



Evaluating effects of different forms of revision instruction in upper-primary students

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Abstract

This study aimed to establish (a) whether teaching students revision skills provides benefit over and above teaching strategies for setting explicit goals for the communicative effect of their text, and (b) whether teaching students to adopt specific revision strategies provides benefits over revision instruction that focusses on increasing students' awareness of audience needs. Six classes of Spanish sixth-grade students (N=107, 11–12 years) were randomly assigned to one of three conditions. In all three conditions students were taught to set communicative goals. Students in the Strategy Focused condition were then taught a 6-step revision strategy. Students in the Reader Focused condition observed a reader trying to comprehend a text and suggesting ways in which it might be improved. Students in a control condition continued with goal-setting practice. Students' writing performance was assessed through composition and revision tasks before and immediately after intervention, 2 months post-intervention, and for transfer to an untaught genre. Writing performance and revision skills improved more in the two revision-instruction conditions than for students in the control condition. The improvements were large, persistent and transferred to a different type of text. We found no statistically significant differences between the two revision conditions. Findings suggest that specific revision instruction benefits sixth-grade students' writing performance and revision skills, but that strategy-focused and reader-focused approaches are similarly effective.

Keywords Strategy-focused instruction · Reader-focused instruction · Goal-setting · Text quality · Revision skills · Upper-primary students

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Introduction

Learning to write is one of the most complex and cognitively demanding activities that children face in school. This can be easily explained if we consider the wide range of processes and factors involved in the composition of high-quality texts (Berninger & Winn, 2006; Graham et al., 2019; Hayes, 1996, 2012; Hayes & Flower, 1980). From a cognitive perspective, effective writing demands the management of low-level transcription skills, which include handwriting and spelling processes, and high-level skills, such as planning and revising (the “Not-So-Simple” view of writing, Berninger & Winn, 2006). These processes, in combination, impose heavy demands on a child’s working memory (Alamargot et al., 2010; Olive, 2014). In order to cope with these demands, and reduce the chances of becoming overloaded, beginning and less skilled writers tend to adopt a knowledge-telling approach to writing (Bereiter & Scardamalia, 1987). This involves students translating content as they think of it rather than thinking about what the audience needs to know and how the text is best structured to support communication. Resulting texts are therefore often weak in both content and rhetoric. A potential solution is that students regulate what they do when they write by adopting specific, explicit planning and revision strategies. Ability to revise—to effectively evaluate and edit draft text—is seen as a key writing process in seminal cognitive models of writing (Bereiter & Scardamalia, 1987; Hayes & Flower, 1980). In comparison to evaluations of interventions that teach text planning, however, revision has relatively little research attention particularly in primary-aged students (Graham & Perin, 2007).

Revision is an evaluative, problem-solving process in which writers detect and attempt to reduce mismatch between their intended message and their inferences about the probable communicational effect of the text that they have actually written (Chanquoy, 2009; Hayes et al., 1987). Although experienced writers vary in the extent to which they tend to revise their text, revision skills are typically seen as an essential component of writing expertise (e.g., Fitzgerald, 1987). Revision tends, however, to be largely absent in the writing processes of upper-primary students (Limpo et al., 2014; López et al., 2019). When novice writers are asked to revise their texts, without specific additional instruction, changes tend to be superficial rather than substantive and typically result in minimal benefit to the text (Limpo et al., 2014; López et al., 2019).

This suggests that, although substantive revision has the potential to improve the content and, particularly, the rhetoric of students’ texts, this promise is often not fulfilled by students’ actual revision practices. There would, therefore, seem to be a strong case for teaching students explicit revision strategies. There is evidence that strategy-focused revision instruction results in improved text in secondary or undergraduate writers (Cho & MacArthur, 2011; De la Paz et al., 1998; Sengupta, 2000; Song & Ferretti, 2013). However, these positive results do not seem to hold for upper-primary students. Although teaching revision in primary school can result in students revising more—i.e., revision strategies appear to be teachable—it does not tend to result in reliable improvements to students’ texts

(Fitzgerald & Markham, 1987; Graham, 1997; Scardamalia & Bereiter, 1983). For example, Scardamalia and Bereiter (1983) taught fourth and sixth grade students revision strategies based around *Compare, Diagnose and Operate*. Students applied this procedure, sentence-by-sentence to their own text, first asking themselves if the text matched their intended meaning, and if not identifying and rectifying issues. After instruction students made more revisions between drafts, however the overall quality of their texts did not improve.

There are two possible, and mutually compatible reasons for this failure for revision strategies to impact the quality of students' texts. One possibility is that students do not have a clear understanding of the message that they wish to convey and/or the effect that they wish to have on their reader against which to compare what they have written (Galbraith & Rijlaarsdam, 1999; McCutchen, 2006). That is, students lack clear goals for the communicative effect of their text to guide the evaluation of their text. This suggests that teaching revision strategies will be effective only if it is combined with teaching students to set clear and explicit goals for their text. There is some evidence that this is the case for upper-primary students in inclusive settings who struggle with writing (De la Paz & Sherman, 2013; McKeown et al., 2020). In these studies students were taught both in revision strategies and goal setting procedures. For example, De La Paz and Sherman (2013) reported findings from a small-N study in which students with different writing abilities were taught goal setting, evaluation criteria focused on genre elements and strategies for applying these criteria when revising their text. All students produced more substantive revisions which in turn resulted in students writing higher quality texts. This finding clearly needs replicating in a larger sample. It is also not clear whether findings of improved text quality reflect the effect of revising per se. Goal setting, on its own, is likely to benefit students' revision skills and text quality (Graham et al., 1995; Midgette et al., 2008). It seems to be that teaching students goal setting procedures, without also teaching revision strategies, have a similar positive effect.

A second reason why teaching revision strategies may fail to have a positive impact on the quality of students' text is lack of understanding of audience needs. Students may have strategies and motivation to revise their text and may have clear goals for the text's effect against which to evaluate what they have written. However, if they don't bring to their revision an awareness of audience—they don't give attention to how their readers might respond to their text—then both evaluation and remediation will fail. Both cognitive and social perspectives of writing emphasize the importance of audience awareness (Graham, 2018; Hayes, 1996; Nystrand, 2006).

Several studies have shown that a combination of promoting audience awareness—encouraging students to think of their text as being written for others—and helping students to take their readers' perspective, positively impacts on the quality of their revisions and final texts (for a review see Rijlaarsdam et al., 2009; Rijlaarsdam & Van den Bergh, 2005). The instructional approach evaluated in these studies starts from the assumption that effective revision is based, first and foremost, in the ability to take the reader's perspective on your own text. This involves both awareness of the needs of potential readers, and the ability to predict how readers will respond to what you have written. Both providing the opportunity to become readers

of other students' texts (Boscolo & Ascorti, 2004; Holliway & McCutchen, 2004; Moore & MacArthur, 2012) and observing readers trying to understand the authors' text (Lumbelli et al., 1999) appear to have a positive impact on upper-primary students' revision skills and writing performance. Holliway and McCutchen (2004), for example, asked fifth grade students to write descriptive essays about abstract geometric shapes. After three sessions, those students who read other's descriptions and tried to match them to shapes (i.e., experienced being a reader), showed consistent and significant improvements, relative to controls, both when revising their own text and writing new descriptions. Lumbelli et al. (1999), provided sixth-grade students with instruction that involved reading directions to play a game written by other students, listening to a carefully scripted "think-aloud" of a reader analysing parts of the text that they found difficult to comprehend and then generating possible solutions. After three sessions students in the experimental condition did better in identifying problems in a new text and writing directions for another game compared with students in a business-as-usual control group. It may, therefore, be that directly instructing students in what they need to do when they revise—giving them explicit revision strategies—is less important than raising their awareness of what their readers need to know and allowing this to affect how they revise their text.

The present study

The present study evaluated different approaches to teaching sixth grade students' how to revise their texts. We addressed two questions:

Question 1 Does teaching revision result in improvements to students' texts over and above teaching them to set clear communicative goals? As we have discussed, previous research does not provide clear evidence for the benefits of revision instruction in upper primary. What evidence exists leaves open the possibility that gains found from revision instruction are not achieved as a result of learning to revise per se—i.e., from teaching students to review, evaluate and then edit their text—but from the students learning to set goals. Our study compared interventions that taught goal-setting and revision with a control condition that taught goal-setting alone. This provided a direct test of the additional benefits of learning to review and edit text. If goal-setting is sufficient for the improvement of students' revision and writing skills, we expected to find no difference between the experimental conditions and the control (goal-setting only) condition. Differences between the revision-instruction conditions and the goal-setting only control condition would confirm the additional value of teaching students to revise.

Question 2 What are the relative benefits of teaching students explicit revision strategies or focussing instruction on an awareness of audience needs? It may be that for students to effectively revise they must learn explicit revision strategies. These strategies then provide them with the executive control necessary to effectively marshal their knowledge of content and rhetoric when they revise. Alternatively, it may be that learning explicit revision strategies is less important than understanding how readers might respond to their text. We therefore compared two different ways in which revision might be taught. In a Strategy Focused condition students

Table 1 Summary of the features of each condition

	Reader-Focused	Strategy-Focused	Control
Set communicative goals supported by mnemonics	+	+	+
Encouragement to improve texts through revision	+	+	
Encouragement to consider the audience when revising	+		
Observation of reader detecting mistakes on imperfect text and providing solutions	+		
Direct instruction of revision strategy supported by mnemonics		+	
Modelling of the use of revision strategy		+	
Practice by pairs	+	+	+
Individual practice	+	+	+

“+” indicates that the feature was present

were taught a revision strategy that prescribed a specific sequence of actions. These were then modelled by an instructor who “thought aloud” while revising a text. In a Reader Focused condition students observed a reader (the researcher) reading an imperfect text, commenting on their understanding, and suggesting ways in which the text might be improved. If teaching explicit strategies is a prerequisite for effective revision in sixth-grade students, then students who receive strategy-focused instruction will necessarily outperform students who receive just reader-focused instruction. If understanding reader needs is essential to motivate effective revision, then we would expect to see better performance in the reader-focused condition.

Methods

Design

Six full-range Spanish 6th grade classes, three in each of two schools, were allocated, randomly within school, to Strategy Focused, Reader Focused, or Control conditions, giving two classes per condition. The key characteristics of instruction in each condition is summarized in Table 1. In all three conditions students were first taught an explicit strategy for setting goals for their text. Goal setting remained the main focus of instruction in the Control condition. In the Strategy Focused condition, students were taught an explicit revision strategy, detailed below. In the Reader Focused condition, students observed a reader representing the intended audience who read imperfect texts out loud, articulating their response to the text and making suggestions for improvement. Instruction in all conditions focused on composing argumentative texts, and was delivered by the first author in four, 50 to 55-min sessions in consecutive weeks.

Performance was assessed as follows: Participants performed two tasks, one assessing composition and another assessing revision competence, immediately before and after intervention (pre-test, post-test), and two months after the end of

Table 2 Sample features (Mean, (SD), number of participants, percentage of female students per condition)

	Reader-focused		Strategy-focused		Control	
	School 1	School 2	School 1	School 2	School 1	School 2
	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
Mean age in months (SD)	160.3 (3.33)	160.5 (4.01)	160.2 (2.62)	161.9 (4.99)	160.1 (2.82)	159.8 (3.67)
N (% female)	18 (61%)	19 (42%)	18 (44%)	19 (58%)	15 (47%)	18 (56%)
Total	37		37		33	

the intervention (follow-up). They also completed a post-intervention composition task assessing transfer to a different genre (transfer task). Text quality was assessed through holistic (reader-based) ratings of *goal orientation*, *audience focus*, *structure*, and *language use*, following a coding protocol described by Van den Bergh and Rijlaarsdam (1986). Revision performance was assessed by a task in which students were asked to detect and remedy various surface and substantive problems in a researcher-produced text.

Participants

Participants were students in 6th grade classes in two urban schools drawing from a predominantly middle-class population in León, Spain. Fourteen students with diagnosed special educational needs and 21 students who did not complete both pre- and post-tests (composition and/or revision tasks), were not included in the sample. The final sample (N=107) is detailed in Table 2. A further five students were absent at follow-up and four students were absent for the transfer task, giving samples of, respectively, 102 and 103 for these analyses. All students spoke Spanish as their first language.

Educational context

In Spain students begin primary education at the age of six and complete six years of primary school. There is a national expectation that by the end of primary education students should be able to use writing as an effective communication tool (Real Decreto 126/2014, de 28 de febrero del Ministerio de Educación, Cultura y Deporte). Students are expected to learn how to plan, draft and revise their texts, and to be able to produce text in a number of different genres. There is some evidence, however, that in practice teaching often deviates from this requirement (Sánchez-Rivero et al., 2021) with a tendency for teachers to focus of surface-level text features (grammar and spelling).

Writing instruction in the schools sampled in this study focused on the main features of different text genre, writing practice based on those genre features and text correction with particular emphasis on mechanical aspects such as spelling or

grammar. Despite the fact that the teaching of mechanical aspects of writing is primarily addressed in previous grades, it is still a main content at the end of primary education.

To provide some standardisation of learning across students prior to intervention students in our sample received two researcher-delivered sessions (55 min each) in which they were briefly taught about the aim, features and structure of argumentative texts. These sessions included students producing their own texts in class and the teacher discussing some of these with students. This instruction occurred prior to pre-test.

Instruction

Instruction was delivered in four, 55 min, whole-class sessions. The content of these is summarised in Table 3. In all three conditions, the interventions started with strategy-focused instruction designed to help students at the start of producing a text, to set goals for what their text should achieve. Students were taught to set goals focused on content, and on the structure and choice of expression that would best communicate this content to their intended reader (Galbraith & Rijlaarsdam, 1999). This instruction was based around the INCA mnemonic: *Introducción* (Introduction; e.g., communicative goal “*I need to introduce the topic in an attractive way to kept the attention of mi audience*”), *Nudo* (Development; e.g., communicative goal “*I am going to write every reason with a clear example to convince the audience*”), *Conclusión* (Conclusion; e.g., communicative goal “*I am going to remind my audience what my main point is*”) and *Aspecto* (Presentation and style; e.g., communicative goal “*I need to use paragraphs to make it easier to understand*”). At the end of the session students were set a homework task that involved using the INCA strategy to set communicative goals and to write an argumentative text. The remainder of the instruction varied across conditions as follows.¹

Strategy focused instruction

In the Strategy Focused condition, instruction aimed to teach students an explicit strategy designed for motivating and structuring their revision processes. Students were taught to revise their texts in six read-revise cycles, starting with at the macro-level (content, structure) and moving on to micro-level issues (spelling and grammar) only once all higher-level issues had been resolved. Learning this procedure was scaffolded with the mnemonic *PIENSO* (in English “*I think*”): *Planes iniciales* (initial goals), *Ideas* (content), *Estructura* (text structure), *Nexos* (links—the use of cohesion ties between sentences and paragraphs); *Sintaxis* (sentence-level grammar); and *Ortografía* (spelling). Students were instructed to read through their draft, focussing on whether or not they felt it met their goals (*Planes iniciales*) identified

¹ A more detailed description of both revision interventions strategy-focused and reader-focused, but not their evaluation, is provided in López et al. (2018).

Table 3 Intervention procedure

Session	Reader-Focused	Strategy-Focused	Control (No revision)
1	<ul style="list-style-type: none"> - Revision process - Information about the need to take into account reader's needs - Observing a reader reading and commenting on imperfect texts 	Direct instruction of strategies for setting communicative goals (INCA mnemonic) <ul style="list-style-type: none"> - Revision process - Direct instruction of the PIENSO revision strategy - Observing a model applying PIENSO Homework: set communicative goals and write an argumentative text for next session	<ul style="list-style-type: none"> - Learning activities to set communicative goals
2	<ul style="list-style-type: none"> - Observing a reader reading and commenting on imperfect texts 	<ul style="list-style-type: none"> - Observing a model applying PIENSO 	<ul style="list-style-type: none"> - Learning activities to set communicative goals
3	<ul style="list-style-type: none"> - Practice in pairs – revise and write the final version of the text (writer and helper roles) - Observing a reader reading and commenting on imperfect texts 	<ul style="list-style-type: none"> - Observing a model applying PIENSO 	<ul style="list-style-type: none"> - Practice in pairs –chose a topic and set goals (writer and helper roles) - Learning activities to set communicative goals
4	<ul style="list-style-type: none"> - Practice in pairs – revise and write the final version of the text (writer and helper roles reversed) - Individual practice – revise a research-created text and write the final version of the text 	<ul style="list-style-type: none"> - Practice in pairs – write a text (writer and helper roles reversed) - Individual practice – set communicative goals and write a text 	<ul style="list-style-type: none"> - Practice in pairs – write a text (writer and helper roles reversed) - Individual practice – set communicative goals and write a text

previously via the INCA procedure and making necessary changes if not. Then they read and revised again for *Ideas*, and so forth.

In the first session students were first presented with a metacognitive matrix which included information about what is revision, how to revise and when and why to revise. Then the instructor explained the PIENSO revision strategy supported by the use of graphic organizers. Once the strategy was clear, students observed a model (the researcher) thinking aloud while using the PIENSO procedure to revise an imperfect argumentative text. In the second and third sessions, students again observed the model applying the PIENSO strategy to revise an imperfect argumentative text. After the observation, students worked in the pairs collaboratively revising a text that they had written as a homework task. Each student in the pair was assigned with a role, writer or helper. Students with the writer role performed the revision task, verbalizing all their actions and thoughts and following the PIENSO strategy throughout. Helpers were asked to support their partner's (the writer's) use of PIENSO, by commenting on the writer's think aloud. Pairs comprised students of broadly similar ability. Pairs were matched by their regular Language teacher. The collaborative task took between 20 and 25 min. Roles were reversed in the third session. In the fourth session students worked individually to revise a researcher-created text that included substantive as well as mechanical issues. This task lasted about 25 min. First, students read the author's communicational goals and critically read and revised the text using the PIENSO strategy, emulating the model that they had observed in previous sessions. Finally, students produced a revised version of the text.

Reader focused condition

In the first session, students were first introduced to the general purpose of revising their texts (*what, where, and when* to revise) as in the Strategy Focused Condition. However, in this condition students were additionally introduced to the need for considering readers when doing revising. Students then observed the researcher "thinking aloud" while reading an imperfect argumentative text, prepared by the researchers, taking the role of a critical reader. Think aloud was semi-scripted and included statements like "*I don't really know what they are saying here, I need more information*", "*But this reason sounds the same as their first reason. I would remove it*", and "*I nearly ran out of breath reading that sentence. I would split it into two sentences*". The readers commented both on substance and macro-structure (i.e., lack of information, organization, lack of structure, content, use of links) and on surface-level features of the text (i.e., grammar, spelling). Each statement was associated with a point in the text where a revision (addition, deletion, rewrite) might occur. It is important to note that the reader not only made comments about mistakes in the texts, but also made recommendations for change.

In the second and third sessions the researcher first described the goals that the "author" of the text set herself, and then read the text aloud in front of the class, inserting comments as in the previous session. Then students worked in the writer-reader pairs collaboratively revising their homework texts as in the Strategy Focused condition. The student with the reader role read the writer's homework text,

emulating the think-aloud of the model reader that they had just observed. The student with the writer role then revised their text in light of the reader's comments, again thinking aloud. Roles were reversed in the third session. In the final session (Session 4), students individually had to revise the same researcher-prepared text as students in the Strategy Focused condition. First students read the author's communicative goals and critically read the text, emulating the reader that they had observed, and then produced a revised version.

Control condition

Instruction in the control condition focused solely on setting communicative goals. No instruction on revision was provided. In the first session, students were reminded of the INCA strategy. They then read two short argumentative texts and answered questions about the texts' structure, content and the extent to which communicative goals were met. In the second and third sessions students first read short texts and tried to guess the communicative goals of the writer, choosing from a list the goals that they thought the writer had met. Students then practiced writing, in the writer-helper pairs. Students with the writer role wrote texts while thinking aloud. Helpers commenting on the extent to which writers adhered to the INCA strategy. In the second session, the writer focused on setting communicative goals for their text. In the third session, the writer wrote the final text aiming to meet the previously-set goals. Writer and reader roles were swapped between in the third session. In the fourth session students worked individually, first setting goals and then writing an argumentative text.

Treatment fidelity

Instruction in all conditions was delivered by the first author—a trained teacher who had previous experience with delivering similar writing instruction. Session content was prescribed in detail, with delivery of essential components scripted or partially scripted. This included the “think-aloud” during modelling.

All sessions were audio-recorded. Audio recordings for all sessions in the three conditions were analysed (24 recordings in total). To establish delivery fidelity, we divided each session scripts into essential instructional components, giving 22 components in each of the revision instruction conditions and 15 components in the control condition. Audio recordings were then coded to establish whether each of these components was delivered, in its entirety, in the appropriate session. All components were delivered in all classes in both revision focused conditions, with the exception of one of six planned components in Session 4—discussion about the changes that students had made to their texts in that session—which was omitted in all classes due to lack of time. In the control condition all components were present in all classes in all sessions, with the exception of one of the three components for one class in Session 4 (reading some of the completed texts in front of the class).

The focus of all sessions were specific assignments that required written output. As a second check on fidelity written products from all learning tasks were collected by the researchers. These materials were then coded on the basis of whether or not the student had completed the intended task. In each condition, students had to complete eight tasks during the intervention. Students completed a mean of 96% of the prescribed tasks ($M=7.67$; $SD=0.64$), 94% ($M=7.53$; $SD=0.56$), and 94% ($M=7.43$; $SD=0.49$) in, respectively, the Strategy-Focused, Reader-Focused and control conditions.

Measures

Writing tasks

At pre-test, post-test and follow-up students responded to prompts requiring short argumentative texts (e.g., *La cautividad de animales salvajes en el zoo, ¿A favor o en contra?*—The captivity of wild animals in the zoo: For or against?). Three different topics were counterbalanced across measurement occasion and condition. For the transfer task students wrote a set of instructions for a simple science experiment. For just this task, students were provided with source materials. Students wrote by hand. They were provided with paper for rough notes, which they could use if they wished, and a separate sheet for their final text. All tasks had a time limit of 35 min.

Texts were evaluated by trained, experienced raters for goal orientation, audience focus, structure, and language use. *Goal orientation* ratings were based on the extent to which the text presented a clear position, supported this position with clear arguments, avoided irrelevance, and gave arguments that were consistent with a specific position. *Audience focus* ratings assessed the inclusion of an attractive and interesting introduction, the use of meta-structural ties (e.g., *Now, I am going to talk about...; In this text, I am going to convince you...; As I have argued...*), and appropriate vocabulary considering the audience. *Structure* assessed the presence of conventional structure (for argument texts, introduction, development and conclusion with appropriate content in each part of the text); the use of rhetorical coherence ties between ideas and paragraphs (e.g., however, therefore); and appropriate paragraphing. Finally, the *language use* ratings examined sentence structure, punctuation, and spelling; diverse and appropriate vocabulary and interesting examples.

Two raters scored texts using a method based on benchmark texts (e.g., Bouwer et al., 2018; Rietdijk et al., 2017). In order to select the benchmark texts, the raters first compared and discussed a sample of 50 texts randomly selected from all measurement occasions. On the basis of this they identified texts that represented average performance, best and worst performance, and performance at 25th and 75th percentiles. These texts were then used to benchmark a scale from 70 to 130, with

benchmark texts representing compositions with ratings of 70, 85, 100, 115 and 130 points and all texts were then rated using this scale.

This process was repeated for each of the four text-quality dimensions. Correlations between raters' scores indicated good reliability both for argumentative texts (Goal Orientation, .89; Audience, .80; Structure, .90; Language Use, .85) and for the transfer task (Goal Orientation, .87; Audience, .83; Structure, .92; Language Use, .84).

We also counted number of words in the final text, ignoring words that were crossed through. This measure was included as a control variable in order to assess if there were differences between conditions in terms of text length. This would allow us to explore if positive intervention effects (if found) are independent of how much students write, which is closely link with motivational aspects (Bruning & Horn, 2000).

Revision task

As a measure of revising skills, independently of written composition skills, we asked students to revise short researcher-prepared texts. Three argumentative texts, each 280 words long, were counterbalanced across conditions and test-occasions. These texts contained four surface-level errors (mistakes in spelling and syntax) and six substantive issues that affected the coherence of the text (lack of structural elements, missing, inconsistent, and out-of-sequence sentences; see "Appendix 1" for an example). Students were asked to read the text carefully and mark anything that did not sound right or that could be improved, and to describe the problem (e.g., "There is no introduction."). Students received one point for each error that was successfully detected and named, giving scores calculated separately for surface and substantive errors. Second, for each problem that they identified students were asked to state a solution (e.g., "Add an introduction where you present the topic and state your opinion clear about the topic."). One point was given for each correct solution, again scored separately for surface and substantive errors ($\alpha_{\text{mechanical issues}} = .80$; $\alpha_{\text{content issues}} = .86$).

Thirty percent of revision responses, distributed across conditions and test occasions, were scored by a second rater. Cohen's weighed Kappa showed a good inter-rater agreement, across the four measures, with a mean of .98 and a minimum agreement of .96.

Statistical analysis

Data were analysed with linear mixed effects models, with condition (control, Strategy-Focused, Reader-Focused) and test occasion (pre-test, post-test, follow-up, transfer) as fixed factors, and random intercepts for class groups, and for students nested within class. We first established whether there was evidence that improvement in performance in the intervention conditions was greater than improvement in the control condition. To this end we started with an intercept-only model (Model

0), then added dummy variables representing the main effects of condition and test occasion (Model 1). Finally, we added the interaction between test occasion and condition (Model 2). Dummy variables were treatment coded, with pre-test and control as the reference categories. We then determined whether the two intervention conditions differed in their effects on performance. This involved evaluating the same models, but with data for the control condition removed. Throughout we used loglikelihood ratio χ^2 tests to compare models. Where there was evidence for an interaction between test occasion and condition (i.e., where Model 2 provided best fit) we then established statistical significance for model parameters by evaluated against a t distribution, with the Satterthwaite approximation for degrees of freedom. Models were implemented in R using the lme4 and lmerTest packages (Bates et al., 2015; Kuznetsova et al., 2017).

Results

Observed means, by assessment tasks and condition, are shown in Fig. 1 (composition task) and Table 4 (revision task). All fit statistics and parameter estimates are given in the “Appendix 2”. Test statistics for focal hypotheses are also given in the text. Appendix Table 7 gives observed standardized effect sizes (see table note for details).

Composition task

Observed means for holistic text quality measures and on word count before and after intervention are presented in Fig. 1. These are also tabulated in the “Appendix 2”. Findings from inferential models indicated no significant interaction between composition task and condition for word count ($\chi^2(6)=4.0, p=.67$ for comparison of the main effect model—Model 1—and the interaction model—Model 2), but significant interactions for all quality measures ($\chi^2(6)>43, p<.001$ in all cases). Tests on individual parameters from the final model (Model 2) indicated that improvement relative to pre-test at each of post-test, follow-up, and transfer test was significantly greater in both of the intervention conditions than in the control group. This was true for all four text quality measures ($t>9.3, p<.005$ for all effects with the exception of audience focus at post-test in the Reader-Focused group, for which $t=2.5, p=.012$).

We found no evidence of reliably different effects for the Reader-Focused and Strategy-Focused groups. Comparison of Model 1 and Model 2 omitting the control group gave $\chi^2(3)\leq 8, p>.05$ for word count and all four quality measures.

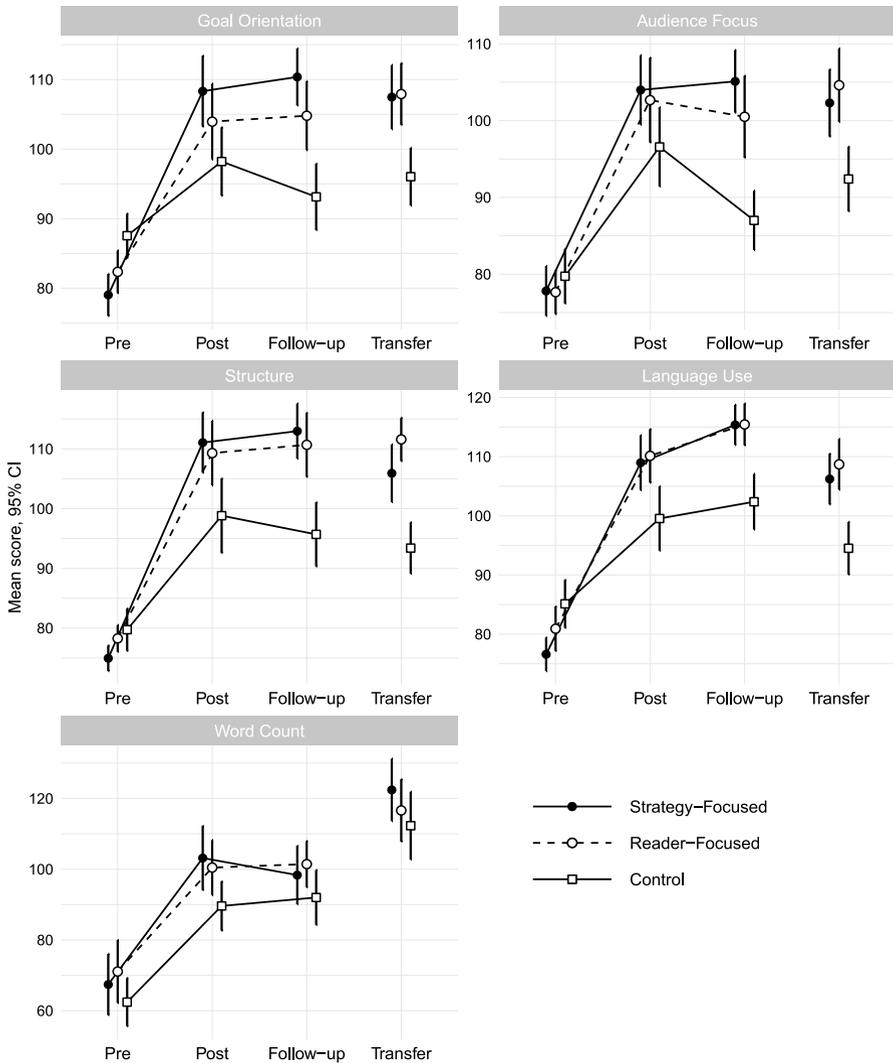


Fig. 1 Mean scores for the four holistic text quality measures and for word count. Error bars represent 95% CI

Revision task

Observed mean scores for intervention conditions at each test occasion in the revision task are presented in Table 4. We found no evidence of a control by test occasion interaction for detection or correction of surface errors ($\chi^2(4)=6.6, p=.16$ and $\chi^2(4)=4.5, p=.67$ respectively for comparison of the main effect model—Model 1—and the interaction model—Model 2). The interaction model did, however, provide better fit for detection and correction of substantive errors ($\chi^2(4)>30, p<.001$). Tests on individual parameters from the final model indicated that improvement relative to pre-test at each of post-test, follow-up, and transfer test was significantly greater in both of the intervention conditions than in the control group ($t>3.5, p<.001$ in all cases).

As with our findings for text quality measures, we found no evidence of different effects for the Reader-Focused and Strategy-Focused group ($\chi^2(3)\leq 5.0, p>.05$ for comparison of Model 1 and Model 2 omitting the control group).

Relationships among outcome measures

Correlations among outcome measures are reported in Table 5 (see table note for an explanation of the analysis). As might be expected, we found strong correlations among holistic writing quality measures. Quality measures were weakly correlated with substantive error detection and correction in the revision task, and unrelated to mechanical errors detection and correction. Word count was only weakly related to other measures. It is worth noting that for the revision task, ability to detect an error of a specific type was near perfectly correlated with ability to successfully correct the error. There was, however, no relationship between performance for surface and for substantive errors.

Discussion

The first aim of the present study was to explore whether instruction that focusses specifically on goal-setting and revision resulted in improvements of upper-primary students' revision skills and text quality over and above instruction that focused just on setting goals for the communicational effect of the text. We found that when students were taught revision in combination with strategies for setting goals for the communicative effect of their texts, then both performance on a revision skill task and the quality of their written compositions improved. This improvement was substantially more than for students who only received goal-setting instruction. There was little evidence of decline in performance after two months, and effects were also present in a task in which students wrote in a genre different from the genre that they had been taught. These gains occurred both when students were explicitly taught a six-point revision strategy and when they observed a reader commenting on a text and suggesting improvements. Our results are consistent with findings from

Table 4 Revision task: observed mean score for intervention conditions at each test occasion. Standard deviations in parenthesis

	Reader-focused			Strategy-focused			Control		
	Pre-test	Post-test	Follow-up	Pre-test	Post-test	Follow-up	Pre-test	Post-test	Follow-up
	Detect Surface	1.8 (1.1)	2.3 (1.1)	2.4 (1.0)	2.3 (1.0)	2.5 (0.94)	2.3 (1.0)	2.0 (1.1)	2.1 (1.2)
Detect Substantive	0.18 (0.45)	2.1 (1.6)	1.6 (1.2)	0.14 (0.42)	1.9 (1.6)	1.6 (1.4)	0.27 (0.55)	0.62 (0.85)	0.6 (0.88)
Correct Surface	1.8 (1.1)	2.3 (1.1)	2.4 (1.0)	2.3 (1.0)	2.5 (0.94)	2.3 (1.0)	2.0 (1.1)	2.1 (1.2)	2.3 (1.0)
Correct Substantive	0.18 (0.45)	2.1 (1.6)	1.4 (1.1)	0.14 (0.42)	1.9 (1.6)	1.6 (1.4)	0.27 (0.55)	0.62 (0.85)	0.47 (0.7)

As can be seen from the correlations presented in Table 5, the nature of the revision task was such that in nearly all cases where students detected an error, either surface or substantive, they also corrected it successfully

Table 5 Correlations among outcome variables across measurement occasions

	Words	Goal	Audience	Structure	Language	Detect surface	Detect subs	Correct surface
Goal orientation	.34							
Audience focus	.34	.89						
Structure	.36	.89	.72					
Language use	.26	.78	.56	.76				
Detect surface	.06	.09	.15	.05	.09			
Detect substantive	.21	.38	.39	.37	.34	-.05		
Correct surface	.06	.10	.16	.06	.09	1	-.05	
Correct substantive	.21	.38	.43	.38	.33	.00	.99	-.04

$p < .05$ for values above .20. Parameters from linear mixed effects models of scores from all tests and students with random intercepts for students and random slopes and intercepts for test

previous research that found positive effects of teaching upper-primary students to revise their texts following a revision strategy that combined with goal-setting procedures (De la Paz & Sherman, 2013; McKeown et al., 2020) and of interventions that promoted students' awareness of readers' response and communicational needs (Boscolo & Ascorti, 2004; Holliway & McCutchen, 2004; Lumbelli et al., 1999).

Looking at effects for the revision task, we found no evidence of improved performance after intervention in detection or correction of surface errors in either of the revision instruction conditions, relative to controls. Revision instruction did, however, increase students' ability both to detect and to correct substantive issues in the text. This suggests that what students learned from the revision instruction was not a general ability to read their text attentively and critically but a new sensitivity to the text's rhetorical or substantive dimensions (i.e., features of the text that would reduce readers' understanding of its message).

Therefore, specifically encouraging students to read back over their text and make changes does appear to benefit the quality of their text, over and above teaching goal setting, and this effect coincided with increased ability to detect and suggest solutions to substantive errors in text written by someone else. It is possible that improvement in performance resulted just from increased motivation rather than from learning new skills. Text length, as an indicator of motivation, increased substantially in all three conditions. However, effects were similar in control and revision intervention groups. Therefore, although there was a tendency for longer texts to gain higher quality ratings this does not appear to account for improved performance in the revision conditions relative to control. Additionally, intervention effects were sustained at 2 months, after all students had return to their normal, largely product-oriented writing instruction. We believe, therefore, that improved performance in the present study resulted from students learning revision skills rather than simply gaining greater enthusiasm for writing.

The second question addressed by this study asked about the relative merits of teaching students explicit revision strategies versus focusing revision instruction on how a reader might respond to their text. We did not find evidence of a difference between the effects of these two approaches to instruction. This is evidence against

the strong claim that direct strategy instruction—explaining and encouraging students to memorise and follow a specific set of procedures for revising their text—is essential if students are to benefit from instruction that teaches revision: This direct instruction was absent from instruction in the Reader Focused condition. As we comment below, our data do not provide evidence of mechanism, however. It may be that in upper-primary children watching a reader suggesting changes that might be made to a text is sufficient to provide students with strategies for regulating their own writing actions. Alternatively, it may be that both strategy- and reader-focused instruction act mainly to give students better understanding of the requirements of good text, that is, the instruction may impact on students' task representations which is an essential component of writing (Hayes & Flower, 1980; Rijlaarsdam & Van den Bergh, 2006). A major focus of both conditions was necessarily not just on the need to identify and correct substantive (ideational and structural) problems in the text but also on the form that these substantive problems might take. The fact that improved performance extended to the transfer task might be evidence against this hypothesis. However, it is worth noting that Torrance et al (2015), in a similar sample, found that adding explicit planning-strategy instruction to teaching that focused on text structure and content provided no additional benefit to production quality, despite evidence that participants adopted the strategies that they were taught.

Our findings confirm the value of students observing an expert reading and commenting on an imperfect student text. This is consistent with previous findings, in particular those of Lumbelli et al. (1999), although it should be noted that in the present study the reader not only commented on issues that they identified in the text but also suggested solutions. Again, however, the fact that students in the strategy-focused condition, which did not include reader observation, obtained similar positive results to those in the reader condition rules out the strong hypothesis that this is an essential component of successful sixth-grade revision instruction.

Teaching students explicit procedures for revising their text, and students observing reader response are, of course, in no sense mutually exclusive. Our theoretical conclusions about what is and is not essential in student learning for them to benefit from revision instruction are relatively weak. However, the practical implications of our findings are clear and straightforward. Our findings indicate (a) that teaching sixth grade students to revise their text, once they have clear goals for what they want their text to achieve, benefits the quality of their writing, and (b) that both direct strategy instruction, and instruction based around reader observation—followed in both cases by practice with peer collaborators—is effective in improving sixth-grade students' written composition. These two approaches might usefully be combined into a single instructional program.

Limitations and future research

Our conclusions need qualifying as follows. First, it is necessary to take into account the short duration of the intervention. Although interventions with a short length have shown to be effective (e.g., Brunstein & Glaser, 2011; López et al., 2017), the fact that the intervention lasted only four sessions may have

influenced the results found in the present study. One of the main features of strategy-focused instruction, as generally proposed under the SRSD instructional approach (Harris & Graham, 2009, 2018), is their criterion-based nature. This means that, as opposed to the time-based intervention considered in this manuscript, the intervention does not end until students can use the strategy and self-regulation procedures independently and effectively. Additionally, and related, the short duration of the intervention necessarily reduced students' practice opportunities and consequently may have affected the students' mastery of the strategy. These aspects, therefore, could have reduced the effectiveness of strategy-focused instruction and might explain—at least in part—why no differences were found between the revision conditions. Thus, it would be advisable for future studies to explore the comparative effects of both revision conditions considering larger or criterion-based interventions to shed light about possible differences between the strategy-focused and reader-focused instructional approaches.

Second, the present study says little about mechanisms by which students benefited from revision instruction. There are at least two possibilities. Most obviously, it may be that students in the revision conditions then spend more time revising their texts and/or their revisions were more effective. Alternatively, however, it may be that exercises that involve students observing revision in a model and revising their own texts are particularly effective in teaching students about the features of good text. This knowledge could subsequently be applied at any and all stages of the writing of their assessment texts, including how they plan and draft their text. Future studies should, therefore, determine effects on students' writing process captured through, for example, by concurrent self-report (e.g., Torrance et al., 2007), thinking aloud (López et al., 2019) or by pen movement recording (e.g., Alves et al., 2016). In addition, the use of these online procedures would also provide specific information about the possible effects of the intervention on students' revision process when revising their own texts instead of a researcher-created text as it was done in the present study. This would be relevant for two main reasons. First, because some studies have shown that students are better in revising other texts, than their own texts (Bartlett, 1981; Hull, 1984). Second, it would provide additional information about the possible differential effects of the two revision conditions on students' revision skills.

Third, the effects of intervention in the present study, as is the case with any evaluation of the effects of instruction, is dependent in part on students' knowledge and expectations on entering the study, and therefore on educational context. This might be particularly the case for instruction that focuses on revision. Jones (2008) notes that students' view of revision, and therefore their response to intervention, is likely to be affected by the kind of feedback they generally receive. As we have noted in the Spanish primary education context a considerable emphasis tends to be placed on accuracy of surface features of the text—producing neatly written text with correct spelling and grammar—and this may well have affected

students' response. However, whether this would work to reduce or increase the effects of revision-focused intervention is less clear.

Finally, and related: Although we have demonstrated that both Strategy- and Reader-focused revision instruction result in an increase in mean performance, our study did not examine differential effects across students. The benefits of revision training in general, and possibly of a specific form of training, may be dependent on a student's literacy ability or individual features. There is some suggestion that students develop preferred writing strategies (planners vs. revisers) and that this preference affects response to intervention (Kieft et al., 2007). Similarly, it would be advisable to explore the moderator effects of other relevant writing-related variables such as students' social and emotional competence (Llorent et al., 2020) or reading skills (Fidalgo et al., 2014). Our sample in the present study was too small for robust inferences about possible moderating effects of learner characteristics. However, this also would be a worthwhile focus for future research.

Appendix

Appendix 1: Revision task



¡Hi! My name is Nico, and I'm reading the text I wrote the last week for my language teacher. I got 7 points over 10, she told me that this is a good text. However, I want to have a perfect text. Could you help me to find things that can be improved in my text?

SPORTS

¹First of all, doing sports is good because it helps you prevent illnesses and keep your body in good condition, helping you live longer and in better conditions for example, people who eat a lot and don't do sports can get too fat and have a heart attack or other kind of illnesses that can even cause death².

Secondly, when you do sport your body is stronger and you have more flexibility and it helps you prevent illnesses³. This is very good because it prevents your back from hurting when you exert yourself or spend a lot of time studying. For example⁴, if you are strong, you can move objects such as furniture, tables or carry your shopping bags. Also, you will get a better grade in physical education because you will be able to do all the exercises better⁵.

⁶Doing sports is important because you learn many values that can serve you tomorrow. A good example is playing soccer, with which you learn to work as a team and fight together to win every game. In addition, in the championships you learn to live with your teammates and be responsible.

Finally, sport is a good way to spend your free time⁷.

In conclusion⁸, sport is good because it helps you to be healthy and strong, as well as allowing you to meet people and have fun with friends. Because of all this, I believe that sport is good and that all children should practice it, because then we would all grow up healthier and learn many things that serve us for our lives, although sometimes it is also a little bad⁹.

1 Lack of an introduction presenting the topic and aim of the text in an attractive way

2 Inconsistent sentence

3 Repetition of information (digression)

4 Spelling mistake (s instead of x)

5 Grammar error (endpoint missing)

6 Initial connector missing

7 Grammar error (Beginning of sentence with lowercase)

8 Missing information of examples that support the argument

9 Spelling mistake (in Spanish lack of accent)

10 No clear position about the topic

Appendix 2

See Tables 6, 7 and 8.

Table 6 Word count and text quality ratings by condition and test occasion

	Control	Strategy-focused	Reader-focused
Word count			
Pre-test	62.4 (20)	67.4 (26.8)	71.1 (27.6)
Post-test	89.6 (20.4)	103 (28.2)	100 (24.1)
Follow-up	92 (22.7)	98.3 (25.6)	101 (20.3)
Transfer	112 (28.1)	122 (27.3)	117 (27.4)
Goal orientation			
Pre-test	87.5 (9.32)	79 (9.36)	82.4 (9.49)
Post-test	98.2 (14.4)	108 (15.8)	104 (16.9)
Follow-up	93.1 (14)	110 (12.7)	105 (15.4)
Transfer	96 (12.2)	107 (14.3)	108 (13.8)
Audience focus			
Pre-test	79.7 (10.5)	77.8 (10.1)	77.6 (8.86)
Post-test	96.6 (15.1)	104 (14)	103 (17.1)
Follow-up	87 (11.3)	105 (12.7)	100 (16.6)
Transfer	92.4 (12.3)	102 (13.6)	105 (14.9)
Structure			
Pre-test	79.7 (10.4)	74.9 (6.66)	78.3 (6.94)
Post-test	98.8 (18.3)	111 (15.7)	109 (16.8)
Follow-up	95.7 (15.7)	113 (14.3)	111 (16.7)
Transfer	93.4 (12.6)	106 (15)	112 (11.3)
Language-use			
Pre-test	85.1 (11.9)	76.6 (8.8)	80.9 (11.7)
Post-test	99.5 (15.9)	109 (14.4)	110 (14)
Follow-up	102 (13.8)	115 (10.5)	115 (10.9)
Transfer	94.5 (13)	106 (13.3)	109 (13.3)

Mean with SD in parentheses. Note that these values are also presented in Fig. 1

Table 7 Model fit statistics: likelihood ratio χ^2 , degrees of freedom, p

	All conditions (control vs. experimental revision conditions)		Just intervention conditions (Strategy-Focused vs. Reader-Focused)	
	Model 1: Main effects of task and condition	Model 2: plus task by condition interaction	Model 1: Main effects of Task and Condition	Model 2: plus task by condition interaction
Composition task				
Word count	248, 5, <.001	4, 6, ns	168, 4, <.001	3, 3, ns
Goal orientation	199, 5, <.001	61, 6, <.001	196, 4, <.001	8, 3, ns
Audience focus	238, 5, <.001	43, 6, <.001	213, 4, <.001	4, 3, ns
Structure	305, 5, <.001	53, 6, <.001	274, 4, <.001	7, 3, ns
Language use	308, 5, <.001	57, 6, <.001	293, 4, <.001	2, 3, ns
Revision task				
Detect surface	7, 4, ns	4, 4, ns	5, 3, ns	5, 2, ns
Detect substantive	111, 4, <.001	30, 4, <.001	100, 3, <.001	< 1, 2, ns
Correct surface	6, 4, ns	4, 4, ns	5, 3, ns	5, 2, ns
Correct substantive	108, 4, <.001	31, 4, <.001	98, 3, <.001	< 1, 2, ns

Model 1 statistics are for fit relative to with the baseline (intercept only) model (Model 0). Model 2 statistics are for fit relative to Model 1. *ns* indicates $p > .05$

Table 8 Test statistics for test of the null hypothesis that change between pre-test and subsequent test (post-test, follow-up, transfer) was the same in the control group and the intervention group

	Reader-focused			Strategy-focused		
	Post-test	Follow-up	Transfer	Post-test	Follow-up	Transfer
Composition task						
Word count	2.2 (6.4), .34, <i>ns</i>	.67 (6.6), .10, <i>ns</i>	- 4 (6.5), -.61, <i>ns</i>	8.6(6.4), 1.3, <i>ns</i>	1.4 (6.5), .21, <i>ns</i>	5.3 (6.5), .82, <i>ns</i>
Goal orientation	11 (3.5), 3.2, .002, .40	17 (3.5), 4.8 < .001, .83	17 (3.5), 4.8 < .001, .98	19 (3.5), 5.4 < .001, .70	26 (3.5), 7.3 < .001, 1.2	20 (3.5), 5.8 < .001, .94
Audience focus	8.2 (3.2), 2.5, .012, .40	15 (3.3), 4.7 < .001, 1.2	14 (3.3), 4.3 < .001, .99	9.3 (3.2), 2.9, .004, .49	20 (3.3), 6 < .001, 1.6	12 (3.3), 3.7 < .001, .80
Structure	12 (3.5), 3.4 < .001, .57	17 (3.6), 4.6 < .001, .95	20 (3.6), 5.6 < .001, 1.4	17 (3.5), 4.8 < .001, .67	22 (3.6), 6.2 < .001, 1.1	17 (3.5), 4.9 < .001, .99
Language use	15 (3.3), 4.5 < .001, .66	18 (3.4), 5.2 < .001, .95	18 (3.4), 5.4 < .001, 1.1	18 (3.3), 5.4 < .001, .59	22 (3.4), 6.4 < .001, .94	20 (3.3), 6.1 < .001, .90
Revision task						
Detect surface	.14 (.30), .45, <i>ns</i>	.20 (.31), .64, <i>ns</i>		-.08 (.30), -.26, <i>ns</i>	-.42 (.31), -1.4, <i>ns</i>	
Detect substantive	1.4 (.29), 4.9 < .001, 1.5	1.0 (.30), 3.5 < .001, 1.2		1.3 (.29), 4.6 < .001, 1.4	1.1 (.30), 3.6 < .001, 1.2	
Correct Surface	.14 (.30), .45, <i>ns</i>	.23 (.31), .75, <i>ns</i>		-.08 (.30), -.27, <i>ns</i>	-.39 (.31), -1.3, <i>ns</i>	
Correct Substantive	1.4 (.29), 4.9 < .001, 1.5	1.1 (.29), 3.7 < .001, 1.6		1.3 (.29), 4.6 < .001, 1.4	1.2 (.29), 4 < .001, 1.8	

Parameter estimates are from linear mixed effects Model 2, as described in the text. *p* was determined using the Satterthwaite approximation for degrees of freedom of *t*. Standardised effect size (Cohen's *d*) is the standardised difference between control group and intervention group observed mean scores, calculated separately at post-test, follow-up and for the transfer task. Note that this is likely to overestimate population effect size. *d* is given only when *p* < .05. *ns* indicates *p* > .05

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Data availability If accepted for publication the data that support the findings will be available under the request of the information to the corresponding author.

Declaration

Conflict of interest There are no conflicts or competing of interest.

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