching slower, more difficult and requires a greater number of teaching strategies such as global reading, the use of analogies, in addition to phonological decoding (Goswami, 2009). An example that learning to read and write in Spanish is easier than learning to read and write in English is the study by Seymour et al. (2003) conducted in 14 languages, which shows that by the end of first grade, Spanish-speaking children (who were taught phonologically) could read 95% of the words on a list, as opposed to English-speaking children who could only read 34% of the words. This evidence of the good performance of Spanish-speaking children highlights that the performance found in first-grade children in this sample is very low.

In fact, phonological instruction is considered to be the most appropriate for teaching reading, regardless of the orthographic characteristics of the language (*National Reading Panel*, 2000). Additionally, it is known that intensive practice in letter-by-letter encoding and decoding develops the child's orthographic knowledge, allows him or her to recognize more and more words, increases his or her vocabulary, increases his or her self-confidence and motivation, all of which makes visual (global) recognition of printed words increasingly faster and effortless (Share, 2004). When children can read words more and more automatically, reading is easier, comprehension is facilitated, and attention and memory resources can be focused on constructing meaning (Ehri *et al.*, 2001; Shanahan & Lonigan, 2010). Once a child learns the alphabetic code, he or she is able to read almost any word, even without knowing its meaning (Perfetti & Verhoeven, 2017) . In addition, neuroimaging studies have shown that teaching the association between letters and their sounds generates

plastic changes in the brain of children and lays the foundation for the construction of a neural network specialized in reading through intensive practice (for review see Schlaggar and McCandliss, 2007).

Therefore, starting with teaching isolated words, so that children can guess their meaning based on the context, can make the process very slow, frustrating and unmotivating, generating in the child the perception that it is very difficult to learn to read. The use of a method like this could be one of the causes of the delay in learning to read observed in the present research. In our results we found that nearly 40% of the children who finished first grade could not read yet and only recognized some isolated letters, even though several months had already passed since they returned to in-person classes.

Furthermore, the results of this research confirmed what has been repeatedly reported in the literature: there is a close correlation between reading speed and reading comprehension (Perfetti & Hogaboam, 1975; Gough *et al.*, 1996; Adams, 1994). Oral translation of a text with speed and efficiency is considered an indicator of general reading competence (Fuchs *et al.*, 2001). The most significant correlation between speed and comprehension was found in first grade and it decreased towards fourth grade, which highlights the importance of this relationship in the initial stage of learning. To the extent that there is early success in learning to read, a love for reading develops, comprehension improves, and reading habits are acquired later in life (Cunningham & Stanovich, 1998).

Other aspects that were evaluated in the children were phonemic awareness and naming speed, both of which have been shown to be good predictors of reading performance (Bravo *et al.*, 2006; Gómez-Velázquez *et al.*, 2010). In the case of the ability to sustain and manipulate the smallest sounds of the language or phonemic awareness, we found that compared to previous results of our group (Gómez-Velázquez *et al.*, 2010), the children obtained a very low performance in tasks such as deletion and substitution of initial sounds, and phoneme counting. This may be associated with the lack of training in phoneme recognition, which is acquired only through learning the grapheme-phoneme correspondence. This is consistent with what was reported by the teachers in the sense that they are not teaching the letters individually, so their ability to manipulate the sounds of words in memory is diminished. In terms of naming speed, we found that children were slower at naming letters and numbers, particularly in first grade, although by third grade naming times were closer to what had been previously reported (Gómez-Velázquez *et al.*, 2010). Although naming could only be assessed in those who could read, the slower naming

times could reflect that the children in this sample have limited reading experience, even those who can read.

These processes are closely related to each other and to reading performance. We found significantly high correlations between naming speed and reading speed, efficiency and comprehension, that is, children who were faster at naming letters and numbers tended to read more words per minute, make fewer errors and understand better what they read, and the same in reverse, those who were slower at naming read slower, made more errors and understood less. We found similar results with phonemic awareness, children with a higher number of correct answers tended to read faster, make fewer errors and understand better, and vice versa. Low-level processes such as letter and sound recognition, the ability to manipulate those sounds, as well as automatic word recognition, are acquired with experience; as the child becomes faster and more accurate, he or she gains higher-order processes such as understanding information, acquiring knowledge and developing verbal reasoning (Scarborough, 2001). This does not happen overnight, it requires practice and appropriate instruction to progressively achieve expert reading.

Conclusions

In this research, we evaluated the reading performance of children from first to fourth grade of primary school. Our results showed that at the end of first grade, a high percentage of children have not yet learned to read and write, in addition to a high percentage of children who require support in later grades.

The poor reading performance of children in public schools in the metropolitan area of Guadalajara, Mexico, could be explained by several factors, including the lack of appropriate learning opportunities resulting from the COVID-19 lockdown and the teaching method currently used in public schools. On the one hand, during the pandemic, the amount of time that children spent on school activities was significantly reduced, since many of them had to start or continue the process of learning to read from home, without the close guidance of their teachers, without a clear program of activities to develop, and with parents overwhelmed by the lack of pedagogical knowledge to teach this complex process. On the other hand, the method used for instruction in Mexico could be delaying reading learning in our children, since the grapheme-phoneme correspondence is not explicitly taught, despite the fact that there is multiple scientific evidence showing that the direct or phonological

method, based on the acquisition of the alphabetic code, is the most effective, especially in transparent orthographies such as Spanish.

Our results confirm that there is a close relationship between automatic letter recognition and general reading performance; the high correlations found between letter and number naming and reading speed, efficiency and comprehension confirm the importance of teaching letters, of providing children with the opportunity to acquire the alphabetic code, of automating word recognition to ensure that more complex skills such as reading comprehension, coherent and creative writing, information acquisition, and finally, that children develop a love for reading, are progressively developed.

Future lines of research

Based on the results of this research, it is important to continue studying the characteristics of children's reading performance in Mexico and Latin America in order to provide scientific evidence to help educational authorities in the design and modification of educational programs. One aspect that has not been studied much is the development of writing. Exploring the characteristics of errors in writing and their relationship with more complex processes such as writing texts could contribute to a comprehensive understanding of the reading process. Finally, it is important to demonstrate in Spanish-speaking children the effect of explicit teaching of grapheme-phoneme correspondence and phonological training on reading acquisition in order to confirm the proposals presented in this study.

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