Strengthening reading precursors in pre-readers

Fortalecimiento de los precursores de la lectura en estudiantes prelectores

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Abstract

Several research studies have demonstrated the efficacy of interventions to improve reading precursors, leading to more successful reading acquisition. Interventions to develop these skills are especially relevant in contexts that show low levels of reading proficiency on national and international evaluations, as in the case of Peru. It has been detected that the Peruvian educational curriculum does not contemplate working on pre-reading skills before beginning to read. Thus, the objectives of this study are: (1) to design a set of research-based activities that can be integrated into the Peruvian curriculum to stimulate these skills; (2) to test this intervention; and (3) to find out how other variables associated with the individual (Age, Sex, ESEC, and Executive Function) could be involved in the changes observed in the study. The activities were designed based on the target competencies and skills of the Peruvian curriculum in the area of communication, starting with the teachers' use of literary texts. The activities were carried out with a sample of 208 Peruvian five-year-old children, divided into an experimental group and a control group. The latter followed an intervention with the traditional teaching format. The results obtained by the two groups were compared, and to control the effect of other variables (Age, Sex,

ESEC, and Executive Function) and find out the degree of variance explained by the program, a multiple regression analysis was performed. The results show that the experimental group activities improved the reading precursors more than the control group intervention, and the regression analysis confirmed that the intervention explained most of the found in the final assessment. We can conclude that teachers can incorporate activities that complement the official curriculum, in order to improve their students' proficiency without placing an additional burden on them.

Resumen

En varias investigaciones se ha demostrado la posibilidad de intervenir y mejorar los precursores de la lectura y de cómo su mejora está relacionada con una adquisición de esta más exitosa. La intervención en estas habilidades es especialmente relevante en aquellos contextos que muestran bajos niveles de competencia lectora en las evaluaciones nacionales e internacionales como es el caso de Perú. Se ha detectado que el currículo educativo peruano no considera trabajar las habilidades prelectoras antes del comienzo de la lectura. Los objetivos de este trabajo son (1) diseñar un conjunto de actividades basadas en la literatura científica que se integre en el currículo peruano, dirigidas a la estimulación de dichas habilidades; (2) poner a prueba dicha intervención y (3) conocer como otras variables, asociadas al individuo (Edad, Sexo, ESEC y Función Ejecutiva) podrían estar implicadas en los cambios observados en el estudio. Las actividades se diseñaron basándose en las competencias que el currículo peruano pretende desarrollar en el área de la comunicación, a partir del uso de textos literarios impartidas por el profesorado. Se aplicó a 208 estudiantes peruanos de 5 años, divididos en grupo experimental y grupo control. Este último siguió una intervención con el formato tradicional de enseñanza. Se compararon los resultados de ambos grupos y para controlar el efecto del resto de variables y conocer el grado de varianza explicada por el programa se realizó un análisis de regresión múltiple. Los resultados muestran que las actividades mejoraron los precursores de la lectura en mayor medida que la intervención del grupo control y el análisis de regresión corrobora que la intervención realizada está explicando la mayor parte de la varianza. Se concluye que el cuerpo docente puede incorporar actividades que complementen el currículo oficial con el fin de mejorar la competencia de sus estudiantes y sin que les suponga una carga adicional.

Palabras clave: alfabetización emergente, lectura temprana, enseñanza de la lectura; intervención temprana; currículo oficial; profesorado de lectura; prelectores.

Introduction

Before learning the formal conventions of written language, a series of skills associated with students' development have to be consolidated. These skills, known as precursors to reading, are also developed through the stimulation received from the environment (De la Calle et al., 2019).

These precursors include *linguistic* skills (Catts, 2015), highlighting the role of vocabulary (Vellutino et al., 2007) and the ability to manipulate and reflect on the grammatical structure of language (Cain, 2007); *metalinguistic skills*, particularly *phonological awareness* (Landerl et al., 2019) and *knowledge about the components and functions* of written language (Murphy et al., 2016); *alphabetic knowledge* (Sunde et al., 2020); *naming speed* (Clayton et al., 2020), which together with phonological awareness and alphabetic knowledge would be the best early precursors to reading (De la Calle et al., 2019); and, finally, certain *cognitive variables*, such as visual perception (Mantovani et al., 2021) and verbal memory (Injoque-Ricle et al., 2012).

Recent findings also show the involvement of the *Executive Functions*, given that in reading it is necessary to develop the ability to maintain attentional control and control interference (Carretti et al., 2017). In addition, the *Socioeconomic and Cultural Status* (ESCS) is also relevant in the acquisition of good reading performance (Escobar & Meneses, 2014).

Intervention in reading precursors

The tendency has been to train the skills that have shown greater involvement in the access to reading. Thus, most interventions have been directed toward developing phonological awareness, either in

isolation (Gutiérrez & Díez, 2017) or along with other skills, such as naming speed (Vander & Van, 2018) or alphabetic knowledge (Gutiérrez, 2018). However, programs have also been designed to enhance other precursors, such as compressive and automated vocabulary (Spencer et al., 2012) or knowledge about the components and functions of what is written (Neumann, 2013). Designs that intervene on all or most of the precursors have been shown to be more effective (Pears et al., 2016). Most of these interventions, in addition to improving the selected skills, have demonstrated their influence on subsequent reading acquisition (Gutiérrez & Díez, 2017; Romero et al., 2016). The programs are usually aimed at all the students, but some are designed for students who have difficulties with specific skills (Lovett et al., 2017).

Interventions can be distributed throughout the course (Gutiérrez & Díez, 2017) or have a specific number of sessions (Arancibia et al., 2012). Some programs, usually supported by ICTs, make the number of sessions and their duration more flexible (Romero et al., 2016). One way to work on these skills is through shared reading (Gutiérrez & Díez, 2017) or reading picture books (Schryer et al., 2015). Less frequent are interventions that integrate the activities into the educational curriculum (Vera, 2011), taking into account the teacher's direct participation in programming and implementing the activities (González et al., 2013) and validating a natural and integrative context (Bowyer-Crane et al., 2008).

Training in these skills is especially relevant in contexts that show low levels of reading proficiency on national and international assessments, as in the case of Peru (Schleicher, 2019): only 37.6% of second-grade students (7-8 years old) in Peruvian schools (public and private) are able to achieve a satisfactory text comprehension level (Peruvian Ministry of Education, MINEDU, 2019).

Pre-reading skills in the Peruvian curricular framework

The Peruvian early education curricular framework (3-6 years) is organized in curricular areas that establish the competencies to be developed and the learning experiences schools must provide for their students (LaTorre, 2014). The Communication area consists of two fundamental sub-areas: text comprehension and oral expression (Table 1).

TABLE 1. Area of communication. Main competencies and capabilities in Early Education

Area of communication	Competency	Curricular capabilities
Text comprehension	Understands written texts	Internalizes the characteristics of the writing system
		Reflects on the form, content, and context of written texts
		Reorganizes information from various written texts
		Infers the meaning of written texts
		Retrieves information from various written texts
Oral expression	Expresses him/herself orally	Adapts his/her oral texts to the communicative situation
		Expresses his/her ideas clearly.
		Strategically uses a variety of expressive resources
		Interacts collaboratively, maintaining the thematic thread

Note. Correspondence between competencies, capabilities, and areas of communication based on the peruvian curriculum

Within this area, reading experiences are developed through contact with different texts in order to be able to construct their meaning and express opinions about them. These are the so-called 'literary activities', a space without a specific structure for working on oral expression and text comprehension skills, allowing teachers to follow their own methodology (MINEDU, 2015). They expect that through contact with written texts, preschool students will gradually deduce the mechanisms of reading . They start from a global approach that sets aside the synthetic approach, which is necessary for word decoding, especially in transparent languages such as Spanish. This approach even questions the relevance of addressing letter knowledge in this educational stage, ignoring the evidence of current research, which shows a clear relationship between success in reading acquisition and the development of phonological awareness and alphabetic knowledge.

The present study

When children are learning to read, the Peruvian curriculum tries to make them deduce the basic reading mechanisms through interactions with a series of texts, putting aside the teaching of certain fundamental pre-reading skills (phonological awareness and explicit and systematic teaching of the alphabetic principle). Therefore, the present study aims to design an intervention that enriches the Peruvian Education Ministry's approach to early reading. This intervention considers the development of these pre-reading skills, but without contradicting the Ministry's guidelines or ceasing to use texts that give meaning to the teaching.

Thus, based on the above, this study has three specific objectives: (1) to elaborate a set of evidence-based activities (Clayton et al., 2020; Injoque-Ricle et al., 2012; Landerl et al., 2019; Mantovani et al., 2021; Murphy et al., 2016; Sunde et al., 2020; Vellutino et al., 2007) that are compatible with and can be integrated into the Peruvian curriculum and are designed to stimulate all the pre-reading skills; (2) to test this intervention, carrying out a comparative analysis of the pre-reading skills developed by the participating students versus those who receive the traditional program; (3) to find out how other variables associated with the individual (Age, Sex, ESCS, and Executive Function) might be involved in the developmental changes observed in the study.

Design and methodology

The empirical study was conducted using a quasi-experimental design, with pretest-posttest repeated measures between an experimental group (enriched program) and a non-equivalent control group (traditional Peruvian curriculum). It was not possible to perform a complete randomization of the children in the groups because the unity of the participating classes was maintained (Johnson & Christensen, 2000). The ethical values required in research with humans were respected (informed consent, protection of personal data, non-discrimination, gratuity, and the possibility of leaving the program), and the study was approved by the Human Research Ethics Committee of the University of Valencia.

Participants

The study involved 208 five-year-old children (M=65.89 months, SD=3.25 months) from three public schools in two districts of Metropolitan Lima with similar socioeconomic characteristics (San Borja and San Luis) in Local Educational Management Unit 7. There were six classrooms in the Experimental Group and four in the Control Group. The number of participants per classroom ranged from 16 to 24 students. Table 2 shows the distribution of students by classroom and school. It was not possible to mix the control and experimental groups in the schools because the latter were reluctant to participate unless a coherent program was maintained in all their classrooms. In addition, given the coordination among the teachers in the same school, it was difficult to keep them from commenting on and/or sharing materials or activities, which could have contaminated the results.

TABLE 2. Distribution of participants in groups

Group	School	Shift	N	%
Experimental	Virgen de Lourdes	Morning	23	11.1
			25	12.0
		Afternoon	24	11.5
			22	10.6
		Total	94	45.2
	Manuel Gonzales Prada	Morning	18	8.6
		Afternoon	16	7.7
		Total	34	16.3
Control	Niño Jesús de Praga	Morning	21	10.1
			23	11.1
		Afternoon	18	8.6
			18	8.6
		Total	80	38.5

Given that at least one-third of the sample was supposed to form the Control Group (CG), the Niño Jesús de Praga school was assigned to this

group, with the other two schools assigned to the Experimental Group (EG).

Variables and instruments

Demographic and socio-economic data

First, *Demographic Data* were collected to characterize the participants: *Sex*, *Age* in months, and *Socio-economic and Cultural Status* (ESCS). The test used for this purpose was an adaptation of the one used in Peru by the OECD (2017) on the PISA reports (MINEDU, 2017). This questionnaire provides three sets of data. First, the *Highest education level of parents* (HISCED) considered both parents, with the following categorization: 'low' (neither parent has secondary education), 'medium' (at least one parent has secondary education), and 'high' (at least one parent has higher education). Second, the *Highest parental occupational status* (HISEI) categorized participants into four levels based on the parent with the highest level. Finally, the *Household Possessions Index* (HOMEPOS) was composed of several variables about what the family owns, with special attention paid to certain cultural goods, such as the number of books. Most of the questions are corrected as 1 or 0, depending on whether the good is owned or not. However, on questions where there may be a high number, such as books, they were categorized into levels to reduce their influence on the final score.

Pre-reading skills

Batería de Inicio a la Lectura, BIL 3-6 (Beginning Reading Battery) (Sellés et al., 2008). This battery consists of 15 tests grouped in five factors that evaluate *Phonological Awareness* (CtF); *Alphabetic Knowledge* (CtA); *Metalinguistic Knowledge* (CtM); *Linguistic Skills* (HaL); and *Cognitive Processes* (PrC). The reliability coefficients for these tests, according to the authors, range from 0.54 to 0.97.

Executive function

Childhood Executive Functioning Inventory (CHEXI) (Thorell & Nyberg, 2008). It is composed of two factors, *Working Memory and Inhibitory Control,* which add up to a total score (*Executive Function),* with a reliability of 0.89, according to the authors.

Variables collected in the program

The first part of the study involved designing a set of tasks, based on scientific evidence, aimed at stimulating pre-reading skills. A brief summary of these tasks can be seen in Table 3: objectives, contents, and methodology. The variables targeted in the intervention were the following:

Phonological awareness, for which different tasks were developed, graded according to their developmental sequence of acquisition. Initially, they were supported by manipulative elements (Bowyer-Crane et al. 2008; Herrera & Defior, 2005):

a) *Counting words.* The difficulty was adapted to the developmental stage of the students, given that at four years of age, they still have problems segmenting sentences with definite articles and prepositions (Sellés & Martínez, 2014).

b) *Counting syllables.* At this age, in Spanish, it is easy for children to perform segmentation tasks with simple two-syllable words (CV), and they are reaching the maximum performance level for monosyllabic words with a complex syllable structure (CVC) (Cruz et al., 2005).

c) *Rhyme.* We took into account that, in Spanish, detecting rhyme is not an easy task, due to the low presence of monosyllabic words ending in a consonant (Herrera & Defior, 2005). Thus, bisyllabic and trisyllabic words were used, whose rhyme is more difficult to detect.

d) *Isolating syllables and phonemes.* We took into account that, developmentally, the isolation of the initial phoneme is easier for four- and five-year-old children (Suárez-Coalla et al., 2013).

e) *Omitting a syllable.* This skill, although it begins to develop at early ages, is not consolidated until the age of six (Sellés & Martínez, 2014), and it involves two tasks: first, identifying the final sound of the word and, second, avoiding saying it.

Alphabetic Knowledge. Its development requires instruction or contact with letters, our program addressed its stimulation through the analysis of certain segments in the texts. . The program prioritized vowels, which are acquired before consonants (Owens, 2003), as well as more frequently used consonants, corresponding to significant words in their context (Owens, 2003).

Linguistic Skills. These skills are based on the following conceptions of language development at age five: a productive vocabulary of 2200 words, including some basic concepts (left-right and some temporal concepts), and some basic grammatical skills (Owens, 2003). The teaching of new vocabulary and the analysis of basic concepts were also carried out through the analysis of literary texts (Owens, 2003).

Components and Functions of Reading. At five years old, the child has already been introduced to notions about the directionality of the text, right to left and top to bottom, the difference between reading and writing behaviors (between three and four years old), and knowing what reading consists of and what its function is (at five years old) (Ortiz and Jiménez, 2001). The tasks were adjusted to these development levels.

Basic Cognitive Processes. These activities were also developed transversally using literary texts. For example, learning poems or riddles was proposed, which required the use of *Auditory Sequential Memory,* or the use of graphics and words to stimulate the *Visual perception* of printed symbols, their directionality in the text, and letters (Kotaman, 2020).

TABLE 3. Enrichment activities and sessions dedicated to their intervention

Curricular capabilities	Beginning reading skills	Enrichment activities	Sub-skills	N. Sessions
He/she internalizes the writing system	*Phonological awareness and alphabetic knowledge*	Tasks of counting syllables and counting words. Rhyming activities: reading poems, children's songs, word games. Activities of isolating syllables and phonemes and omitting syllables. Alphabetic knowledge through the texts worked on.	Rhyme	6
			Counting words	5
			Counting syllables	7
			Isolating syllables	5
			Isolating phonemes	6
			Omitting syllables	5
			Alphabetic knowledge	6
Reflects on the form, content, and context of written texts.	*Metalinguistic knowledge*	Reflective processes on the elements of written language, learning to identify the structure and functionality of reading.	Recognize words	3
			Recognize sentences	2
			Functions of reading	9
Reorganizes information from various written texts Infers the meaning of written texts Clearly expresses his/her idea. Strategically uses a variety of expressive resources Interacts collaboratively, maintaining the thematic thread	*Linguistic knowledge*	Based on work with literary productions, increase vocabulary, extract and analyze sentences.	Vocabulary	6
			Grammatical structures	3
			Basic concepts	2
Recovers information from diverse written texts	*Cognitive processes*	Memorization of poems, riddles, stories, recipes… Identification of symbols and images.	Auditory sequential memory	7
			Visual perception	6

Procedure

Because the groups could not be randomized, the first step in the study was to check that the two groups could be considered comparable, at least on the descriptive and control variables. The aim was to verify that there were no significant differences between the groups in *Age*, the *ESCS* and its subcomponents *HISEI, HISCED and HOMEPOS*, and *Executive Function* (EF), as well as its factors: *Inhibitory Control* and *Working Memory*. It should be noted that the *ESCS* questionnaire was not filled out by some families of the children participating in the study. The intervening variables (Phonological Awareness –CtF–, Alphabetic Knowledge –CtA–, Metalinguistic Knowledge –CtM–, Linguistic Skills –HaL–, and Cognitive Processes –PrC–) were also included in this initial study carried out, using a t–test for independent samples.

Demographic and *ESCS* data were collected before the intervention. Once this information had been gathered, each participant in the study was evaluated individually. A trained psychologist who was part of the research team administered the Beginning Reading Battery (Batería de Inicio a la Lectura), BIL 3–6 (Sellés et al., 2008) to each participant. During the administration of this test, the researcher had to observe the students and fill out the protocol corresponding to the *Scale of Executive Functions* (CHEXI). All the schools had a space where the evaluation could take place in appropriate conditions.

Once the students had been evaluated, the intervention plan with enrichment activities was implemented. These tasks did not increase the time the curriculum proposes for literary activities (contact with texts to deduce reading strategies) because some activities were substituted by others. Thus, based on the competencies of the Early Childhood Education curriculum (see Table 1), teachers were instructed to substitute some of the usual exploratory activities with others that specifically worked on pre–reading skills. A total of 20 sessions were held, two sessions per week, and the teachers were responsible for carrying out the tasks. Meanwhile, during these 10 weeks, the control group continued with the contents and methodology promoted in the Peruvian curriculum. In order to compare the interventions, the teachers of the control group were asked to use the same texts as the experimental group, with the two interventions only differing on one aspect. That is, while the control group was engaged in the usual literary activity, the experimental group

performed an enrichment activity (see Ysla, 2015). The work sessions were structured as follows for both groups:

a) *Preparation and presentation of the literary production (CG and EG).* Initially, the topic of the text was presented, with the purpose of activating their previous knowledge and facilitating their comprehension. Then the text was presented, and students were encouraged to discover what type of text it was (story, poem, riddle, recipe, news). Subsequently, the class had to follow along while the teacher read aloud (6 minutes).

b) *Comprehension and analysis of the literary production (CG and EG).* After the initial reading, comprehension questions were presented at the literal, inferential, and critical levels (5 minutes).

c) *Core Activity.* At this point, the CG and EG activities diverged. While the CG maintained the *Literary Activity* as stipulated in its program, working on activities designed to deepen the processes of interpretation and reflection, the EG participated in the proposed enrichment activities (see Table 3). The work in this part of the study was in small groups and monitored and modelled by the teacher (12 minutes).

d) Finally, time was left for *Individual work* (CG and EG). Each child worked individually on a card with the activities he/she had done in the group in the previous stage (7 minutes).

Final evaluation. Once the training period had been completed by both groups, the BIL 3–6 test was administered again to all the participants.

Results

The previous study verified that there were no significant differences between the groups (see Table 4) in Age, the ESCS and its subcomponents, HISEI, HISCED, and HOMEPOS, and Executive Function and its factors: Inhibitory Control and Working Memory. The groups were also comparable in the domain of pre–reading skills (Phonological Awareness –CtF–, Alphabetic Knowledge –CtA–, Metalinguistic Knowledge –CtM–, Linguistic Skills –HaL–, and Cognitive Processes –PrC–.

TABLE 4. Initial comparison of CG and EG

	Group	N	Mean	SD	t (df)	p
Age (months)	Control	80	66.18	3.03	0.985 (206)	.326
	Experimental	128	65.72	3.38		
Working Memory	Control	80	12,31	5.38	1.345(206)	.180
	Experimental	128	11.30	5.25		
Inhibitory Control	Control	80	11.45	1.73	1.155(206)	.249
	Experimental	128	11.17	1.67		
Executive Function	Control	80	23.76	6.08	1.486(206)	.139
	Experimental	128	22.46	6.13		
HISEI	Control	54	2.61	1.09	0.092 (173)	.927
	Experimental	121	2.59	1.05		
HISCED	Control	53	2.74	0.49	1.569 (173)	.119
	Experimental	122	2.61	0.51		
HOMEPOS	Control	49	5.65	2.59	-1.647 (173)	.102
	Experimental	108	6.34	2.35		
ESCS	Control	48	-0.05	0.91	-0.605 (173)	.546
	Experimental	108	0.04	0.91		
CtF	Control	80	19.69	5.93	-1.398 (206)	.164
	Experimental	128	20.86	5.86		
CtA	Control	80	9.31	7.26	-.388 (206)	.698
	Experimental	128	9.70	6.93		
CtM	Control	80	9.15	2.62	-0.474 (206)	.636
	Experimental	128	9.33	2.74		
HaL	Control	80	18.94	4.20	-1.663(206)	.098
	Experimental	128	19.96	4.35		
PrC	Control	80	32.47	6.78	1.215 (206)	.226
	Experimental	128	31.20	7.62		

Note. HISEI (Highest parental occupational status), HISCED (Highest education level of parents), HOMEPOS (Household Possessions), ESCS (Socio-economic and Cultural Index), CtF (Phonological Awareness), CtA (Alphabetic Knowledge), CtM (Metalinguistic Knowledge), HaL (Linguistic Skills), Prc (Cognitive Processes)

After establishing the equivalence of the groups, the mastery of pre-reading activities was compared in the two groups after the intervention,

which was the second specific objective. Thus, an analysis of covariance (ANCOVA) was performed for each factor. The dependent variable was always the trained skill, and the factor was always belonging to the CG or EG. The initial score obtained on the pretest was introduced as a covariate in each study. This design was chosen because, as stated above, it was not possible to completely randomize the students into experimental and control groups. In these cases, the recommendation is to include the initial score to control the differences in the initial variance (Johnson & Christensen, 2019). Table 5 shows the descriptive values on the posttest, the result of the ANCOVA for each skill studied, and their effect sizes (Cohen's d).

TABLE 5. Posttest descriptive statistics and ANCOVA

	Group						Effect Sizes Cohen's d
	Control		Exper.				
	Mean	SD	Mean	SD	F (df)	p	
CtF	23.94	5.38	33.57	4.39	27.135 (1,204)	.000	1.961***
CtA	11.59	7.12	14.7	6.93	10.780 (1,204)	.001	0.442*
CtM	10.61	2.83	13.87	1.53	27.756 (1,204)	.000	1.395***
HaL	21.16	3.39	24.89	3.04	12.254 (1,204)	.001	1.158***
PrC	37.28	4.35	40.21	3.02	13.751 (1,204)	.000	0.782**

Note. CtF (Phonological Awareness), CtA (Alphabetic Knowledge), CtM (Metalinguistic Knowledge), HaL (Linguistic Skills), PrC (Cognitive Processes).
* Small effect size <=.50, ** Medium effect size >.50 y <=.80,
*** Large effect size >.80

Third, we wanted to know the effect of other possible explanatory variables on the observed change, as well as the degree of variance explained by the intervention program. Multiple regression analysis was used to achieve this final objective. Each of the pre-reading skills analyzed

was used as the dependent variable in order to determine the weight of the variance explained by the intervention program (dichotomous variable) compared to the other possible explanatory variables included in the study: *Age, Sex, ESCS, and Executive function*. These last two variables were standardized before they were introduced. Likewise, given that the groups were theoretically non-equivalent because the participants were not randomized, the initial scores were also included in the regression model, as Theobald and Freeman (2014) proposed, to avoid possible biases in the initial samples. The final summary of the model is presented for each factor, as well as the coefficients for the proposed model.

TABLE 6. Hierarchical Regression CtF (Phonological Awareness)

	B	SE B	β	t(sig.)	R	R^2_c	Δ R²
Model 1					.686	.467	.471
Group	10.12	0.87	0.69	11.71*			
Model 2					.812	.654	.188
Group	9.01	0.71	0.61	12.744*			
Pretest	0.51	0.06	0.44	9.184*			
Model 3					.821	.668	.016
Group	9.01	0.69	0.61	12.997*			
Pretest	0.52	0.05	0.46	9.644*			
Sex	1.71	0.64	0.13	2.692*			

Note. * Significance <=.001

In relation to CtF (Table 6), the regression equation with three predictors is significant (F(3.152)=104.953, p<.000), with a *corrected R²* of .668. Belonging to the experimental group was the greatest predictor of this equation. In addition, the initial score on the factor was also quite relevant, as would be expected. Finally, the *Sex* of the student was also significant in the model because being male was related to a higher increase in the score. Another issue to consider is that age in months was not significant, although the age differences could have been reflected in the pretest without its influence varying throughout the intervention

program. Neither *ESCS* nor *Executive Function* entered the regression model.

TABLE 7. Hierarchical regression of CtA (Alphabetical Knowledge)

	B	SE B	β	t(sig.)	R	R2c c	Δ R2
Model 1					.829	.686	.688
Pretest	0.84	0.05	0.83	18.423*			
Model 2					.853	.724	.039
Pretest	0.84	0.04	0.82	19.520*			
Group	3.09	0.66	0.20	4.708*			

Note: * Significance <=.001

In the final CtA model (Table 7), the regression equation with two predictors is significant (F(2.153)=204.106, p<.000), with a *corrected R^2* of .724. In this case, the greatest predictor turned out to be the pretest score. This is logical when dealing with letter knowledge, which is a very small set whose possible increase has a clear ceiling effect. Even so, belonging to the experimental group explained a small amount of variance on the posttest. None of the other predictor variables entered the final proposed model.

In the final model with the CtM (Table 8), the regression equation with the greatest explained variance was the one with three predictors (F(3.152)=210.144, p<.000), with a *corrected R^2* of .557. Again, belonging to the experimental group was the greatest predictor in this equation. Other predictors were the score and the *Executive Functions*, given that a better score on CtM slightly, although significantly, influenced the posttest score.

TABLE 8. Hierarchical Regression of CtM (Metalinguistic Knowledge)

	B	SE B	β	t(sig.)	R	R2c	Δ R2
Model 1					.621	.382	.386
Group	3.60	0.37	0.62	9.830*			
Model 2					.728	.524	.144
Group	3.48	0.32	0.60	10.833*			
Pre-test	0.38	0.06	0.38	6.853*			
Model 3					.752	.557	.036
Group	3.50	0.31	0.61	11.307*			
Pretest	0.30	0.06	0.31	5.331*			
EF	0.54	0.15	0.20	3.557*			

Note. EF (Executive Function), * Significance <=.001

TABLE 9. Hierarchical Regression of the HaL (Linguistic Skills)

	B	SE B	β	t(sig.)	R	R^2_c	Δ R^2
Model 1					.693	.477	.480
Pretest	0.59	0.05	0.69	11.931*			
Model 2					.789	.617	.142
Pretest	0.54	0.04	0.63	12.491*			
Group	3.07	0.41	0.38	7.578*			

Note. * Significance <=.001

In the final model obtained for the HaL (Table 9), a regression equation with two predictors was obtained ($F_{(2.153)}=125.963$, p<.000), with a *corrected R^2* of .617. In this case, the greatest predictor also turned out to be the pretest score. Even so, belonging to the experimental group represents a significant increase in the variance explained on the posttest. None of the other variables analyzed entered the final model.

TABLE 10. Hierarchical Regression of the PrC (Cognitive Processes)

	B	SE B	β	t(sig.)	R	R^2_c	ΔR^2
Model 1					.533	.280	.284
Pretest	0.28	0.04	0.53	7.822			
Model 2					.668	.439	.162
Pretest	0.29	0.03	0.54	9.002			
Group	3.39	0.51	0.40	6.684			

Note. * Significance <=.001

Finally, in the analysis with the PrC factor (Table 10), we found a regression equation with two predictors (F(2.153)=61.611, p<.000), with a *corrected R^2* of .439. In this case, the greatest predictor was again the pretest score, followed by belonging to the experimental group. None of the other variables considered had sufficient weight to be significant in the final model. It is important to recall that a large part of the weight of these variables could already be reflected in the pretest score.

Conclusions

The first specific objective of this study was to elaborate a series of evidence-based activities that could be integrated into the Peruvian early childhood curriculum to develop pre-reading skills. The challenge was to create activities based on reading a series of texts previously established by the Ministry as part of the official program. This enrichment was necessary due to the absence of current evidence-based elements, in the original proposal, designed to stimulate the development of pre-reading skills (especially phonological awareness and alphabetic knowledge).

The design and implementation of these activities confirmed, first, that it is feasible to carry out these types of tasks in early childhood education classrooms without changing or contradicting what is established in the curriculum. This evidence provides the opportunity to use text-based activities to specifically intervene in pre-reading skills while maintaining the significance of the existing curriculum. Sometimes there is a gap between the current reading instruction and the socio-constructivist

perspective underlying the pedagogical renovation in early childhood education, progressively moving away from the text and focusing more on decoding (Sánchez & Santolaria, 2020). This study demonstrates the possibility of combining the two perspectives.

The second specific objective was to test the effectiveness of the proposal in developing pre-reading skills. The results showed that the experimental group improved significantly, compared to the control group, on all the skills targeted in the intervention. In addition, the regression analysis confirmed that the intervention explains most of the variance and is, along with the pretest score, the most relevant change factor of all the factors considered.

Thus, after performing activities related to the use of rhymes, sound games, or decomposition of sounds the phonological awareness improved more in the EG. This result is consistent with other phonological awareness intervention programs, that have been shown to be effective (Gutiérrez & Díez, 2017; Suárez, 2013). In our study, the significance of this result lies in the fact that it is possible to use text analysis to engage to identify and manipulate sounds.

The intervention in alphabetic knowledge also led to a significant improvement in the experimental group, but this skill was less sensitive to the intervention. This result could be due to the fact that, in this program, as in other previous programs (Alfonso et al., 2012), the name of the letters was not taught directly. Instead, based on the analysis of written material used in class (stories, cards, recipes), we tried to initiate the students in understanding the correspondence between the printed letter and the sound. Even so, the intervention was successful and resulted in greater learning than in the control group, without renouncing the principle of meaningfulness, which is so important in early reading.

Although the Peruvian curriculum contemplates involving children in reading situations, a more specific intervention was carried out. The results show that students in the experimental group were more aware of the nature of written language and its forms and functions. The tasks, which started with recognizing and interacting with written productions, allowed students to begin to realize that texts contain words and sentences, an issue that is not usually considered in the curricula but is fundamental in learning to read (Murphy et al., 2016). This experience reinforces the results of other intervention programs (Bedard et al., 2018; Nevo & Vaknin-Nusbaum, 2018), and it shows that it is not sufficient to

have contact with printed material because there is a need for intentional, systematic instruction oriented toward learning to read.

In addition, the Peruvian curriculum explicitly intervenes in the development of vocabulary, but in our proposal, the intervention also effectively addressed other linguistic sub-skills, such as grammatical structures and basic concepts as in other previous studies (e.g. Spencer et al., 2012). Although the curriculum was already oriented towards the development of these linguistic components, the use of these new activities reflects the need to enrich the tasks in order to enhance their development. Moreover, we should not forget that the level of oral language acquisition has a significant effect on the development of phonological awareness (Pasquarella et al., 2015).

In the case of cognitive processes, our material was designed to manipulate the written material. For example, the students had to differentiate between a letter or a number to improve their perceptual skills. Similarly, reading aloud productions such as rhymes or poems and asking them to learn them encouraged the retention of phrases, thus working on auditory sequential memory. Training these skills increased their development, as previous studies found (Romero et al. 2016). A possible explanation for the improvement in perceptual ability would be that the subtest that evaluates this skill consists of identifying graphic elements that are very similar to letters, an issue directly addressed in the activities.

This shows that these skills can be adequately taught through pedagogical actions using specific activities supported by scientific evidence, and that these tasks can be implemented by the teachers (González et al., 2013) and are most effective when working on various reading precursors (Romero et al., 2016).

Limitations and prospective

It remains to be seen whether and how improvements in these skills foster learning to read. It was difficult to propose this objective because students in Peru do not remain in the same school after finishing Early Childhood Education, and the number of participants to whom a reading test could be administered was not very representative. A new research proposal would be to find out if this method of including specific activities,

when working with literary texts, has an impact on the acquisition of the reading and on motivation to read.

This study shows that teachers can incorporate activities into their tasks that complement the curriculum. However, previous studies highlight deficient teacher preparation in the area of reading precursors (Meeks & Kemp, 2017), which suggests the need to train them to expand their knowledge about reading readiness, introducing updated content about pre-reading skills and their relationship with success in reading acquisition, without having to give up the principle of meaningfulness (Sánchez & Santolaria, 2020). In this regard, it would be especially relevant to consider when to start this training by investigating teachers' and student teachers' preconceptions about learning to read (Trigo et al., 2020).

Finally, to further facilitate success in beginning to read, a comprehensive intervention could be proposed during the entire school year, not only in literary activities (as in this experience), but also progressively and transversally addressing pre-reading skills within a meaningful context. Although this was a school-based intervention, we should not forget the importance of greater family involvement in creating a reading environment that supports classroom interventions (Gentaz et al., 2015).

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