Effect of an intervention program on the reading comprehension processes and strategies in 5th and 6th grade students

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Abstract

Background: Various investigations have revealed that the promotion of cognitive and metacognitive strategies can improve reading comprehension and that when readers receive this type of instruction, they can use monitoring processes and regulation strategies adequately. The goal of this work is to analyze the effects of strategic and metacognitive instruction on reading comprehension processes and strategies, using the “Aprender a Comprender” [Learning to Understand] program. Method: Instruction was carried out in the classroom by two teachers during six months. Ninety-four students participated, 49 from 5th grade and 45 from 6th grade. A pretest-intervention-posttest-follow-up design was used with a comparison group by grade. Results: The analysis of variance shows an impact of the intervention and its differential maintenance in each grade. The 5th-grade intervention group scored higher than the comparison group in the reading comprehension test, both at posttest and at follow-up. The 6th-grade intervention group scored higher than the comparison group in the Planning scale, both at posttest and at follow-up. Conclusions: Textual strategy instruction favors reading comprehension and the progressive development of planning, which is necessary for supervision and regulation, and its effects are maintained over time.

Keywords: strategy instruction, reading comprehension, planning, intervention program.

Background: The reading comprehension levels achieved by Spanish students have not improved since the year 2000 (Pullis, Martin, Foy, & Druker, 2012; OECD, 2013). This suggests that our educational system is not very successful in the achievement of higher reading levels that require more significant levels of meaning. In addition to the importance of reading comprehension itself, its cross-sectional nature leads to collateral effects on the rest of the academic areas and the subsequent learnings of secondary education (Alverman & Earle, 2003).

Reading comprehension is the result of the interaction between the reader’s prior knowledge, the processes and strategies used to coordinate it, and the textual information employed to meet the text demands (García-Madruga, 2006; Snow & Sweet, 2003). The constant interaction between the reader and the text promotes awareness and allows the reader to establish a comprehension plan depending on his or her intentions (Echevarría, 2006). The construction of reading comprehension implies the organization of the explicit propositions of the text (micro-structure) and of the global text (macro-structure). This construction promotes a representation (Van Dijk & Kintsch, 1983) that favors the active use of literal comprehension strategies. Comprehension of the main idea of the text allows readers to combine the information of the text with their information and to build a mental situational representation (Kintsch, 1988) in which the inferences involve their active work and metacognitive control of the meaning of the text by means of specific strategies (García-Madruga, 2006).

Method:

Método: la instrucción se llevó a cabo durante seis meses, en el aula, a cargo de dos docentes. Participaron 94 escolares, 49 de 5º grado y 45 de 6º grado. Se utilizó un diseño pretest-intervención-postest-seguimiento con un grupo de comparación por grado. Resultados: los análisis de varianza muestran un impacto de la intervención y su mantenimiento diferencial en cada grado. Los estudiantes del grupo de intervención de 5º grado puntuaron más alto en la prueba de comprensión lectora en postest y en el seguimiento. Los del grupo de intervención de 6º grado puntuaron más alto en la escala de planificación tanto en postest como en el seguimiento. Conclusiones: la instrucción estratégica textual favorece la comprensión lectora y el progresivo desarrollo de la planificación necesaria para su supervisión y regulación, manteniendo sus efectos en el tiempo.

Palabras clave: instrucción estratégica, comprensión lectora, planificación, programa de intervención.
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Participants

Ninety-four students, aged between 9 and 12 years, who studied 5th (M = 9.59 years, SD = .537) and 6th grade (M = 10.93 years, SD = .447) in a public school of the city of Ourense (Spain), participated in this study. The distribution of the participants by sex, grade, and group can be seen in Table 1. The students were from an urban area, and their families had a medium-high socioeconomic level.

The intervention and comparison groups were randomly formed, respecting the natural grouping of the classrooms. No significant differences were found in the variables grade and gender for the groups: \( \chi^2(1) = .043, p = .863 \), or in reading comprehension, either in 5th, \( F(1, 47) = 1.323, p = .256 \), or in 6th grade, \( F(1, 43) = 1.527, p = .223 \).

Instruments

To operationalize the independent variable, we used the instruction program “Aprender a Comprender” [Learning to Understand] (Ribeiro et al., 2010), made up of 30 thematic units, arranged according to difficulty level, which includes texts and their corresponding reading comprehension tasks to be solved. The text contents are those of the Primary Education curriculum. They correspond to diverse types of genre: informative, instructional, poetry, and biographical. The activities carried out with the texts use diverse response formats: multiple, short, transcription, true-false, completing, ordering, associating, summarizing, completing schemas or tables, and elaborating questions about the text.

The program is made up of two books, one for the teacher, with the program orientations, and the other for the student, which includes the texts, activities, and all the work materials.

To operationalize the dependent variable, reading comprehension, we used the “Prueba de Evaluación de la Comprensión Lectora” ([Reading Comprehension Assessment Test] ACL; Catalá et al., 2010), which contains different types of texts, grouped by level from 1st to 6th grade. Each level contains texts with 3 and 4 items that represent four comprehension levels: literal, inferential, critical, and reorganization. Literal comprehension is reflected in the skill to recognize information explicitly expressed in the text. It assesses strategies of “recognizing referents” and “finding the specific information in the text or selective inquiry.” Reorganization requires the skill to integrate and reuse information from the text to classify, summarize, etc. It assesses the strategies of “rewriting fragments and paraphrasing fragments from a text.” Inferential or interpretative comprehension requires readers to think beyond the written text and use their personal experience to deduce details, predict, elaborate hypothesis, or interpret the

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Method

Planning refers to the cognitive strategies used to manage goal-oriented behaviors and for the development and implementation of an approach to perform tasks that have not been carried out habitually (Locascio et al., 2010; Mahone et al., 2002). It includes knowledge of the use of strategies to understand what one reads, planning an organized response.

Sesma, Mahone, Levine, Eason, and Cutting (2009) found that planning contributes importantly to reading comprehension, but not to word reading. Cutting et al. (2009) studied a sample of students with difficulties in reading comprehension, finding that they displayed important deficits in the planning and organization of the associated skills. The study of Locascio, Mahone, Eason, and Cutting (2010) suggests that specific aspects of the executive function may be related to reading comprehension.

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stands for the specific situations presented. The underlining of the two numbers that are the same in the different columns of the Planning Scale requires an efficacious approach to sequentially connect a series of randomly distributed numbers, and to connect numbers and letters alternately and sequentially. The sum of the three subtests provides a standard score for the scale with a mean of 100 and standard deviation of 15. The reliability of this scale for the Spanish sample was .90, calculated by the test-retest procedure (Deaño, 2005).

**Administration procedure**

*Instruction program.* The “Aprender a Comprender” [Learning to Understand] program was applied through 30 thematic units, in 60-90-minute sessions, one day per week, for six months of the school term, integrated within the curriculum, in the subject of Language and Spanish Literature. The procedure followed is that indicated in the program: First: read the text; Second: answer the questions formulated by the members of the comprehension family; Third: act according to the response to those questions, writing them down in the corresponding space.

In each session, the teachers explained what to do and how to get organized to carry out the task. They asked the students to read the text individually, sometimes in silence and sometimes out loud, or they would read it to them. Then, the students worked individually or in pairs, in small groups or the entire class, answering the questions proposed. The last ten minutes were dedicated to discussing and assessing the task performed, for which purpose they received scoring templates.

The teachers were trained in the administration of the program, one for each intervention group, until their interpretation of the guidelines established in the program was equivalent. The teachers had to adapt to the orientations specified in the teacher’s book, which includes all guidelines to carry out the program. In successive meetings, doubts were resolved, and the teachers’ performance with the intervention groups was analyzed and monitored.

The comparison groups were instructed by another two teachers who were in charge of teaching the subject in these groups. They followed the habitual methodology, consisting of a spoken explanation of the tasks to be carried out with the texts of the book, reading the corresponding materials, and performing the proposed exercises individually. These groups received the same number of study hours as the intervention groups. They used reading texts of books from a publishing house, which were similar in typology, structure, and complexity to those used in the book of the “Aprender a Comprender” [Learning to Understand] program used by the intervention groups.

**Measurement of reading comprehension and planning.**

The pretest and posttest measures corresponding to reading comprehension (ACL) and planning (D.N.: CAS) were taken collectively. The Planning Scale (D.N.: CAS) was applied individually. The tests were administered one week before and one week after the intervention. The follow-up tests were carried out 24 weeks after the posttest, in each case, following the same protocol as for the previous measures. Both tests followed the administration rules established by their authors.

**Design and data analysis**

We used a pre/intervention/post/ follow-up design, comparing the intervention and comparison groups in each grade. We conducted a 2×3 (2 Groups: intervention and comparison, × 3 Measurement Moments: M1, M2, and M3) repeated measures analysis of variance with the general linear model procedure for reading comprehension (ACL) and planning (D.N.: CAS). We used the SPSS statistical package version 18.0.

**Results**

In 5th grade, analysis of the effect of the intervention on the variable reading comprehension revealed a main effect for measurement moment, $F(1, 47) = 171.225$, $p < .001$, $\eta^2_p = .785$, and a significant Group × Moment interaction, of a large size, varying from $M_1 (M = 4.67)$ to $M_2 (M = 6.25)$, with a large effect size.

The significant Group × Moment interaction, of a large size, indicated that, at M1, both groups had a similar performance in reading comprehension, $F(1, 47) = 1.323$, $p = .05$, $\eta^2_p = .027$, but at M2, the intervention group performed significantly better than the comparison group, $F(1, 47) = 8.496$, $p < .01$, $\eta^2_p = .153$. In the evolution of each group from M1 to M2, the increase of the intervention group’s scores was statistically significant, $F(1, 47) = 157.178$, $p < .000$, $\eta^2_p = .770$. The comparison group also increased their scores, $F(1, 47) = 36.429$, $p < .001$, $\eta^2_p = .437$, but with a smaller associated effect size than the intervention group.

For the variable planning, a main effect for measurement moment was found, $F(1, 47) = 111.426$, $p < .000$, $\eta^2_p = .703$, but the Group × Moment interaction was nonsignificant (Table 2). The 5th grade participants significantly improved their mean scores in planning from $M_1 (M = 99.16)$ to $M_2 (M = 105.61)$, with a large associated effect size.

The absence of a significant Group × Moment interaction shows that, at M1, the intervention group achieved a significantly higher performance in planning than the comparison group, $F(1, 47) = 4.545$, $p = .05$, $\eta^2_p = .088$. At M2, this initial difference was dissipated, with a very marginal level of significance, $F(1, 47) = 3.867$, $p = .055$, $\eta^2_p = .076$. The evolution of the intervention group
from one measurement moment to the next showed a significant increase of their mean scores in planning, $F(1, 47) = 55.284, p < .001, \eta^2_p = .540$. This was also found for the comparison group, $F(1, 47) = 56.147, p < .001, \eta^2_p = .544$, with a similar effect size for both groups.

The effect of the intervention program on the 5th graders’ reading comprehension was maintained at the follow-up measure (Table 3). All the children improved their mean scores in reading comprehension from $M2 (M = 6.25)$ to $M3 (M = 6.78)$, $F(1, 47) = 44.069, p < .001, \eta^2_p = .484$, but the gains of the students from the intervention group were statistically significant compared with the other group, $F(1, 47) = 4.775, p < .05, \eta^2_p = .116$, and the comparison group, $F(1, 47) = 47.136, p < .001$, gained in reading comprehension.

For planning, when analyzing $M2$-$M3$ and controlling for $M1$, the 5th graders performed similarly at both measurement moments, $F(1, 43) = 162.037, p < .001, \eta^2_p = .790$, with a large effect size. Reading comprehension at $M2 (M = 6.83)$ was significantly better than at $M1 (M = 5.12)$ for all the 6th grade students. A significant Group × Moment interaction was also produced (Table 4). At $M1$,
In planning, both the 6th grade groups increased their scores significantly at posttest and follow-up, as the students who took part in the intervention program increased their scores differentially from the comparison group. The intervention group gained more, with a large effect size.

The second proposed goal, the maintenance of the effects of the intervention six months after completing the program, was confirmed in the reading comprehension level in the 5th grade intervention group, with regard to the comparison group. The improvement in planning achieved by the 6th grade intervention group was maintained at follow-up compared to the posttest measurement, with important differences regarding the comparison group. This shows the lasting effect of the improvement in planning processes, which contribute to reading comprehension.

These results coincide with studies showing improvement in trained reading comprehension strategies (Echevarría, 2006; Spörer, Brunstein, & Kieschke, 2009). Students who followed the “Aprender a Comprender” [Learning to Understand] program showed that they know the principles of the trained comprehension strategies, they apply them to new situations, and they maintain the learnings, as manifested in normalized reading comprehension tests (Spörer et al., 2009). They acquired these principles by means of the aid and facilitation of questions that were first provided by the characters of the Comprehension Family and that they gradually asked themselves. They became aware, not only of the principles of the trained strategies, but also of their combination and use for their reading goals. This seems to be reflected in their planning scores regarding reading comprehension (Das et al., 1994) and current studies that show that planning is an important component of reading comprehension (Cutting et al., 2009; Sesma et al., 2009).
This proposal lends some meaning to other results of this study, where the comparison groups, both of 5th and 6th grade, following the habitual school program for primary education, obtained similar scores in reading comprehension and planning at some of the measurement moments.

These results extend our existing knowledge of the efficacy of instruction programs in reading comprehension, by including support through questions formulated in the learning context in order to make the students aware of the most efficient cognitive strategies for the development of reading competence. Textual instruction is efficacious to regulate the cognitive resources of readers, who are also aided by actively dealing with the combination of multiple strategies for reading comprehension, progressively improving it while they develop planning, which is also necessary to supervise and regulate reading skills.

This study presents some practical and empirical limitations regarding the difficulties encountered by the teachers to apply a new approach in classrooms that had been formed for years, and with learning experiences that were different from the one presented herein. It is necessary to extend the number and sociodemographic characteristics of the participants, controlling for the effect of variables such as the teacher, the contents of the texts, the students’ interest and motivation, and the randomness of participant assignation to the groups.

Future research should determine which strategies, of those developed by the program, are the most effective to improve reading comprehension and promote its planning.

References


