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Facilitators of the learning process of writing in early ages

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Título: Facilitadores del proceso de aprendizaje de la escritura en las primeras edades.
Resumen: El estudio del aprendizaje de la escritura en las primeras edades ha sido objeto de numerosas investigaciones en los últimos años. Actualmente se sabe que en las lenguas de escritura alfabética como la nuestra, aprender a escribir requiere tanto del conocimiento alfabético como de la toma de conciencia de la estructura fonológica del habla, siendo el desarrollo del lenguaje oral una habilidad necesaria para el aprendizaje de la lengua escrita. Sin embargo, son escasos los trabajos que se han realizado con la finalidad de conocer las vinculaciones existentes entre estas habilidades y el aprendizaje inicial de la escritura. El propósito de este trabajo fue analizar si con programas que integren el fomento del lenguaje oral junto con el desarrollo de las habilidades de procesamiento fonológico y el conocimiento alfabético se favorece la eficacia del proceso de aprendizaje de la escritura. Se empleó un diseño cuasi-experimental de comparación entre grupos con medidas pretest y postest. En el estudio participaron 403 alumnos de diferentes centros públicos y concertados con edades comprendidas entre los 5 y los 6 años. Los resultados ponderan el valor potencial del programa y apoyan el desarrollo de modelos de enseñanza que facilitan el acceso al conocimiento alfabético desde nuevas perspectivas educativas en cuanto que se favorece el aprendizaje del sistema de la escritura.
Palabras clave: escritura; lenguaje oral; conocimiento alfabético; aprendizaje de la escritura; conciencia fonológica.

Abstract: The study of learning to write at an early age has been the subject of much research in recent years. We now know that in languages of alphabetic writing like ours, learning to write requires both alphabetical knowledge and the awareness of the phonological structure of speech, with the development of spoken language a necessary skill for learning written language. However, few studies have been conducted in order to understand the link between these skills and the initial learning to write. The purpose of this study was to examine whether programs that integrate the promotion of oral language along with the development of phonological processing skills and alphabetical knowledge favour effectiveness of the written learning process. A quasi-experimental comparison group design with pre-test and post-test measures was used. The study involved 403 students from different public and private schools aged between 5 and 6. The results weigh the potential value of the program and support the development of teaching models that provide access to alphabetic knowledge from new educational perspectives that facilitate the learning of the writing system.
Key words: writing; oral language; alphabet knowledge; learning to writing; phonological awareness.

Introduction

In recent decades, the study of the early literacy process has received special attention in the scientific field, with many studies being conducted in order to analyse the relationship between spoken language and the learning of written language. It has shown that school achievement depends on a range of knowledge and skills which begin to develop from early ages. Initial attempts of children to access the writing system underline the importance that the command of oral language has in learning the written code, especially in alphabetical systems like that of Spanish, in which writing represents the phonological structure of speech.

When children start learning the written language they need to know that our system of representation is based on the segmentation of the spoken chain and the lyrics are graphic symbols that correspond to the sound elements as each letter is associated with a unit of sound (Defior and Serrano, 2011). Therefore, they must be aware that there is a direct relationship between oral and written language. However, to understand the link between spellings and sounds is not an easy task as children hear a familiar word and directly activate meaning through sounds as if the sound form of the word does not exist. This difficulty resides in the spoken language since when the words are pronounced the sounds are articulated in groups.

The ability to become aware of the sound elements of words is called phonological awareness. The development of phonological awareness skills favours the relationship between the two languages (oral and written), which highlights the close relationship between learning the written language and the development of skills that lead to reflection and analysis on speech (Aguilar, Marchena, Navarro and Menacho, 2011; Suarez-Woodcock, García de Castro and Cuetos, 2013; Escotto, 2014; Feld, 2014; Gutiérrez and Díez (in press)).

Phonemic awareness has been one of the aspects most studied in the early ages in relation to the learning of the written language (Defior, 2008; Castejon, Gonzalez and Cuetos, 2011; González, Cuetos, Vilar and Uceira, 2015), refers to the ability to identify and manage units of spoken language. It is not a unitary phenomenon, but it can distinguish various levels of phonological awareness depending on the segmentation unit: lexical, syllabic, intrasyllabic and phonemic awareness. Of all these levels, there is now agreement that the handling of the smallest units of words and the ability to discover the sequence of phonemes that compose them, is the aspect that has more relationship with learning the written language in an alphabetic code such as Spanish, because the better identified the phonemes of a word are, the easier it will be to associate sounds with their corresponding grapheme (Defior and Serrano, 2011).

Numerous studies with children who speak different languages have shown that phonological awareness is the

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best predictor of learning to read (Guarneros and Vega, 2014), in the sense that preliterate children who get better marks on tasks of phonologic character are those who learn to read before. However, despite the importance phonological awareness presents in learning written language, there is a clear imbalance in favour of the number of studies designed for the study of reading compared with those which consider the implications that are present in the development of phonological awareness in learning to write (González, Cuetos, Vilar and Uceira, 2015), when curiously it has revealed that it presents greater importance in writing than in reading (Furnes and Samuelsson, 2011). Which is logical, because when writing it is necessary to segment speech into phonemes and each phoneme has to be transformed into its corresponding grapheme. This transformation is consistent in transparent orthographies like Spanish (Landerl and Wimmer, 2008; Verhagen, Aarnoutse and van Leeuwe, 2010). At the same time, learning to write favours the development of phonological awareness, so that when children learn to write they increase their ability to recognize the phonemes of words (Treiman, 1998).

Accordingly, and as a result of a significant body of research conducted in recent years, it is now known that learning written language in alphabetic systems like Spanish in which writing represents the phonological structure of speech, phonological development acquires a very important role (Guarneros and Vega, 2014; Suarez, 2014), however, language is constituted by a larger number of components: form (phonological and morphosyntactic), content (semantic) and use (pragmatic), which act and develop simultaneously in both oral and written language, and that is, to establish a comprehensive relationship between oral and written language the individual uses metalinguistic awareness, defined as the knowledge possessed about language in these levels (phonological, morphosyntactic, semantic and pragmatic) which are those that permit knowing, thinking and cognitively manipulating language (Diaz, 2006).

The knowledge of the names of the letters of the alphabet has also been investigated as an important component of the process of early literacy, showing that it is a factor of great importance in learning the written language (Bravo, Villalón and Orellana, 2006; Diuk and Ferroni, 2012) , which is logical since in an alphabetic system like ours the relationship between the names of the letters and the sounds facilitates the acquisition of the grapheme-phoneme correspondence. It has been found that it is one of the best predictors of learning the written language (Catts, Fey, Zhang and Tomblin, 2001; Schatsneider, Fletcher, Francis, Carlson and Foorman, 2004). Correlational studies have also found a strong relationship between the name and the sound of the letters and command of the written code (Stage and Wagner, 1992; Bravo, Villalón and Orellana, 2006).

Likewise, it has been shown that alphabetic knowledge favours the development of phonological skills, establishing a causal relationship between the knowledge of the names of the letters and learning the sounds of these (Share, 2004). It has also been established that the combination of phonological awareness and letter knowledge, are the most critical factors when acquiring written language (Sprugevica and Høien, 2003).

Early forms of writing have been the object of several studies showing that children write initially using a series of operations and knowledge that vary progressively with learning to more elaborate strategies (Ferreiro and Teberosky, 1979; Ferreiro, 2002).

Under the psychogenetic perspective it is clear that in the acquisition of the process of writing the child progresses through four stages: pre-syllabic, syllabic, syllabic-alphabetical, and alphabetical (Portilla and Teberosky, 2007; Portilla, Peró and Teberosky, 2009). In the *pre-syllabic* stage the learner uses an indistinct number of letters, there is no correspondence between the spelling and word sounds, in the *syllabic* stage the establishment of the relationship between the oral speech chain and the graphic chain used in writing starts, characterized in that each syllable of the word is represented by a letter, in the *syllabic-alphabetic* stage more than one letter is used to designate each syllable with other representations in which only one letter is used, finally in the *alphabetical* stage a relationship between phonemes and graphemes are set, using a letter to represent each sound.

At the beginning of the writing process are phonological processing skills, first, those that enable graphical representation of the words, but with practice the skills involved in coding become automatic creating orthographic representations that allow more direct access. Thus, when the learner is faced with writing words several times he/she begins to use the spelling pattern of their mental lexicon, allowing it to focus its resources on higher written production processes. That is to say, through the practice of writing, phonological processing skills become less indispensable while the skills involved in the direct lexical processing gain greater prominence. Therefore, it is of great importance that the skills involved in code writing are well developed from the start, because otherwise inadequate orthographic patterns can be acquired and these may originate difficulties in the process of coding words, as well as the production processes and written composition of pupils.

Consequently, in an alphabetic system like ours, one of the first requirements that children face when learning to write is to identify the letters in our alphabet and learn the sound corresponding to each of them (Cuetos 2009). But also, along with this learning the development of the different components of oral language and specifically phonemic awareness is required, in that through this learning, knowledge and awareness of the sound elements of the word is acquired. After learning the association between graphemes and phonemes these correspondence rules have to become automatic and know how to combine different words to write accurately to progressively develop more complex productions.

One problem with research established to test the relationship between phonological awareness and learning the

written language is that there are very few studies devoted to the study of writing, when it is clear that it is an even better predictor of learning to write than reading (Defior, 2008, Furnes and Samuelsson, 2011). In addition, we find very little research for the study of alphabetic knowledge when several authors consider that it is an even more important predictor that phonological awareness in the early years of formal education (Muter, Hulme, Snowling and Taylor, 1998).

The results of the programs of linguistic intervention indicate that these are more effective if the stimulation of oral language along with instruction in phonemic awareness is enhanced by establishing connections between phonemes and letters that represent them (Adams, Foorman, Lundberg and Beeler, 2003). However, despite these assertions there is no research in our language in which the effectiveness of programs that address the development of these factors in relation to learning to write is studied.

The aim of this study was to analyse the effect that the intervention in phonemic awareness along with the stimulation of oral language and knowledge of the letters has on learning to write, because despite the evidence presented by these factors (knowledge phonology, oral language and alphabet knowledge) in the process of written language acquisition, few studies aimed at analysing how these components exercised jointly can contribute to the successful learning of the writing system.

For this two samples of children aged 5 and 6 were compared in learning to write, one receives intervention in phonemic awareness, stimulation of oral language and learning the letters of our linguistic code and one that follows the traditional teaching program. Our hypothesis is that students belonging to the group being trained will achieve better performance in learning to write.

Method

Participants

In the study 403 students participated aged between 5 and 6 (M = 5.37, SD = 0.41), of which 47.3% were boys and 52.7% girls. These students belonged to four public and subsidized schools in the city of Alicante. Of these, two schools were assigned to the experimental group (205 students) and the other two to the control group (198 students). Of the 205 experimental participants, 45.8% male and 54.2% female, while the 198 participants in the control group, 48.1% were male and 51.9% are female. The contingency analysis (chi square test) between condition and sex showed no statistically significant differences ($X^2 = 0.53$, $p > .05$). They all shared the feature of being located in a mid-level socio-cultural context.

Design and procedure

The study used a quasi-experimental design of repeated measures pre-test-post-test with control group. Before and after implementing the intervention program a battery of three assessment instruments was applied to the experimental and control participants in order to measure the dependent variables on which it was hypothesized that the program would take effect: phonological awareness, oral language and learning processes of writing. The application of the battery of tests before and after applying the program was carried out by education professionals (hearing and language specialist teachers and psychologists) previously trained, facilitating consistency in data collection.

The initial assessment of students was conducted individually in areas next to regular classrooms in October and during school hours. Later the intervention program in the experimental groups was implemented (5 sessions of 45 minutes weekly), while the control groups followed the established language textbook. In the month of May, when the program had already been fully implemented, all students were assessed with the same tests. The study complied with the ethical values required in research with human beings (informed consent, the right to information, data protection, guarantees of confidentiality, non-discrimination, free and able to leave the program at any stage).

Evaluation instruments

In order to assess the dependent variables under study, three assessment instruments were used with psychometric guarantees of reliability and validity.

. *Test for the Evaluation of Phonological Awareness* (CEEC). This test evaluates two levels of phonological awareness (syllabic and phonemic), each of which consists of three different tasks: identification, addition and omission. It also takes into account the position of the syllable or phoneme with which you work: at the beginning, middle or end of the word. This test includes three subtests with syllables and phonemes (identification tasks, addition and omission), with a total of 30 items (15 syllables and 15 phonemes). The maximum score that can be obtained is 30; 1 point for each correct answer and 0 for each error. In the tasks of identifying syllables, for example, a drawing of a die, along with 5 other drawings is presented and the child told: "Look at these pictures. Tell me the name of each one. Point to the picture where you hear / da / ". In the task of omission of phonemes, for example, a drawing of a pudding is presented and the child is asked: "Look at this picture, think what it's called and tell me the name. Now, tell me the name of the drawing but removing the sound / f / ". In syllables and phonemes addition tasks a (white, yellow and red) card stock representing syllables and phonemes to be added are presented. Reliability estimated by Cronbach's alpha coefficient is .80.

. *Navarra Oral Language Test Revised* (PLON-R). For the evaluation of oral language PLON-R (2004) test was used, it is a standardized test designed for children between three and six years of age. Its application is individual and through its application it allows quick detection (screening)

of oral language development. It aims to analyse the different components of language form (phonology, morphology and syntax), content (semantics) and use (pragmatics), and to evaluate the three basic communicative functions: informative, regulatory or request and metalinguistic.

In component form the formal aspects of language, specifically phonology, morphology and syntax are valued.

. Phonology: the degree of articulatory domain of the different sounds of our linguistic code is analysed. It is performed by deferred imitation supported image.
. Morphology and syntax: suffixes and verbal morpheme variants having the lexicon and the type of sentences produced by children are analysed: single, coordinated subordinate ... To evaluate morphology we analyse if the child uses pronouns *his* and *with you* orally. While for the assessment of syntax we explore the oral production of temporary subordinate, causal, relative and conditional clauses. "Ana will go to play after tea. When is Ana going to play?"

In the component of content all aspects of the meaning of words both on a comprehensive and productive level were assessed: excluded, opposites, categories and definitions of words. In excluded the formation of categories is valued by recognizing an object that does not belong to the set in which it has been included. In opposites we analyse whether the child produces the opposite terms to some given words in categories taking into consideration the production of elements belonging to one of the categories that the child is acquiring, while in definition of words, the ability to define different types of words: nouns, verbs and adjectives is valued.

The component in use is valued through five types of activities: absurd, where the ability to reflect on the correct use of language as content and form is tested; understanding a metaphor, according to whether they understand the meaning of a simple metaphor; ordering and storytelling , assessing the capacity to order and tell a story of three sequences; understanding and adaptation, considering whether the child is able to verbally resolve two everyday situations, and finally, planning, evaluating the ability to verbally plan a known game.

The direct scores of each dimension are transformed into standard scores organized into three categories: "retard", "needs to improve" and "normal". The test also allows to obtain a total score on the development of language. This test has a Cronbach reliability coefficient of 0.87.

. *Proescri-Primary* (Evaluation Test of Cognitive Processes in Writing) (Artiles and Jimenez, 2007). To assess the degree of learning acquisition of writing, tests relating to the domain of lexical processes were used, which include tasks of: dictation of alphabet letters, creation of words, dictation of words, dictation of words subject to orthographic rules and dictation of pseudowords. The following explains each in detail:
. *Dictation of alphabet letters*: It consists of 21 items corresponding to the letters of our language. It identifies the knowledge of grapheme-phoneme rules of correspondence.
. *Generation of words*: It rates the ability to write words of different complexity from its visual image. It consists of 24 drawings and involves the knowledge of the different syllabic structure of our language.
. *Dictation of words*: This task comprises a total of 20 items where the student must write words that do not fit any spelling rule, which shows that the student is able to remember its lexical representation. The words have different lengths and familiarity.
. *Dictation of words subject to orthographic rules*: This task consists of 35 items and identifies the knowledge of basic spelling rules: capitalization in names, m before b and p ...
. *Dictation of pseudowords*: This task comprises a total of 20 items, characterized by presenting different length and syllabic positional frequency. The correct spelling of pseudowords indicate a good use of the phonological route and therefore appropriate learning of the grapheme-phoneme conversion process.

In each of these tests one point is awarded for each correct answer. According to the procedure Cronbach reliability coefficient it is .85.

Intervention program

The program to learn to write that was used consists of 90 sessions of 45 minutes. It aimed explicitly at developing phonological awareness, language stimulation and construction of the written word.

Phonemic awareness tasks worked with lexical segmentation, syllabic awareness and phonemic awareness by proposing playfulness through activities such as: segmentation, recognition, comparison, substitution, addition and omission of syllables and phonemes. For the development of lexical segmentation focused tasks were carried out: identify and classify words by length, divide sentences formed by different content words, divide compound sentences of several words of content and function, elaborate sentences from a series of words given and compose sentences given a set number of words. Syllabic awareness was worked using activities such as: recognition of the number of syllables in two syllable words, three-syllable, polysyllabic and monosyllabic, identify words in response to the initial and final syllable, substitute syllables in words, add and omit syllables in initial and final position. Phonemic awareness was exercised through focused tasks: recompose words from phonemic synthesis, identify words in response to the initial and final phoneme, replace, add and omit phonemes in words in different positions.

For language stimulation activities were carried out aimed at developing the different components of oral language: form, content and use. Phonological, morphological and syntactic component (form) were worked through exercises using onomatopoeia, naming images containing groups of phonemes with greater articulatory and perceptual similarities, completing sentences from a series of given words, forming sentences through a series of images, inventing stories and titles, joint creation of small narrative texts.

Regarding the semantic development (content) that was intended to enrich the lexical field, oriented recognition of elements in cards, photographs and drawings, word search in present and absent context from a series of slogans tasks were carried out, making lists of objects by semantic fields, identifying words in sentences and intrusive searches of synonyms and antonyms.

Communication skills (use) that were intended to promote the use of functional language were developed by tasks using expressions of feelings, wishes and opinions, explaining everyday events, daily newspapers, communicative situations of role playing and group expositions around certain centres of interest.

Learning the process of building the written word focused on strengthening the recognition of each letter on a multisensory level, enhancing the contrasts on a visual and auditory level with other spellings of similar characteristics, presenting the letters in groups to promote their discrimination attending to the proximity point and / or mode of articulation (b, t, d, p, f, z, s, k, j, g, l, r, d, n; ch, ll, and ñ; x, w , v, h) and in relation to their perceptual similarity exercising together, during each learning unit, learning situations with the same spellings that are studied in the phonemic awareness program. The situations of creating a text were focused on the manipulation of movable letters containing an image with each script allusive to their sound (eg. a snake in the "s", a motorcycle in the "r", ...). CV directly structured words were initially worked on and progressively other more complex VC, VCV, CVC, CCV words. The construction of a sentences was initiated gradually starting from the productions made in oral language and skills acquired in the phonological awareness tasks: lexical segmentation, syllabic and phonemic awareness.

Results

In order to analyse the change in the variables under study, descriptive analysis (means and standard deviations) with scores on tests administered in the pre-test phase, post-test and the post-test-pre-test differences were made, as well as analysis of variance with pre-test scores (MANOVAs, ANOVA) and analysis of covariance (MANCOVAs, ANCOVAs) pre-test-post-test of differences in experimental and control variables measured before and after the intervention. These analyses were performed with SPSS 19.0 program. Pre-test MANOVA results for all variables showed that before the intervention there were no significant differences between experimental and control groups, $F(1, 118) = 1.04$, $p > .05$. However, the results of MANCOVA of the differences post-test-pre-test, using the pre-test scores as covariates were significant $F(1, 118)= 4.06$, $p < .05$. These data show that the intervention program had a significant effect. To analyse the change in each variable, descriptive and variance analysis were performed, presented in Table 1.

Changes in phonological awareness

In order to analyse the effectiveness of the program in the development of phonological awareness, the changes in scores were studied on the PECO test. The pre-test MANOVA showed no significant differences between experimental and control groups, $F(1, 118) = 2.97$, $p > .05$, however, the results of pre-test-post-test MANCOVA, $F (1, 118) = 1.76$, $p < .05$, confirmed significant differences between the two conditions. Nevertheless, analysis of each variable independently only confirmed differences in phonemic awareness, in which a further increase was observed in the experimental group ($M = 1.63$) than in the control group ($M = .88$), and ANCOVA post-test-pre-test highlighted statistically significant differences between conditions, $F (1, 118) = 14.73$, $p < .001$. This highlights an improvement in the ability to become aware of the minimal units of the words attributed to the intervention program.

Changes in oral language development

In order to assess the impact of the program on oral language, we analysed the changes in scores on the PLON-R test. The pre-test MANOVA conducted with all three measured variables (form, content and use) showed no significant differences in the pre-test phase between experimental and control groups, $F (1, 118) = 2.25$, $p > .05$. However, significant differences were found in the post-test-pre-test MANOVA, $F (1, 118) = 5.46$, $p < .01$, as in the MANCOVA post-test-pre-test, $F (1, 118) = 6.24$, $p < .01$. As can be seen in Table 1, in the form variable, the experimental sample obtained an increase ($M = 0.53$), higher than that obtained by the control group ($M = 12$). The results of the pre-test ANOVA revealed no significant differences between experimental and control groups, $F (1, 118) = .033$, $p > .05$ at this stage. However, data from ANCOVA post-test-pre-test differences showed significant results, $F(1, 118) = 16.02$, $p < .001$. In the variable content a higher increase in experimental group can be found ($M = 1.12$) compared to the control group ($M = .50$). The results of the pre-test ANOVA showed a priori no significant differences between the two conditions, $F (1, 118) = .825$, $p < .05$, performing an ANCOVA with pre-test-post-test differences that indicated significant differences, $F (1, 118) = 20.32$, $p < .001$. As in the previous two variables, in the case of use, the experimental group also exceeds the mean difference post-test-pre-test ($M = 1.03$) of the control subjects ($M = .50$). The pre-test ANOVA showed that before starting the interven-

tion there were no significant differences between experimental and control groups F (1, 118) = .33, p > .01, via an ANCOVA pre-test-post-test significant differences were also indicated, F (1, 118) = 18.76, p < .001. These data highlight a significant improvement in the development of oral language attributable to the intervention program, as evidenced by the significant increase in form, content and use components.

Changes in cognitive processes of writing

To assess whether the program was effective in the development of cognitive processes involved in learning to write, changes in scores achieved in the PROESCRI Primary Test were analysed. The pre-test MANOVA performed for the set of variables of the test showed that there were no significant differences in the pre-test phase between experimental and control groups, F (1, 118) = 2.45, p > 0.05. However, significant differences were found in the post-test-pre-test MANOVA, F (1, 118) = 3.47, p < .01, as in the MANCOVA post-test-pre-test, F (1, 118) = 4.34, p < 0.01. As shown in Table 1, in the variable *generate words*, the experimental group improved (M = .55), greater than that achieved by the control group (M = .15). The results of the pre-test ANOVA revealed no significant differences between experimental and control groups, F (1, 118) = .025, p > .05 at this stage. However, data from ANCOVA post-test-pre-test results indicated significant differences, F(1, 118)=10.07, p < .01. In the variable *writing words with different lengths and familiarity* higher increases are detected in the experimental mode (M = .67) compared to the control group (M = .08). There was also a significant improvement in *writing arbitrary spelling words*, F (1, 118) = 18.38, p < .001, with higher increases in the experimental group (M = .92) than in the control group (M = .27), and as in writing *pseudowords*, F (1, 118) = 14.72, p < .001, with a greater increase in the experimental group (M = .92) than those from the control group (M = .28). These data show improved learning of writing attributable to the intervention program implemented.

Table 1. Means and standard deviations in oral language, phonological awareness and writing letters, words and non-words, and results of analysis of variance and covariance for the experimental and control groups.

	Experimental Group (n = 205)						Control Group (n = 198)						Experimental – Control (n = 403)		
	Pre		Post		Post-Pre		Pre		Post		Post-Pr		Anova	Ancova	
													Pre-test	Post-test-Pre-test	Post-test-Pretest
Variables	*M*	*DT*	*M*	*DT*	*M*	*DT*	*M*	*DT*	*M*	*DT*	*M*	*DT*	*F (1, 118)*	*F (1, 118)*	*F (1, 118)*
PLON-R															
Form	1.48	.50	2.02	.56	.53	.65	1.50	.50	1.62	.66	.12	.55	.033	14.25***	16.02***
Content	1.45	.50	2.57	.56	1.12	.64	1.53	.50	2.03	.92	.50	.81	.825	21.30***	20.32***
Use	1.47	.50	2.50	.56	1.03	.78	1.45	.50	1.95	.85	.50	.67	.033	16.02***	18.76***
PECO															
C. Syllabic	2.95	.87	3.90	.79	.95	.79	3.02	.91	3.80	.95	.78	.86	.168	.678	.50
C. Phonemic	2.45	.76	4.08	.86	1.63	.95	2.55	.83	3.43	.89	.88	.71	.468	15.07***	14.73***
PROESCRI															
Writing letters	1.90	.73	2.67	.47	.77	.90	2.02	.53	2.65	.48	.63	.75	.996	.761	.008
Generate words	1.58	.64	2.13	.36	.55	.87	1.57	.50	1.72	.66	.15	.84	.025	4.78*	10.07**
Writing words 1	1.55	.56	2.22	.88	.67	.86	1.62	.66	1.70	.49	.08	.67	.349	11.16**	15.28**
Writing words 2	1.55	.50	2.47	.81	.92	.94	1.60	.61	1.87	.76	.27	.82	.238	16.20***	18.38***
Writing pseudowords	1.37	.61	2.28	.66	.92	.86	1.52	.50	1.80	.68	.28	.73	2.15	15.30***	14.72***

** p<.05; **p<.01; ***<.0*

Influence of gender on program effects

In order to explore whether the program had a differential effect regarding sex, that is to say, if it was more beneficial to boys or girls, or if the change brought about by the program was similar in both sexes, descriptive analyses were performed (mean and standard) deviations and variance (ANOVA, ANCOVAs) in the pre-test and post-test phase-pre-test differences in gender. The results are shown in Table 2. Regarding the development of oral language, neither the MANCOVA post-test-pre-test, F (1, 81) = 2.24, p > .05, nor the pre-test-post-test ANCOVAs (see Table 2) showed significant differences in gender. In phonological skills on making syllabic and phonemic awareness, neither the pre-test-post-test MANCOVA F (1, 81) = 1.34, p > .05, nor the pre-test-post-test ANCOVAs showed significant differences. Similarly, with respect to the variables related to the processes of writing neither the MANCOVA post-test-pre-test F (1, 81) = 3.04, p > .05, nor the pre-test-post-test ANCOVAs evidenced differences. Consequently, none of the variables studied showed differential effects of the program based on gender.

Table 2. Means and standard deviations of experimental participants in oral language, phonological awareness and writing letters, words and non-words in gender, in the pre-test phase and the post-test-pre-test difference.

	Experimental Group Pre-test				Experimental Group Post-test-Pre-test				ANOVA ANCOVA		
	Boys (*n*=93)		Girls (*n*=112)		Boys (*n*=93)		Girls (*n*=112)		Pre-test	Post-test-Pre-test	Post-test-Pre-test
Variables	*M*	*DT*	*M*	*DT*	*M*	*DT*	*M*	*DT*	*F (1, 81)*	*F (1, 81)*	*F (1, 81)*
PLON-R											
Form	1.36	.48	1.62	.48	.39	.67	.26	.60	6.05	1.203	.003
Content	1.46	.50	1.52	.50	.85	.88	.77	.69	.532	.282	.111
Use	1.42	.49	1.49	.50	.75	.73	.79	.81	.553	.84	.318
PECO											
C. Syllabic	2.98	.82	2.98	.95	.85	.94	.89	.73	.063	.035	.481
C. Phonemic	2.58	.91	2.43	.67	1.14	.85	1.38	.98	1.058	1.401	.816
PROESCRI											
Writing letters	1.97	.64	1.95	.64	.69	.79	.70	.88	.064	.004	.005
Generating words	1.58	.56	1.57	.59	.27	.74	.43	.82	.067	.694	1.228
Writing words1	1.56	.62	1.61	.61	.37	.63	.38	.95	.175	.001	.147
Writing words2	1.59	.56	1.56	.56	.58	.98	.61	.90	.122	.031	.056
Writing pseudowords	1.41	.52	1.48	.59	.63	.9	.57	.92	.445	.096	.026

* $p<.05$; ** $p<.01$; *** $p<.001$

Discussion and conclusions

The aim of this study was to test the effect that the joint intervention in phonological awareness, oral stimulation of language and alphabet knowledge learning presented in writing. The results obtained show that instruction in these skills improved the acquisition of the process of writing very significantly.

We have found that the implemented program helped to increase the development of the different components of oral language (form, content and use), a fact highlighted as there are numerous studies indicating that written language is based on the domain of spoken language (Defior 2008; Ouellette and Haley, 2013; Guarneros and Vega, 2014), so that the higher the oral language level, the easier it will be to access the segmental units of spoken language and association of the phoneme-grapheme correspondence processes.

Similarly, the results found in this study are consistent with others that evidenced the relationship between learning of writing and phonological awareness (Defior, 2008; Nunez and Santamaría, 2014). Even though, we have to consider that phonological awareness is an entity composed of different levels, which have varying degrees of complexity according to the linguistic unit that is involved. Our study has shown this importance, finding significant differences in the importance of developing phonemic awareness regarding learning to write, not so in the case of syllabic awareness. Information coincides with other research in which it is affirmed that the handling of the smallest units of words and the ability to discover the sequence of phonemes that compose them, is the aspect that presents greater relationship with learning the written language in an alphabetical code like Spanish, in which different sound forms are represented by different letters, and the same sound forms are represented with the same letters (Porta, 2012; Feld, 2014).

In relation to the learning processes of writing, the data indicate that although there is no difference in the acquisition of the alphabetic knowledge, the intervention program did contribute relevantly to the improvement of the different variables involved in the writing of words. There were significant improvements in the ability to generate words, write words of different length and familiarity, write words without spelling errors and write pseudowords correctly, indicating that the students participating in the program achieved an improvement in both the phonological processing, like spelling, that allows them access to the representation of words quickly and accurately. Consequently, the program developed allows a domain of phonological skills that are necessary for beginner writers, which in turn enable the development of orthographic skills that are associated with rapid orthographic processing.

This progress is explained by the automation of the rules of phoneme-grapheme correspondence (which are those that allow you to write any combination of letters accurately) together with the development of oral language and the ability to analyse and manage the phonemic units of words. This fact reflects that when children learn to write they recognize the phonemes of the words of oral language and phonological awareness is enriched by writing through the alphabet knowledge. So that the further development of these three components have (oral language, phonological awareness and alphabet knowledge) the faster and more effective learning to write will be. In addition, another factor that may be influencing this achievement is the fact that when the child acquires knowledge of written language and starts using it, this knowledge is reflected in the development of spoken language (Guarneros and Vega, 2014), leading to a constant enrichment of the learning process of writing.

The results obtained in this study show the positive effects of the program and point in the same direction as those obtained in other studies that indicate that intervention in oral language skills contribute to the acquisition of written language (Porta, 2012; Suarez -Coalla, García de Castro and Cuetos, 2013; Nunez and Santamaría, 2014). Even

though most previous studies have addressed the learning of reading, there are still very few which have specifically focused on the acquisition of learning to write (González, Cuetos, Vilar and Uceira, 2015).

In short, the relationships found between language skills and the learning process of writing show that the whole development of phonological awareness, oral language and alphabet knowledge significantly favours the acquisition of the writing system.

In summary, this work contributes to facilitating the learning processes of writing, allowing the design and implementation of educational activities specific to the skills that have been identified as relevant, recommending the design of intervention programs aimed at students who begin compulsory schooling in order to foster learning the writing system. It would also be of interest in future research to consider the influence of these variables on high-level processes, such as planning, organization and revision of written composition.

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