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"Another child wrote it like that". Educational aid and results of invented spelling activities[1]

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Abstract

Introduction. Invented spelling consists of learning activities presented to preschool children to encourage them to write words or sentences, the best they are able to, in order to involve them in thinking about the relationship between oral and written language. The aim of this study was to analyse the implementation and the results of this type of activities in preschool education, and particularly to record the main instructional strategies linked to interaction and educational support.

Methodology. 119 Portuguese children with no formal instruction in literacy were selected. Children were randomly divided into two groups: an experimental group (that participated in 10 invented spelling sessions in small groups, lasting for 15-20 minutes each) and a control group (that took part in storytelling activities of a similar length). In order to ensure the groups' homogeneity, all children were assessed for their cognitive abilities, alphabet knowledge and phonological awareness. All

children completed two types of tests (word reading and writing) before and after the instructional intervention. A parallel observational study of the interaction process and the type of support offered to the experimental group was also carried out in six of the invented spelling sessions.

Results and conclusions. Results show significant progress in the experimental condition for both reading and writing, whereas no significant differences were found in the control group. The analysis of verbal interaction during the invented spelling activities also reveals a highly scaffolded learning process based on joint writing and joint corrections strategies, as well as control transfer strategies that could explain their efficiency. To conclude, these findings and their implications for future research are discussed.

Key-words: Invented spelling, Literacy, Scaffolding, Early Education, Learning.

Resumen

Introducción. La escritura inventada consiste básicamente en actividades de aprendizaje en las que se propone a niños aprendices de lector/escritor que escriban, como sean capaces, palabras o frases, involucrándoles en una reflexión sobre las relaciones entre lo oral y lo escrito. La finalidad de este estudio era examinar el proceso y los resultados de este tipo de actividades en la Educación Infantil. En particular, se pretendía documentar las principales estrategias instruccionales, relacionadas con la interacción y la ayuda educativa.

Metodología. Para ello se seleccionaron 119 niños portugueses que no habían recibido todavía una enseñanza formal de la lectoescritura. Los sujetos fueron distribuidos aleatoriamente en un grupo experimental (que participó en 10 sesiones de 15-20 minutos de escritura inventada en pequeño grupo) y otro de control (que participó en actividades de lectura de cuentos de una duración similar). Para garantizar la homogeneidad de los grupos se evaluó individualmente las habilidades cognitivas, el conocimiento del alfabeto y la conciencia fonológica. Todos los niños realizaron dos pruebas de lectura y escritura de palabras, antes y después de la intervención. Paralelamente, se realizó un estudio observacional del proceso de interacción y las ayudas proporcionadas a los niños de la condición experimental durante 6 de las sesiones de escritura inventada.

Resultados y conclusiones. Los resultados mostraron mejoras significativas tanto en la lectura como en la escritura de palabras de la condición experimental, mientras que en la de control no se encontraron diferencias significativas. El análisis de la interacción verbal durante las actividades de escritura inventada revela, por otra parte, un proceso de aprendizaje muy "andamiado", basado en ciertas estrategias de escritura y corrección conjunta así como de traspaso de control, que podrían explicar su eficacia. Finalmente, se discuten estas conclusiones y sus implicaciones para futuras investigaciones.

Palabras-clave: Escritura inventada, Lectoescritura, Andamiaje, Educación Infantil, Aprendizaje.

Introduction

Studies on literacy *scaffolding²* have been the focus of many researches aiming at understanding which strategies teachers use when helping their pupils to read and write (van de Pol, Volman & Beishuizen, 2010) and, particularly, which strategies are more effective in facilitating early literacy skills learning (Pentimonti & Justice, 2010). A quite extended alternative in promoting this skill in preschool is the development of *invented spelling* activities (Alves Martins, Salvador, Albuquerque & Silva, 2016; Hofslundsengen, Hagtvet & Gustafsson, 2016; Ouellette, Sénéchal & Haley, 2013; Sénéchal, Ouellette, Pagan & Lever, 2012).

The concept of invented spelling was initially introduced by Read (1971; 1975) and by Chomsky (1971), who pointed out the way children spell prior to getting a formal reading and writing instruction. These authors showed that these early spelling forms are nor merely arbitrary, and that they allow us to understand the evolution of child knowledge on how oral language is represented in spelling.

Ferreiro and Teberosky (1979) and Ferreiro (1988) also studied in detail the evolution of these early spelling processes, showing that in the beginning children write letters or sets of letters to represent various words or sentences, without a consistent relationship between oral language and spelling: they use a minimum number of letters to write different words (quite often the letters of their own names), introducing letter sequence variations. In a subsequent evolution stage children not only develop the notion that oral words are composed by different sound components, but also begin to take into account that each component matches a specific letter, and that such letter stands for a sound feature of that segment.

During these invented spelling activities implemented in preschool, children were told to write down – the best they could or were able to – words or sentences, leading them to think about the relationship between what is said and what is written. Those early spelling practices may be seen as problem solving activities in which children actively explore the

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(2) This concept was initially adopted by Wood, Bruner and Ross (1976) as a metaphor to explain the role adults play in problem solving tasks. The aim of scaffolding is to expand the growth of mental strategies in children until they are able to execute those tasks autonomously. Mediation forms will change according to each child's level, kind of task and context (van de Pol et al, 2010), enabling the progressive support withdrawal and internalisation of the required procedures (Cole, 2006).

written code, using their knowledge about the nature of spelling (Tolchinsky, 2005). Since they engage in an explicit reflexion about the words' oral segments and their corresponding letters, such activities not only promote the development of phonological awareness, but also the connexion between graphic and phonological representations and the understanding of the alphabetical principle (Adams, 1998; Mann, 1993; Richgels, 1995; Treiman, 1998). Its influence upon literacy early development (namely in spelling, phonemic awareness and reading results) has therefore been proved in languages with different levels of transparency.

Invented spelling shows there is a direct link to the development of phonological awareness, and that it is stronger than in other word analysis and matching activities (Márquez, 2003). The paramount relevance of phonological awareness in learning literacy, may somehow explain the potentiality of invented spelling for educational practices not just in Spanish (Rueda, Sánchez & González, 1990), but also in other less transparent languages (as Portuguese, French or English).

Canada has implemented various experimental intervention programmes with English-speaking children that included invented spelling activities. These studies were made with preschool children (Ouellette & Sénéchal, 2008b), with at-risk preschool children (Sénéchal, Ouellette, Pagan, & Lever, 2012) and with children from mainstream preschool education that included exposure to literacy activities (Ouellette, Sénéchal & Haley, 2013). In this last study authors also found there were positive effects upon reading on the longer term.

Several experimental studies were carried out in Portuguese to assess the impact of invented spelling activities individually implemented in the development of early literacy skills in preschool children (Alves Martins & Silva, 2006; Alves Martins, Albuquerque, Salvador & Silva, 2013; Silva & Alves Martins, 2002; Silva, Almeida & Alves Martins, 2010; Silva & Almeida, 2015). The intervention was quite effective, particularly in the learning of orthographic and phonemic awareness, as well as in early reading. As far as works by Alves Martins *et al.* (2006) and the two by Silva *et al.* are concerned (2002, 2010), *scaffolding* was based upon the following strategies: after spelling a word, each child was shown the spelling of that same word at a higher level than what he/she was able to produce (Alves Martins *et al.*, 2013) and, with the support of the adult, he/she was encouraged to analyse the differences between those two

forms. Moreover, in order to facilitate using those letters, in the first sessions the initial syllable of both words would match either the name or the sound of the correspondent letters.

Finally, several experiments have shown that invented spelling activities – in groups of preschool children in different languages – facilitate the learning of reading and spelling. However, we have just documented the support strategies used by adults to mediate interactions with the children.

Unlike other explicit literacy teaching activities, a fundamental aspect of invented spelling is that it presents itself as a "situation in which both children and adults intervene to promoting *scaffolding*" (Teberosky, 1989, p. 170). The wider the repertoire of *scaffolding* strategies is, the better quality the support will have (Pentimonti & Justice, 2010). Since invented spelling activities may be carried out by preschool teachers in co-operative work group contexts (and not only through individual work), it is crucial to carry out a thorough assessment of the support strategies occurring during group discussions in order to study the mediation role played by the adult, and thus reach more effective interaction dynamics in early literacy learning.

Within this framework, this study has two goals:

■ To assess the impact of an intervention programme, based on invented spelling activities in small groups, in the evolution of spelling and writing in preschool children. Our hypothesis was that children who participated in this experiment would be better than the ones who belonged to the control group (comparing a pre-test and a post-test).
■ To describe and analyse strategies and support given by the adult to mediate the intervention with the children during invented spelling activities.

Method

Participants

Participants included 119 five-year old Portuguese-speaking children (56 girls and 63 boys), enrolled in 6 preschool classes, from various socio-economic backgrounds living in the Lisbon area. We collected information about their families' education level: the mothers had an average school

attendance of 12.25 years (SD=2.6) and the fathers of 12.21 years (SD=2.10).

Since in Portugal formal reading and spelling teaching only begins at primary school, no regular alphabetisation activities were made in class, except for storytelling and some phonological tasks.

Design

The research was based on a double design: experimental and descriptive. To control the effect of possible external variables deriving from previous literacy learning experiences, children from each group-classroom were divided randomly into two conditions: experimental and control. The experimental group included 52 children – with an average age of 65.6 months (SD=3.13) who took part in an invented spelling programme. To corroborate the equivalence of both conditions, all children were assessed in terms of cognitive abilities, phonological awareness, and knowledge of letters. To assess their initial skills, they also took individual spelling and reading tests. They also took those tests once the intervention programme was over.

Simultaneously it was also carried out an observational study on the interaction process and the support given to children of the experimental group during the whole sequence of invented spelling activities.

Measures

Letters

To assess their knowledge of the alphabet, children were handed a set of cards with capital letters. They were asked to say their names and sound of each letter. Every correct answer got one point. The total score could therefore range from 0 to 23 (the letters K, Y and W were not considered because they seldom appear in Portuguese words).

Cognitive abilities

Cognitive abilities were assessed according to the *Raven's Progressive Matrices Test* (Raven, Raven, & Court, 1998). Scores ranged from 0 to 36 points (one point for each correct answer).

Phonological awareness

Two phonological awareness assessment tests by Silva (2002) were administered: initial syllable and initial phoneme classification. In these tests children should match pictures and words according to the coincidence of their first syllable or phoneme. Each correct answer got one point, and scores ranged from 0 to 14 for each test.

Spelling pre-test and post-test

In spelling tests each child was asked to write a list of 18 bi-syllabic and 2 monosyllabic words the best they could (without any help from the adults). Words were presented randomly. Those words were different from the ones used in the invented spelling programme and had syllabic structures often used in Portuguese. Each correct phoneme-grapheme correspondence was given one point, and the maximum score could be 68 points. The number of correct words was also accounted for and was also given one point, so the maximum score would be 20.

Reading pre-test and post-test

In reading tests, each child was asked to read out loud the same 20 words that had been used in the spelling tests. Words were presented randomly. No feedback was given. The children's readings were recorded and transcribed. Just like it was done for the spelling tests, there were two types of scores: number of correctly decoded graphemes and number of words correctly read.

Support

Finally, the support messages verbalised by the teachers during the intervention with the experimental group, in a sample of 6 invented spelling sessions, were classified and quantified.

Procedure

Initial assessment

Two educational psychologists that did not know the children administered the individual tests for the assessment of alphabet

knowledge and phonological awareness for approximately 15 minutes. After a short break, they administered the Raven's Progressive Matrices Test for approximately another 15 minutes. Reading and spelling initial assessment tests (pre-test) were administered some days later, for approximately 12 minutes each.

Control group activities

Control group children took part in 10 storytelling sessions in small groups of 4 children, for 15 minutes each. First the adult would read the story, and would pause to re-read and comment some words. The children would later make a drawing of the story.

Experimental group activities: invented spelling programme

Invented spelling activities, in small groups of 4 children under the mediation of an adult, took place twice a week for 5 weeks. The adult/mediator role was played by the researchers themselves. Each session lasted for 15/20 minutes. Activities were designed to help the children to correctly use conventional letters in spelling different words. In each session, the adult would ask the children to think about four words, to discuss the best way to spell them, and finally to tell the adult which letter he/she would have to write down. Children should reach an agreement. They were invited to present their standpoint and to justify the reasons for their choice. Once the initial spelling of each word was finished, they were shown the same word correctly spelled – spelled by a hypothetic child from another school – and asked to compare both spelling.

Analysis of the interaction process during the activities: support

The 10 invented spelling sessions held by 2 groups (from 2 different classes), randomly chosen among the 13 experimental groups, were fully recorded by digital video camera. The initial sessions (session 1), the middle (session 5), and the last (session 10) were then transcribed. The goal was to analyse the verbal support recorded during such invented spelling activities, in both quantitative and qualitative terms. Each session was divided in 4 tasks or interaction episodes, during which – for approximately 5 minutes – the teachers would introduce a new word to be written (see transcription of one of these episodes in the Annex).

Firstly, transcripts from each episode were segmented into support messages. Messages are functional units of information with enunciation context full meaning, and therefore may not be decomposed into more elementary units with loosing their communicative potential in such context (Coll, Onrubia & Mauri, 2008).

Secondly, we have categorised each support message given by the teachers. To create the category system, we have used a previous proposition specifically designed to assess the dialogic interactions, typical of teaching activities in small groups (García & Montanero, 2004; Montanero & García, 2005). During the analysis process of the first transcripts, we have noticed some discrepancies among the observers. The category system was therefore slightly adapted so we could characterise some specific support given for spelling learning activities. The table below shows each resulting category.

According to the "transactionality" of the learning activity viewpoint (Berkowitz & Gibbs, 1983; Teasley, 1997), the three first general categories (Management, Instruction and Questioning) encompass a mediation focused on *eliciting* the interlocutor thoughts or actions; the following three (Signalisation, Elaboration and Doubt) imply the *representation* or exteriorisation of the speaker's ideas, while the last two (Valuation and Re-elaboration), encompass a higher level of *integration*, since meanings are verbalised explicitly linked them to the previous ones, either showing agreement, or changing them, increasing them or summarising them.

After a training process, two researchers separately categorised the messages from one of the first episodes, and reached a high level of agreement (Kappa statistic=0.94; p<0.001). Scarce discrepancies were solved by agreement.

TABLE I. System of educational support categories in learning in small groups.

Support (categories)		Definition
1. Management	1. Space-time	Requests to use space, material, time distributions, etc.
	2. Participation/co-operation	Requests to intervene or help, involvement in the activity, admonishment, etc.
2. Instruction	3. Planning	Orientations about task self-regulation aspects as, for instance, how to identify a relevant information, how to represent a problem's data, how to ascertain the result, etc.
	4. Focus	Imperative actions leading the attention to some task's specific aspect or data.
	5. Operation	Precise indications on the steps or decisions that mechanically solve the task, or part of the task, or its final solution.
3. Questioning	6. Inference-evocation	Questions asked to facilitate an inference (either conceptual or procedural) directly deriving from the information given over the task, to recover a previous knowledge, or to assess comprehension.
	7. Question	Questions asked so that the interlocutor expresses a doubt or his agreement with an idea.
	8. Clarification	Requests to clarify, elaborate, summarise, justify or give an example of an idea.
4. Signalisation	9. Task-action	Verbal explanation of the goal, task, or request.
	10. Record-representation	Explanation of the data formulation, scheme, or graphic representation. Record or explanation (without just reformulation) of available data or information in the task's formulation or completion.
5. Elaboration	11. Conceptual	Verbal enunciation of one or more ideas, encompassing a significant change or increase of the available information. Re-elaboration (reformulation, justification, synthesis or exemplification) of a previously expressed idea.
	12. Procedural	Enunciation of strategies, operations or decisions to complete the task (may include partial or final results). Example (or modelling) of how to complete a task.
6. Doubt	13. Accurate	Enunciation of a specific doubt about the task.
	14. Inaccurate	Expression of non-understanding or specific doubt about the task.
7. Valuation	15. Agreement	Positive valuations of consensus or appraisal of the interlocutor's exteriorisation.
	16. No agreement	Valuations of non-agreement, discrepancy, or explicit disagreement with an idea expressed by the interlocutor.
8. Re-elaboration	17. Correction	Proposition of an alternative or of modifying the interlocutor's idea or answer.
	18. Precision	Justification, increase, or reformulation (either explicative or revised) in other words of an idea expressed by the interlocutor, that supposedly he is thinking of (reflexion).
	19. Example	Example, illustration, or analogy of an idea expressed by the interlocutor.
	20. Synthesis	Recapitulation of the ideas expressed by the interlocutor.

Source: adapted from García and Montanero, 2004

Final assessment

The final assessment tests in word spelling and reading (post-test) were administered by the same evaluators after the intervention. Each test took approximately 12 minutes.

Results

Aiming at confirming the equivalence between the two conditions – experimental and control – we have administered the t test, taking the group (experimental and control) as an independent variable, and the age (in January), the number of known letters, cognitive abilities and phonological awareness as dependent variables. Table 2 shows the means and standard deviations of those two conditions under those variables.

TABLE II. Characterisation of the experimental (EC) and control (CC) conditions according to age, number of known letters, syllabic and phonemic awareness level, as well as cognitive abilities.

	Age (in months)		Letters		Syllabic awareness		Phonemic awareness		Cognitive abilities	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
EC (n=60)	65.68	3.13	16.73	4.00	4.97	3.58	3.03	2.31	16.13	4.36
CC (n=59)	66.44	3.72	16.14	4.05	5.51	3.62	3.54	2.37	16.19	4.38

Source: the authors

No significant differences were found between both conditions (p>0,50 in all cases). They may therefore be considered equivalent.

Spelling

The results of the spelling tests may be found in Table III.

TABLE III. Means and standard deviations of the number of letters and words correctly spelt in the pre-test and post-test in the experimental (EC) and control (CC) conditions.

	Number of letters				Number of words			
	Pre-test		Post-test		Pre-test		Post-test	
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**
EC (n=60)	17.22	12.38	49.58	13.79	.37	.92	8.00	6.74
CC (n=59)	14.29	11.41	16.36	14.52	.29	.95	.69	2.25

Source: the authors

The repeated measures ANOVA (taking into consideration the condition as independent variable, and the number of letters correctly spelt in the pre and post-tests as dependent variable) has shown a significant statistic interaction between the independent and the dependent variable ($F(1,117)=209.06$; $p<0.001$; $\eta p^2=0.64$). Table 3 demonstrates how children from the experimental condition had clearly improved their spelling skills, while those from the control condition had just recorded some small increments in their scores. The results for the analysis of variance were very similar in terms of words correctly spelt ($F(1,117)=71.50$; $p<0.001$; $\eta p^2=0.38$).

Reading

Table IV shows statistic data from reading tests. Just like in the spelling abilities, the repeated measures ANOVA confirmed that participants of

the experimental conditions significantly improved their reading abilities, in both letter decoding (F(1,117)=209.06; p<0.001; p2=0.64) and word reading (F(1,117)=43.37, p<0.001; p2=0.27), while those from the control condition showed very small improvements in their scores.

TABLE IV. Means and standard deviations of the number of letters and words correctly read in the pre-test and post-test in the experimental (EC) and control (CC) conditions.

| | Number of letters | | | | Number of words | | | |
| | Pre-test | | Post-test | | Pre-test | | Post-test | |
	M	SD	M	SD	M	SD	M	SD
EC (n=60)	8.62	7.56	36.63	22.25	.23	.56	5.52	5.86
CC (n=59)	8.03	6.39	8.54	9.73	.25	.54	.53	1.39

Source: the authors

Interaction and support

From the sample of the 6 chosen sessions from the invented spelling programme we have identified 740 verbal messages of support, with an average of 123.3 per session (Table V). As explained before, 4 different words were spelt in each session. Therefore, there was an average of 30.8 messages in each one of these episodes.

TABLE V. Frequency (F), mean (M) and percentage (%) of support messages recorded in three of the invented spelling sessions (S) with two experimental condition groups.

Support	Group 1			Group 2			Total		
	S1	S5	S10	S1	S5	S10	F	M	%
Management - participation	3	0	2	2	2	1	10	1.7	1.4
Focus	3	1	2	1	0	2	9	1.5	1.2
Instruction - operation	0	0	0	2	1	0	3	0.5	0.4
Questioning - inference	45	45	47	43	29	25	234	39.0	31.6
Questioning - question	24	24	24	21	15	13	121	20.2	16.4
Questioning - clarification	16	21	10	4	6	1	58	9.7	7.8
Signalisation - task	9	9	9	9	8	6	50	8.3	6.8
Signalisation - record	13	12	16	14	12	7	74	12.3	10.0
Procedural elaboration	18	15	23	25	10	17	108	18.0	14.6
Doubt	0	1	0	0	0	0	1	0.2	0.1
Valuation - agreement	9	10	5	5	3	6	38	6.3	5.1
Valuation - no agreement	1	0	0	0	0	0	1	0.2	0.1
Correction	3	3	2	0	1	0	9	1.5	1.2
Precision	3	0	0	3	1	0	7	1.2	0.9
Synthesis	3	1	3	6	0	4	17	2.8	2.3
Total	150	142	143	135	88	82	740	123.3	100

Source: the authors

Figure I shows a clear predominance of questioning messages (55.8% of total messages). Most of these *questions* were aiming at leading the children to make an *inference* (31.6%) about how a given sound should be spelt ("So, it's the first letter. Take a look. It is also the same. Which letter did you spell?). In other occasions, these support messages are *questions* (16.4%) lead the children to express their agreement with an answer ("Do you think it is an O, Ana?"), or clarifications (7.8%) to justify their own ("Why do you think it should be an A now, Maria?").

On the other hand, we have found 16.8% signalisation messages, in which the teachers explain what the task was ("How do you think this word should be spelt?"); or wrote the children's joint answers on the blackboard. Such visual record would allow a second moment of written representation the children had reached to be compared with the word's correct spelling, in order to facilitate the reflexion about their similarities and differences.

FIGURE I. Percentage of messages verbalised by the teachers in each support category in the whole of the 6 analysed sessions.
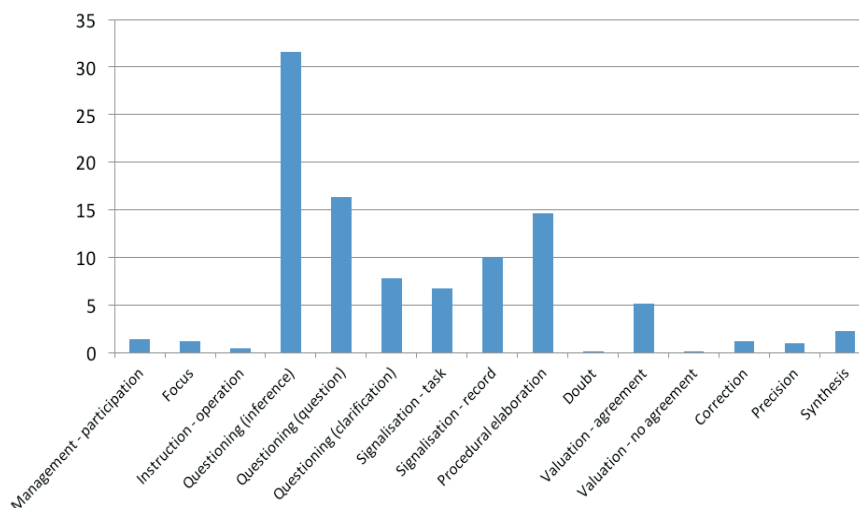
Source: the authors

Finally, 14.6% of the teachers' messages were mainly focused upon the words' oral analysis. They are exclusively procedural elaborations, in which the teachers verbalise the sounds of a word. ("Now think: TAAA").

The remaining categories account for 10% of the messages. We should point out how scarce *instructions and corrections* were ("We have put the D here, Ana") – a mere 1.6% of the total verbal messages.

On the other hand, the type of support messages was quite similar in both teachers. The chi-squared test only detected a significant difference between the proportions of classified messages in one of the categories: questioning clarifications (X^2=27.65; p=0.016).

Comparing the first, the middle, and the last sessions (Figure II) allows us to see the decrease of support messages frequency as the programme develops, especially as far as group 2 is concerned. This group recorded almost 50% less support messages in session 5, as compared to session 1. However, we have not found significant differences between the

message distribution profile in the different support categories in sessions 1, 5 and 10: there is a clear predominance of questioning messages and, – at a lower level – a high number of signalisation and procedural elaboration messages.

FIGURE II. Frequency of support messages verbalised by the teachers in the initial, middle, and last session.
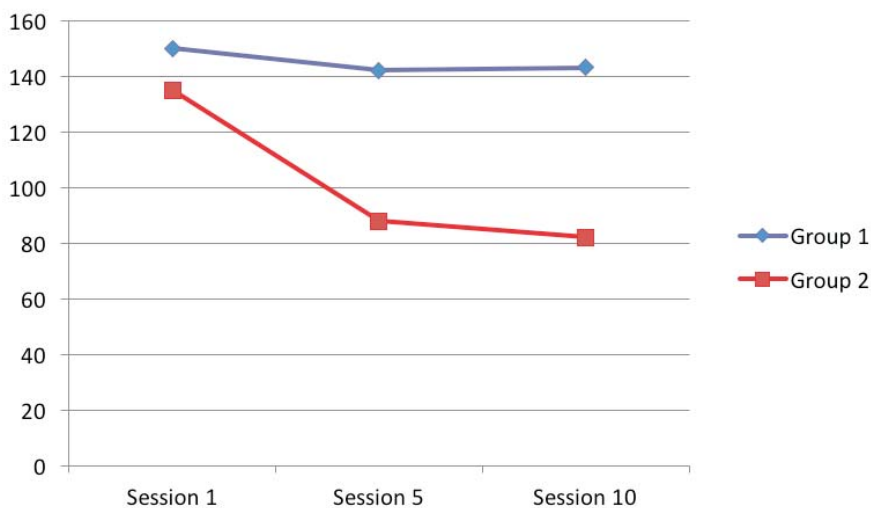
Source: the authors

In each episode (focusing on spelling a new word) it is possible to identify two types of messages that are – almost invariably – repeated in every session. We shall call it *joint spelling* and *joint correction*.

Joint spelling messages always occur at the beginning of each word-spelling episode. The teacher would cyclically develop the following support sequence: (1) asked for help to complete a task ("Help me spell the word TIO"); (2) made a series of questions about the word to spell ("Do you think we should put a P first or an I? […] Why do you think it is the letter P?"); or about its corresponding sound ("An I? Do you all

listen to the I sound?"); (3) analysed and verbalised (procedural elaboration) the sounds to be spelt ("Like your name: HU-GO... U"); (4) and would finally ask if they agree, writing down the word on the blackboard (see Annex 1).

At the end of each episode one may observe a second configuration, in this case focused on the joint correction of the task's product (the written word). This configuration may have a simple or complex form.

In its simplest form, the sequence goes as follows: (1) it begins with a signalisation in which the teacher shows a card with another alternative to the word the children have just spelt ("Lets see how the other child wrote it"); (2) continues to ask questions (of inference or clarification), and helps the children to identify and think about the differences between the word they wrote and the alternative word on the card ("Which letter did you write? […] "Why did you put a P first?"); (3) and finally the teacher says she agrees ("Ok").

The complex *joint correction* configurations include other forms of support, mainly focused on phonetically elaborating the alternative word ("Think about the word... PA-PO"); and, at a lower level, on managing the child's participation in the task (see the transcript corresponding to shifts 51 to 62 of one of the episodes in Annex 1).

Discussion

The first goal of this study was to assess the impact of invented spelling activities, in small groups, upon the literacy evolution of Portuguese preschool children. Our hypothesis was that children from the experimental condition would improve more than the ones from the control condition. Data we have collected corroborates this hypothesis, both in what concerns spelling and reading letters and words.

This result is coherent with the ones from previous studies, contextualised in several languages (Albuquerque & Alves Martins, 2016; Alves Martins, Salvador, Albuquerque & Silva, 2016; Ouellette & Sénéchal, 2008a.b; Ouellette, Sénéchal & Haley, 2013; Sénéchal, Ouellette, Pagan & Lever, 2012). They also support the idea that there is a causal relationship between invented spelling activities and the development of reading and writing skills. It seems that the task of discussing about word spelling implies a thorough analysis of the oral and the pursuit of more

adequate letters to represent the identified oral segments. This reflexion pushes children to simultaneously develop the phonemic awareness and understand the logic of the written language alphabetical structure (Adams, 1998; Defior, 1996; Márquez, 2003). Skills practised during invented spelling sessions may be transferred to word reading. In fact, the words' oral analysis facilitates the understanding of units of orthographic and phonological nature (Perfetti & Hart, 2002; Rueda *et al.,* 1990; Share, 1995). The transfer from spelling to writing is congruent with the findings by Ehri (1997), Rieben, Saada-Robert and Moro (1997), that suggest the interdependence between the acquisition of both abilities.

On the other hand, invented spelling programmes cannot be reduced to a mere mechanic training. Activities are supported by a *scaffolding* (Wood *et al.,* 1976) process, in which the support given by the teacher plays a fundamental role. No previous work had however examined the nature of such interaction. Therefore, our second goal was to describe in detail, both quantitatively and qualitatively, the type of support teachers give to mediate the interactions with the children during invented spelling activities. Results from this second goal point out great similarity in the type of interaction established in the analysed activities (with different groups and teachers). In all cases, adults managed activities in a quite "scaffolded" way, in a *reciprocal teaching-learning process* (Teberosky, 1989). This is translated into an essentially "questioning" speech that although being of dialogical nature, is supported by his constant interruptions. We just find instructions and corrections that suggest that teachers above all try to actively implicate the children in a reflexive process of elaboration and re-elaboration of their own answers, in which word spelling emerges as a problem that children must solve.

According to Pontecorvo, Ajello and Zucchermaglio (2005), the adult's mediation is essential to expose children to situations in which they have to debate, as well as to involve them in the construction of a collective solution to a problem. This mediation role consists mainly in leading and organising the children's communication interchange. Teachers were able to lead the children to discuss about the letters they should write, mainly using support aiming at facilitating an inference on how to spell a given sound, and questions pushing children to justify their answers or stating if they agreed with the others' propositions as well. The decreasing frequency of support messages we notice throughout the programme also

suggests that the programme's sequence of spelling activities is developed within a process of *progressive transfer of control* (Coll, Colomina, Onrubia & Rochera, 1992), and therefore pupils get more autonomy in word spelling (Cole, 2006).

Finally, another peculiarity of the interaction, that could also explain the invented spelling programme efficiency, has to do with the configurations of *joint correction* we have repeatedly identified in all analysed activities. As we have seen, this type of message sequences show an essentially symmetrical dialogical interaction, which avoids or decreases the teacher's external correction. Using an artifice (confronting them with what a child from another school supposedly wrote) one is able to involve the children in a metalinguistic process of revision, negotiation and re-elaboration of their own answers to the task. This way the adult promotes the discussion between different points of view, and helps the children to become more autonomous to jointly solve a problem (Pontecorvo *et al.,* 2005).

However, due to the specificities of this education level in Portugal, it was not possible to compare the specific effect of the joint correction with other types of support offered in mainstream literacy initiation activities in preschool. It is a quite relevant limitation we intend to overcome in new currently undergoing researches. Comparing the results of invented spelling activities with others based on explicit instructions, we could confirm the value of these *scaffolding* strategies. Future works should also thoroughly analyse the nature of these mediation processes with a double goal – to describe semiotic and instructional devices of this kind of activities, and to experimentally assess their efficiency. It would be interesting, for instance, to carry out experimental studies to examine in what way the progressive decrease of support throughout an invented spelling programme really favours the pupils' learning and autonomy.

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Annex. Transcription of one episode (Group 1, session 5, episode 17)

1. Teacher: Come here, children! Let's play a spelling game. Help me spell the word TIO.
2. Children: III!
3. Ana: TTTI...
4. Diogo: A T!
5. Ana: T, T, T!
6. Maria: A T, a T, a T!
7. Children: T, T, T!
8. Teacher: What comes first: T or I?
9. Children: T, T, T!
10. Teacher: And why do you think it is the letter T?
11. Ana: Because it's TI...! TTTI-OOO!
12. Teacher: Isabel, do you also hear T, like Ana?
13. Diogo: I do.
14. Children: TTTTI.
15. Maria: T, T, T!
16. Teacher: So. I'll write a T, right?
17. Teacher: [writes T on the blackboard]
18. Teacher: And now what is the next letter? Or is it ok like this?

19. Children: III!

20. Teacher: An I? Can you all listen to the sound of the I? Why should we now write an I?

21. Isabel: TIIIII.

22. Children: IIII!

23. Teacher: So, I'll now write an I.

24. Teacher: [writes TI]

25. Teacher: And now what is the letter?

26. Isabel: TI-O... U.

27. Children: U!

28. Teacher: Do you all agree that the next is a U?

29. Children: Yes!!!

30. Teacher: Do you all agree? Why do you think it's a U?

31. Ana: No! It's an O, it's an O.

32. Teacher: Do you think it's an O, Ana?

33. Ana: Yes.

34. Teacher: Why?

35. Ana: Because I remember that the other kid wrote a word (I don't remember which) that had O and not U, right?

36. Teacher: Do you all remember what Ana is saying?

37. Maria: Yes, I do!

38. Ana: Then we should try to put an O... Or just leave it like that.

39. Isabel: That's it! It's because we may also spell it with another letter!

40. Diogo: Because the letter in my name is the O, but it sounds like U.

41. Teacher: Just like your name: HU-GO... There's the U and then the O at the end, right?

42. Teacher: Do you all agree with this?

43. Children: YEEESS!

44. Teacher: So, which letters are we going to write now? Ana remembered the O.

45. Children: An O!

46. Diogo: Cheers for the O!

47. Teacher: TIO... So, let's put an O here.

48. Teacher: [Writes TIO]

49. Teacher: And now? Shall we write any other letter or the word is already complete?

50. Children: It's done!

51. Teacher: Let's see how the other kid wrote it. He wrote TIO like this. See? Is it like yours or is it different?

52. Children: It's the same!

53. Ana: That's why I said we should put an O!

54. Teacher: Yes. And why? Because the O [in Portuguese] may also have the sound of…

55. Children: UUU!

56. Teacher: When it's at the end of the words, right? Hmm... That means the other kid also remembered that… Now… the first letter… look, is it the same? What letter did you write?

57. Isabel: A T.

58. Teacher: Yes. And why did you write a T first?

59. Maria: Because it's TTI.

60. Isabel: TI, TI, TI.

61. Diogo: Because TTTTIII sounds like T.

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