

Research Article

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Metacognitive Instruction on Asking Questions to Improve Reading Comprehension

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Abstract

Background: This study analyzes the use of a text-related question strategy aimed at improving the reading comprehension and reading awareness abilities of a metacognitively trained group of students with reading comprehension difficulties. In an initial Grade 3 primary school students' assessment in the same classroom, some students were incidentally found to have more difficulties with reading comprehension than other typical peers. All of the students had been classmates since the beginning of primary school. The educational center decided to support those students (N=8) with a metacognitive reading intervention while the other students continued with the usual teaching methods. The total number of students in the classroom was 30.

Methods: The training program consisted of learning the questions-about-the-text strategy by means of the *Planning Facilitation* method. The measuring instruments used were reading comprehension evaluation scale (ACL for its acronym in Spanish) for reading comprehension and Reading Awareness Scale (ESCOLA for its acronym in Spanish) for reading awareness. A pre-test, post-test and follow-up approach was used for carrying out the study.

Results: After the program's application, the intervention group improved the comprehension and awareness abilities and became equal to their classmates or comparison group.

Conclusions: The *Planning Facilitation* fosters this improvement by promoting discussion between classmates and ensuring a reflective verbalization on questions about a text.

1. Introduction

The ability to understand a written text is one of the most complex mental tasks. This process requires students to use prior strategies to effectively address the text: knowing how to understand a word or a sentence, how to relate one sentence to another and how to access the main idea (Jouini, 2005). These strategies are intentional cognitive processes (Gutiérrez-Braojos & Perez, 2012). A reading strategy is a set of actions intentionally sequenced for the purpose of understanding the meaning of a text. At certain points in learning to read, extracting the meaning of a text requires the reader to ask him- or herself questions about it— how, when, how many, who and where (3CQD)— to extract the relevant information. This information refers to the subject of the action, the action itself and the receiver of the action (Torres-Soto et al., 2025). Knowing these meanings in their sequence facilitates the extraction of meaning from the sentence. In this way, the strategy of asking questions appears to be connected to comprehension of the text.

Despite the abundant research conducted on reading comprehension strategies, a notable lacuna persists in the study of how specific structured questioning techniques, such as those grounded in the 3CQD (What, How, When, Where) model, can most efficaciously influence students' reading comprehension in diverse educational contexts. While the significance of reading strategies and the capacity to pose questions is acknowledged, there is a pastime of research that has examined the direct applicability of this approach in the classroom and how it can be adapted or customized to meet the needs of students. Furthermore, there has been insufficient depth on how these questioning strategies can be systematically integrated into current pedagogical methods to foster deeper and more meaningful reading comprehension. This lacuna in the extant literature signifies that the utilization of questioning as a pedagogical instrument merits further investigation, not only as a content comprehension technique, but also as a dynamic process that fosters critical reflection, metacognition, and long-term knowledge retention.

The necessity to enhance reading comprehension is further emphasized by the findings of the OECD's PISA reports. Recent editions of the report have indicated that a considerable number of students worldwide do not attain the requisite levels of reading proficiency, thereby impeding their capacity to learn autonomously and cultivate critical skills across diverse domains of knowledge. Of particular concern is the finding that a considerable proportion of students in several OECD countries have not attained the basic reading proficiency level, which hinders their capacity to analyze, synthesize and apply the information they read effectively. This situation underscores the need for the implementation of more effective teaching strategies that foster deeper reading comprehension. The 3CQD model, a teaching method that encourages students to question the text, has the potential to enhance students' abilities to not only extract information but also to reflect on it in a critical and meaningful way. This is particularly important in a world that is increasingly interconnected and inundated with information.

The present article aims to address this lacuna by exploring the efficacy of structured questioning, as exemplified by the 3CQD model, in enhancing students' reading comprehension and providing a more concrete and effective approach to teaching critical and deep reading.

2. Literature Review

The initial comprehension of a text is contingent on inferential processes. Inferences facilitate the reader's comprehension of text-text and text-prior knowledge relationships, favoring the necessary mental representation of a more elaborate overall structure (Dole et al., 2009). Several articles demonstrate that asking questions clarifies relationships between different textual aspects that facilitate the improved realization of inferences and reading comprehension (Gutiérrez-Braojos & Pérez, 2012).

Neuenhaus et al. (2023) carried out research on the topic of teaching using strategies of asking questions, literally introducing questions into the text to make readers aware of the importance of asking these questions. Brown and Day (1983) observed how good readers who think out loud commonly ask themselves questions. The authors taught this self-questioning strategy to poor readers, and they obtained a significant improvement in comprehension. Moreno (2017) estimated the merit of asking questions to obtain information on how a text is organized to develop an overall idea of it. Through questions, students identify the most important events, the characters involved in a story and the relevant circumstances. As they read, readers organize the text and construct its meaning.

Asking questions has been and continues to be considered a strategy for understanding texts at various educational levels. At high school, Juliana and Pasaribu (2023) used the PQ4R strategy to work on reading abilities. The results showed significant improvements both in the planning of reading goals and in actively accessing the process of comprehension among the students. At the high school level, Al-Qawabeh and Aljazi (2018) conducted a study with the objective of recognizing the effectiveness of the PQ4R strategy for reading comprehension. The study was carried out with 104 students divided into two groups with an equal number of participants and equal numbers of males and females in each group. The PQ4R method was applied to the intervention group, while the control group received no treatment. The improvement in reading scores was significantly greater in the experimental group. Bibi (2011) also researched the effect of the PQ4R strategy on academic achievement among 104 secondary school students randomly selected from 121 schools. The experimental group and control group comprised 52 students each. The experimental group was taught the PQ4R strategy, while the control group was taught using the traditional method. The results indicated that the PQ4R strategy significantly improved the reading results among the students in the experimental group compared with the control group. Along these same lines, Sarimanah (2016) conducted a study to determine the effects of learning to read through the PQ4R metacognitive strategy with the objective of improving the reading ability of high school students who did not have reading disorders such as dyslexia. The results indicated that metacognitive reading strategies based on the PQ4R learning model are effective and suitable for use in high schools. In university studies, there have also been reports (Artis, 2008) of the effectiveness of the SQ3R strategy among university students and graduate students in marketing to improve their reading comprehension, metacognitive reading strategy and control, which are necessary for specific professional competence.

In terms of a mediated and interactive approach to learning, asking questions about the text is a strategy that was used by Palincsar (2013) in the context of reciprocal teaching based on four basic reading strategies designed to promote active reading comprehension. The students to whom the program was geared were those who possessed good word recognition abilities but demonstrated difficulty with extracting the meaning of the texts they decoded. These strategies make it possible to identify the structure of the text, predict its content, generate questions about the text and summarize it. This is a constructivist practice in which a teacher/student dialogue is developed to help students internalize and generalize the use of strategies, which allows students to monitor and control their own comprehension (Ferrer et al., 2013). This practice allows the teacher to support the student as he or she experiences the transfer of and initiative for the learning activity, gradually gaining skills as the teacher adjusts assignments progressively. These strategies, due to implementation method, have had an effect of improving reading comprehension and monitoring (Palincsar, 2013).

The instructional procedure used in this approach consisted of the class reading a fragment of text that the teacher later summarized in his or her own words, clarifying the difficulties encountered, asking questions about the text and predicting the content of the next text fragment within a context

of dialogue and active student participation. For the subsequent fragments, the teacher was replaced by each of the students. As the students began to understand the procedure, intervention by the teacher steadily decreased. Subsequent studies carried out since then at different educational levels have shown the effectiveness of questions for reading comprehension in the context of reciprocal teaching (see Soriano-Ferrer et al., 2009).

Based on an approach of guided learning and the control and transfer of strategies, asking questions is a strategy that has been employed by Naglieri and Gottling (1997), Naglieri and Johnson (2000) and Haddad et al. (2003) in the context of the PASS intervention.

The instruction outlined in the PASS intervention model focuses on the knowledge and metacognitive control of specific strategies linked to the gradual transfer of control of learning strategies and metacognitive instruction. The teacher guides the students' cognitive and metacognitive activity, bringing the students to a level of increasing independence and then gradually withdrawing the support they provide until control over the process is left in the hands of the student.

The instructional procedure of Planning Facilitation (Haddad, et al., 2003) consists of three moments. Moment 1: The teacher delivers the materials to the students and asks them to complete a goal-oriented task (read a text to answer questions about it): "Today, each of us will read another passage and answer questions the same way you did it the first time. I want you to think about how to answer more questions correctly." Moment 2: The teacher facilitates a discussion that encourages students to consider more successful ways of answering the questions, but without making direct statements such as "this is correct" or "remember we should use that strategy" or providing any direct reading instruction. The role of the teacher is to help students reflect on how they completed the reading comprehension task, help to clarify what was written and encourage self-reflection. The teacher uses questions when they deem it suitable, for example, "Tell me how you completed it. Why did you do it that way? What can be done to improve it? How would you do it next time?" The children might respond to the intervention sessions in the following way: "Read slower to remember better. I thought in my head. I tried to remember important parts. Read slower and do it in my head. Don't get distracted. Read the story more carefully, and think about the best answer because it was already in the story. Remind myself. I tried to remember it visually. I listened to what it was about as I read". Moment 3: The teacher gives the students another reading so that they can answer more questions.

Using this procedure from Planning Facilitation (Naglieri & Gottling, 1997; Naglieri & Jonson, 2000), it was found that students with poor planning improved substantially more in mathematical calculations compared with those who did not have weak planning. Haddad (2000) used a single case design to compare the effects of Planning Facilitation on reading fluency and accuracy and found that the intervention had a positive effect on both variables. Haddad et al. (2003) evaluated whether instruction designed to improve planning would have a differential benefit on reading comprehension according to the PASS characteristics of each student. The results demonstrated that students with cognitive weakness in planning benefitted substantially from an intervention designed to facilitate planning.

The effectiveness of the Planning Facilitation intervention among students with weaknesses in informed planning for academic content (arithmetic, reading fluency and reading accuracy; Naglieri and Gottling, 1997; Naglieri & Jonson, 2000; Haddad, 2000) and non-academic content (Naglieri & Das, 2002; Kar et al., 1993) suggests that the intervention method could be applicable to a variety of curricular areas, including reading (Haddad et al., 2003).

3. Methodology

This study seeks to demonstrate the effect of a cognitive strategy on reading comprehension among a group of third grade students in elementary school. The cognitive strategy consisted of five

possible questions (3CQD) about a text that was read. This strategy was taught through the metacognitive instruction method of Planning Facilitation (Naglieri and Gottling, 1997) based on the PASS theory of intelligence. According to previous research (Haddad et al., 2003; Naglieri & Das, 2002; Kar et al., 1993; Naglieri & Gottling, 1997; Naglieri & Johnson, 2000), this method improves planning in students who need it most for learning in diverse academic areas. An attempt was made to demonstrate that the questioning of the text strategy (3CQD) of Planning Facilitation can improve the initial reading comprehension of texts among third grade students.

The metacognitive instruction was operationalized through the Planning Facilitation described by Haddad et al. (2003) and the mediation of a teacher who guided the students' cognitive and metacognitive activity according to the PASS intervention model. The consideration of the cognitive processes together with the strategies for their transfer is the basis of PASS metacognitive instruction (Das et al., 1994). Students gain an awareness of the benefits of the strategy and its effectiveness; they use it spontaneously and generalize it through its flexible application if they are trained in the control of such strategies. That is, if students are taught to plan and to complete goal-oriented tasks, this can favor autonomous use of the strategy, awareness of its effectiveness and its transfer to new tasks. Metacognitive instruction regarding the strategies also highlights the mediating role of the teacher, who guides students toward control over their own learning and the completion of goal-oriented tasks, promoting guided practice and collaborative activities in which students participate and progressively assume control over and responsibility for their own learning.

Thus, the first objective of this study was to evaluate if the strategies of questioning a text implemented through the Planning Facilitation method improve reading comprehension. It was expected that the reading comprehension scores (ACL) of the intervention group measured in the post-test and follow-up would not be different from those of the comparison group.

The second objective was to establish the effect of planning facilitation on reading awareness. It was expected that the intervention group would demonstrate an increase in their metacognitive awareness (as measured by the ESCOLA).

If intervention training is generalized to the improvement of reading comprehension (ACL) and reading awareness (ESCOLA), then the process used for the training would be effective. This would provide evidence of a for-transfer of learning.

This study expands on the results of previous investigations that used the Planning Facilitation strategy in the context of metacognitive instruction in reading in various ways: (i) it was carried out within an elementary school and a class group; (ii) it was applied to students in the third grade of elementary school, which has not been done previously; (iii) it expanded on the effects of the questioning strategy for initial reading comprehension among students at risk of reading difficulty who were progressively differentiated from their own group in reading performance; and (iv) it used a pre-post intervention and follow-up design.

3.1. Participants

The sample for this research was made up of 30 students from a third year primary school class in the city of Ourense (Spain). The participants came from an urban environment where the predominant economic sector is the tertiary sector, which provides family units with an average monthly income of 2,689 euros, placing them at a medium income level (Galician Institute of Statistics; IGE, 2022). As regards the educational level of the parents, the majority had completed secondary education (54%). In addition, 51% of families had a computer at home and 40% had access to the Internet. In terms of gender distribution, 13 of the students were girls and 17 were boys.

The sample was divided into two groups: the experimental group, consisting of 8 students, and the control group, consisting of 22 students. The experimental group was made up of students with

difficulties in the cognitive processes involved in reading comprehension, as identified by previous assessments using standardized reading achievement scales. The control group, on the other hand, was made up of students with typical performance on the same assessments.

The sample was obtained by convenience sampling, selecting the participants according to their cognitive needs and the objectives of the intervention. The students in the experimental group, who initially showed deficiencies in cognitive processes, were considered to receive an intervention designed to help them equalize or improve their performance and reach a level comparable to that of the control group. The control group, for its part, made it possible to compare the results of students with typical levels of reading comprehension.

Although the allocation was not random, the sample used is methodologically relevant and ethically justifiable, as it allows the intervention to be adapted to the specific needs of the participants. In addition, the sample was homogeneous in terms of social, economic and cultural characteristics.

3.2. Instruments

Reading processes

The *Avaliación de la Comprensión Lectora* [Reading Comprehension Evaluation] (ACL; Català et al., 2010) test was administered. The ACL consists of six tests corresponding to each of the six grade levels in elementary education. The tests aim to evaluate reading comprehension in a broad sense with texts of diverse types (narrative, expository, poetic, interpretation of a graphic, interpretation of data) and with topics related to different curricular materials. These tests gather information about four relevant dimensions of reading comprehension: literal, which focuses on the explicit ideas and information in the text; reorganizational, in which the student must analyze, synthesize and/or organize the ideas explicitly manifested in the text; inferential, which occurs when the student is capable of simultaneously using the information made explicit in the text and the prior knowledge he or she possesses to make conjectures and develop hypotheses; and critical, in which the student must provide responses that indicate that they have made a value judgment, confronting the ideas expressed in the text using internal criteria (personal) or external criteria (the teacher, other sources, etc.). The reliability index of this scale, calculated using Cronbach's alpha, was found to be 0.81.

The ACL-3 is used for the third grade of elementary school. The items for this grade are presented in a format of short, attractive and interesting age-appropriate texts. The students must read the texts and answer four or five questions about each one. The reliability of the test for the third grade, calculated using the Kuder–Richardson Formula 20 (KR-20), is .80.

Reading awareness

To evaluate reading awareness, the long version of the *Escala de Conciencia Lectora* [Reading Awareness Scale] (ESCOLA; Puente et al., 2009) was used. The ESCOLA comprises 56 items and requires approximately 40 minutes of completion. The scale evaluates the processes of planning, monitoring, and evaluation that children aged 8 to 13 engage in during written situations that pose dilemmas. Planning is measured through items related to the procedure of seeking information, the attitude of the reader toward the tasks, the selection of suitable strategies for reading tasks based on the objective to be met, the demands of the task itself and the typology of the text. Monitoring is evaluated using items that refer to the student's attention and effort during a reading task, the use of strategies to select relevant information in the text, and the reader's perseverance and self-efficacy to achieve the proposed goal. Evaluation entails the reader's self-control of a reading task, verifying the use and adaptation of the strategies used for the task and identifying the results achieved.

The processes described are evaluated according to three variables: person, task and test. The person variable involves the knowledge the student possesses regarding his or her own ability to face a reading task. The task variable refers to the knowledge the reader possesses regarding the importance of the reading task and its degree or level of difficulty. The text variable refers to the characteristics of the text presented to the reader, such as its vocabulary, syntax and structure.

Direct scoring of the scale makes it possible to obtain the corresponding percentile based on the subjects' age and year. Its reliability index, calculated using Cronbach's alpha, is .81.

3.3. Measurement Procedure

The administration of the ACL and ESCOLA tests was conducted in groups, with the application and registration standards established in their respective manuals being adhered to. The application process for each test took approximately 30 minutes and was conducted in separate sessions on different days. Prior to the administration of the tests, evaluators underwent rigorous training, encompassing both theoretical and practical sessions. This training was based on the guidelines provided in the respective manuals, with the aim of standardizing the evaluation process. Furthermore, a pilot test and supervision were carried out beforehand to ensure inter-evaluator reliability.

3.4. Intervention Program

The program comprised different levels of texts for reading that were taken from the ACL. These texts were used to answer questions posed to students regarding each text at different levels. The levels of the texts used for this program were ACL-1, ACL-2; ACL-4 and ACL-5. The program includes eight to ten texts per level. Each text has five questions. The level with which the program began for third graders was ACL-2, followed by ACL-1, ACL-4 and finally ACL-5.

3.5. Intervention Procedure

The intervention was conducted through a system of small groups, with four participants per group. This configuration was informed by empirical evidence suggesting that such an arrangement fosters enhanced interaction among participants, thereby engendering a more dynamic and collaborative learning environment (Sanahuja et al., 2024 and García-Candel et al., 2024). The implementation of small groups also facilitates the personalization of support by the instructor and promotes reflective dialogue among students, which are key aspects for the development of reading comprehension skills (Palincsar & Brown, 2009). In this context, the reading program tasks were implemented using the Planning Facilitation strategy, thus optimizing the active participation and cognitive regulation of the students during the intervention. The strategy includes three moments.

Moment 1: The teacher gives students an ACL text with the five questions they must answer individually in ten minutes. An example text is below: The Ebro, for much of its course, crosses land that is very poor, devastated and without trees. It flows with such force that it reaches the end of its course heavy with mud. The color of the river at the end of its course is nothing like water, but rather, the yellowish color of the dense, thick mud it carries with it. It is these quantities of mud that are deposited before the ocean that explain the origins of the delta (Catalá et al., 2001, p.99). The questions were: How was the delta of this river formed? What is most of the land it crosses like? What is the water like at the mouth? What title would best summarize this text? What is the text about? (3CQD).

Moment 2: With the questions answered by the students within view, the teacher initiates a debate, asking questions such as (Das, 2015, p. 159) Can someone tell me something about what you had to do? What is it about? What does it tell us, and what is the purpose of the question? What question can be formulated? What else did this text do? Why did you do it this way? How would you

do it next time? How did you solve the problem? Could you have done it another way? Someone did not do something important; what do you think? The teacher does not have to exhaust the repertoire of questions about the text chosen or to ask all the questions of just one student. The text serves as an excuse for dialogue. If the dialog flows based on the students' initiative, the teacher ceases to ask questions; if the initiative ceases or if some response situation is not focused because the most pertinent question has not been raised, the teacher continues to ask questions. After ten minutes, the teacher ends the discussion.

Moment 3: The teacher gathers the sheets from all the students and hands out new ones with the same text and the same questions. The students are instructed to complete the task in ten minutes.

The time allotted for covering a text was one half-hour session twice per week per group. The number of texts used was 24; at two sessions per week, a total of 12 weeks of intervention was performed for each group. The total number of intervention sessions was 48.

3.6. Design and Data Analysis

To evaluate the efficiency of the strategy of asking questions among third grade students in elementary school, a pre-post intervention follow-up design was used. The intervention and comparison groups were contrasted for each measure through the Bayesian repeated measures ANOVA (Wagenmakers et al., 2018) for reading comprehension (ACL) and reading awareness (ESCOLA). This type of analysis was used because the Bayesian approach overcomes classical inference problems due to simple size, namely statistical power and reliability of effect sizes (Wagenmakers et al., 2018).

Data were analyzed with the open-source statistical package JASP (JASP Team, 2024, version 0.19.1, <https://jasp-stats.org/>). The interpretation of the Bayesian values was made according to the classification of the Bayes factor BF10 (Wagenmakers et al., 2018) shown in Table 1. For example, a BF10 equal to 10 means that the data are ten times more likely to occur under H1 compared to H0 (strong evidence).

Table 1. A descriptive and approximate classification scheme for the interpretation of Bayes factor BF10

Bayes factor	Evidence category
> 100	Extreme evidence for H ₁
Between 30-100	Very strong evidence for H ₁
Between 10-30	Strong evidence for H ₁
Between 3-10	Moderate evidence for H ₁
Between 1-3	Anecdotal evidence for H ₁
1	No evidence
Between 1-.33	Anecdotal evidence for H ₀
Between .33-.10	Moderate evidence for H ₀
Between .10-.03	Strong evidence for H ₀
Between .03-.001	Very strong evidence for H ₀
< .001	Extreme evidence for H ₀

4. Results

4.1. Reading Comprehension

Extreme evidence was found for the effect of the group in reading comprehension in the performed three measures ($BF_{10} = 475.57$). Moderate evidence ($BF_{10} = 9.00$) was obtained in pre-test (Table 2, Figure 1) for the mean scores' difference between the intervention group and the comparison group. The intervention group had a lower performance than the comparison group. In the post-test (Table 2, Figure 1), anecdotal evidence ($BF_{10} = 1.36$) was found for the mean scores' difference between the groups, therefore they showed a similar performance in reading comprehension. In follow-up (Table 2, Figure 1) the evidence was anecdotal for the non-existence of mean scores' difference between the groups ($BF_{10} = .47$), so the performance continued to be similar for both of them.

Table 2. Bayesian repeated measures ANOVAs results for reading comprehension

Groups	<i>M</i> Pre (<i>SD</i>)	<i>M</i> Post (<i>SD</i>)	<i>M</i> Follow-up (<i>SD</i>)	BF_{10}
Comparison	5.53 (2.00)	6.20 (1.76)	6.43 (1.81)	6.255e+12
Pre-Post				44313.12
Pre-Follow-up				383.42
Post-Follow-up				.58
Intervention	3.20 (1.19)	4.95 (.74)	5.90 (1.11)	11240.16
Pre-Post				341.30
Pre-Follow-up				23.14
Post-Follow-up				1.08

Figure 1. Graphical representation of the mean scores in reading comprehension by group and measure

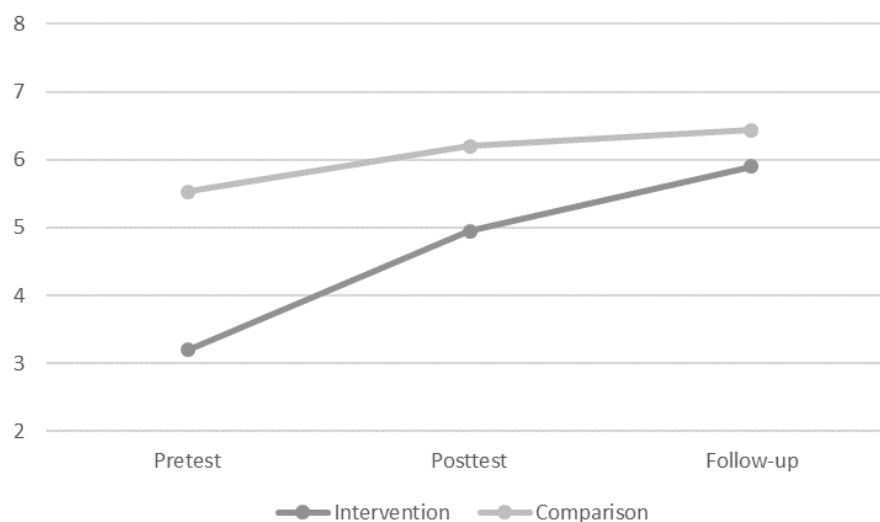


Figure 1. Mean Scores in Reading Comprehension

Regarding the score increase obtained by the groups from one measure to another, it was found extreme evidence of mean score increase in the comparison group in reading comprehension from pre-test to post-test and from pre-test to follow-up (Table 2, Figure 1). Anecdotal evidence was found for the absence of a mean score increase from post-test to follow-up, which means that the group performance was not changed (Table 2, Figure 1). Extreme evidence of a mean score increase was found in the intervention group from pre-test to post-test and strong evidence from pre-test to

follow-up (Table 2, Figure 1). The evidence was anecdotal from post-test to follow-up, so the performance level of the post-test was maintained (Table 2, Figure 1)

4.2. Reading Awareness

Anecdotal evidence was found for the effect of the group on reading awareness in the three measures ($BF_{10} = 2.52$). Anecdotal evidence ($BF_{10} = 1.55$) was obtained in pre-test (Table 3, Figure 2) for the mean scores' difference between the intervention group and the comparison group. The groups' performance was similar. Anecdotal evidence was found for the non-existence of mean scores' differences between the groups (Table 3, Figure 2) in post-test ($BF_{10} = .44$) and in follow-up ($BF_{10} = .50$), so they showed a similar performance in reading awareness.

Regarding the score increase obtained by the groups from one measure to another, it was found extreme evidence of mean score increase in the comparison group in reading awareness from pre-test to post-test and from pre-test to follow-up, while the evidence was very strong from post-test to follow-up (Table 3, Figure 2). Extreme evidence of an increase in the mean score of reading awareness was found in the intervention group from pre-test to post-test and from pre-test to follow-up (Table 3, Figure 2). Anecdotal evidence for the non-increase in the mean score of reading awareness was found from post-test to follow-up, which means that the group performance was not changed (Table 3, Figure 2).

Table 3. Bayesian repeated measures ANOVAs results for reading awareness

Groups	<i>M</i> Pre (<i>SD</i>)	<i>M</i> Post (<i>SD</i>)	<i>M</i> Follow-up (<i>SD</i>)	<i>BF</i> ₁₀
Comparison	66.09 (8.67)	77.64 (8.54)	80.57 (7.57)	6.397e+12
Pre-Post				183333.36
Pre-Follow-up				8.298e+8
Post-Follow-up				32.430
Intervention	58.25 (11.49)	75 (13.61)	77.69 (8.21)	11073.26
Pre-Post				139.516
Pre-Follow-up				543.054
Post-Follow-up				.64

Figure 2. Graphical representation of the mean scores in reading awareness by group and measure.

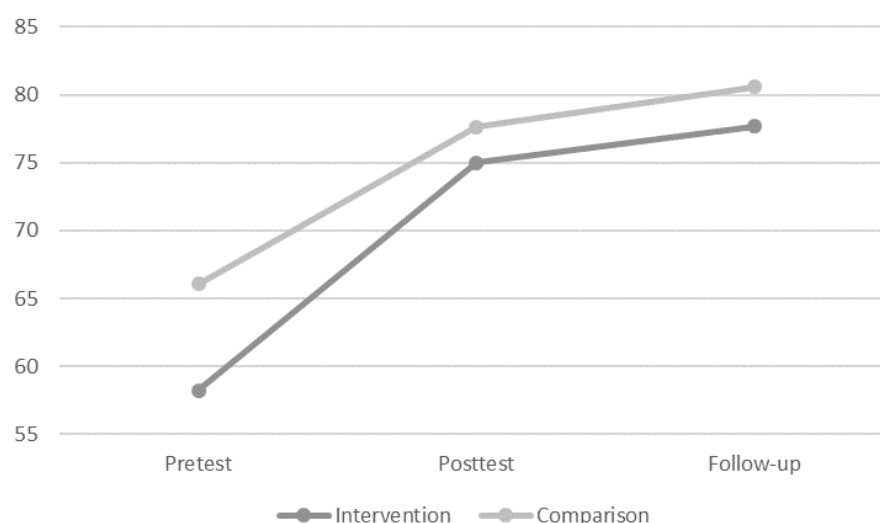


Figure 2. mean scores in reading awareness

The thorough analysis of the reading awareness components showed moderate evidence of the group effect for planning ($BF_{10}=7.345$), where the pre-test measurement showed moderate evidence of a score difference between the groups ($BF_{10}=3.430$). The comparison group had a higher average score than the intervention group (Table 4). The post-test ($BF_{10}=.500$) and follow-up ($BF_{10}=.404$) measurements showed anecdotal evidence of differences between the groups, having a balanced performance in both measurements (Table 4).

Both groups showed strong to extreme evidence for score gain between measurements in the three-reading awareness sub-components, namely from the pre-test to the post-test measurements (Table 4). The intervention group stood out in the evaluation component, in which it evinced a moderate average score increase in the post-test to follow-up measurement in contrast with the comparison group (Table 4).

Table 4. Bayesian Repeated Measures ANOVAs Results for Reading Awareness Components

Groups				
Comparison	<i>M</i> Pre (<i>SD</i>)	<i>M</i> Post (<i>SD</i>)	<i>M</i> Follow-up (<i>SD</i>)	BF10
Planning	27.82 (4.90)	33.73 (5.67)	32.66 (4.87)	4.708e+9
Pre-Post				143387.838
Pre-Follow-up				5.429e+7
Post-Follow-up				1.192
Supervision	19.55 (4.45)	22.27 (4.06)	24.36 (3.00)	2.803e+6
Pre-Post				92.482
Pre-Follow-up				136239.064
Post-Follow-up				42.578
Evaluation	18.82 (4.22)	22.73 (2.87)	23.43 (2.70)	1.339e+7
Pre-Post				2786.112
Pre-Follow-up				61434.310
Post-Follow-up				.703
Intervention	<i>M</i> Pre (<i>SD</i>)	<i>M</i> Post (<i>SD</i>)	<i>M</i> Follow-up (<i>SD</i>)	BF10
Planning	22.75 (4.65)	31.75 (4.46)	31.82 (3.78)	1.190.002
Pre-Post				23.024
Pre-Follow-up				22.509
Post-Follow-up				.338
Supervision	16.50 (5.63)	22.75 (4.77)	22.48 (3.50)	2.509.544
Pre-Post				267.690
Pre-Follow-up				46.623
Post-Follow-up				.366
Evaluation	17.75 (5.06)	21.75 (3.45)	23.18 (2.80)	813.599
Pre-Post				37.230
Pre-Follow-up				51.251
Post-Follow-up				3.407

5. Discussion

The first objective of the study was to analyze the effect of a metacognitive instruction method on the improvement of reading comprehension. This objective was met satisfactorily. Score gain in reading comprehension has reduced the difference between groups and is now balanced, showing post-test anecdotal evidence and keeping the same follow-up values. Such improvement was derived from the usage flexibility of the reading strategy for the purpose of posing questions about the text based on the reading comprehension knowledge and mastery the students acquired through the training they received in the Planning Facilitation. Furthermore, as expected, the differences between groups were reduced to none in the post-test and follow-up reading comprehension scores.

The second objective was to analyze the effect of a metacognitive instruction method on improving reading awareness. This goal was also met satisfactorily. The control group planification scores became equal to the comparison and post-test scores and maintained their values in the follow-up measurement, showing an anecdotal difference in both groups.

As expected, the Planning Facilitation method improved cognitive and metacognitive knowledge of the strategy that students learned in the intervention group.

The results are consistent with those obtained in other studies using the PASS intervention model (Naglieri & Das, 2002; Das et al., 1994; Das et al., 1995; Deaño et al., 2015; Haddad et al., 2003; Kar et al., 1993; Naglieri & Gottling, 1997; Naglieri & Johnson, 2000). Reading comprehension was improved by metacognitive instruction, which influenced knowledge of the strategy and awareness of its use. The increased metacognitive practice allowed the students to be more efficient in the use of cognitive strategies for reading comprehension due to the group discussion and verbalization regarding completion of the reading tasks, without direct instruction by the teacher.

Verbalization helps students adjust their interrogation strategy to better understand the text and complete the tasks, thus regulating cognitive activity through language itself (Naglieri & Das, 2002), using it more flexibly and avoiding irrelevant answers. Verbalization, as part of explicit metacognition, makes it possible for students to share their own experiences with others, thus promoting reflective discussion (Das & Misra, 2015). In progress toward solving a task, verbalization promotes the recognition and identification of the cognitive activity required to solve the task, the anticipation of the inherent limits of that solution and the development of awareness of task resolution (Kar et al., 1993).

Instruction using the Planning Facilitation method promoted students' ability to analyze their self-monitoring and self-correction of the task (Naglieri & Das, 2002). Reading comprehension and awareness improved through questions directed and guided by the teacher-mediated intervention and through collaboration among students to learn to answer these questions. Planning Facilitation leads students to become aware of the effectiveness of their strategies and use them or modify them to control their execution. It also facilitates the generalization of these strategies to new situations. This is what appears to have occurred, based on the measurement results; the students first become aware of the use of strategies and then later use them and control them.

Planning Facilitation produced a transfer of what was learned that can be interpreted as a transfer of the effects of the training. The knowledge and use of the strategy were acquired through the teacher's reflection and verbalization and such knowledge principles were transferred to reading comprehension and reading awareness. The program produced a transfer of what was learned to improvement of reading comprehension. The use of the strategies that students learned through the reading tasks transferred to the improvement on tests on reading comprehension (ACL) and reading awareness (ESCOLA), demonstrating near-transfer (Feuerstein, 2012) in the former case and far-transfer in the latter (Zimmerman & Schunk, 2014; Salomon & Perkins, 2018). The procedures used

by the students in the training program were transferred to the improvement of the variables analyzed. Students' metacognitive knowledge and mastery of the learned strategy seems to be positively influenced by the mediated and guided metacognitive instruction and allows for the gradual mastery and transfer of the strategy to acquire such knowledge. Thanks to the Planning Facilitation, students "know how to foresee the consequences of their actions with the strategy (anticipation); know how to understand the whole (representation); know how to act (execution) and know how to correct (regulation)" (Das 1998, p. 158). These components learned through the Planning Facilitation are the basic components of planning.

6. Conclusion

These results demonstrate that the skills that were used in the instruction were effective and can be interpreted as supporting the validity of the program. This finding is important because it is difficult to demonstrate an improvement in cognitive functioning in tasks on which participants have not received training (Das et al., 1995). It is also important because it demonstrates that improvements in reading comprehension and awareness can be retained. Finally, it is important because it demonstrates improvements in the control of cognitive activity in reading.

The results expand on those of Haddad et al. (2003) in the sense that the third grade is a good time to address incipient difficulties in learning to read that have not been demonstrated in previous grades and that arise from the need for change in cognitive activity to approach written information. Planning Facilitation benefits not only poor planners but also those with poor simultaneous processing (Ares-Ferreirós & Deaño, 2019) who also demonstrate difficulty with reading comprehension. Third grade is a time of new academic demands (complex reading comprehension), of changes in the predominant cognitive activity of processing for reading comprehension and of integrating other complex cognitive skills (thinking, reasoning, inference, comprehension); during this period, reading comprehension difficulties can manifest and can be successfully corrected by increasing the Planning, using the Planning Facilitation method in conjunction with reading strategies implemented by the program.

Metacognitive instruction was useful for students with typical development who applied it to resolve their emerging difficulties. These students increased their metacognitive awareness in the third grade, which represents an earlier manifestation than reported in other studies carried out to date. Reading awareness can increase in this grade, and this improvement can become evident and be maintained and transferred, resulting in improvement in reading tasks through the execution and control of reading awareness skills. Follow-up measurement appears to be essential in this type of study to demonstrate the manifestation of strategies that are progressively discovered by the students themselves and their maintenance and transfer to new learning situations.

7. Suggestion

The students' mental activity for reading comprehension was improved. At this grade, the children benefitted from knowledge of a strategy and its use and control at this age. These benefits were maintained and transferred, and the risk of reading difficulty appears to have disappeared.

This study possesses limitations that should be resolved in future research. It was conducted using an intentional sample to address a specific situation in a classroom with students at risk of learning difficulty and in which metacognitive instruction was carried out with subjects who required an educational response. This led to a second limitation, which was the assigning of participants to groups. The groups were not balanced in number, and the total sample size was small. The typical comparison group also showed significantly improved scores in reading comprehension and awareness. A randomly selected representative sample with cognitive weakness in simultaneous processing and low reading comprehension measures, along with a comparison group in the third

grade, should be receive training in the Planning Facilitation strategy to demonstrate the validity of its effectiveness.

Declarations

Author Contributions. Martina Ares-Ferreirós: literature, methods, research and writing original manuscript. Sonia Alfonso Gil: methodology and data analysis. José María Álvarez Martínez-Iglesias: review-editing and writing. Abraham Bernardez Gomez: conceptualization, writing and review-editing. All authors have read and approved the published on the final version of the article.

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