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The long-term effects of strategy-focussed writing instruction for grade six students ☆

Raquel Fidalgo [b], Mark Torrance [a,*], Jesús-Nicasio García [b]

[a] *Division of Psychology, Nottingham Trent University, 6, Burton Street, Nottingham NG1 4BU, UK*
[b] *León University, Spain*

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Abstract

We compared 56 eighth-grade students who 28 months previously had received instruction in strategies for planning and revising their writing, with 21 students of similar academic ability from the same school who had not experienced the intervention. Both groups wrote an expository essay whilst logging their writing activities and completed writing metaknowledge and self-efficacy questionnaires. Students who had received the intervention showed a greater tendency to pre-plan (but not to revise) their texts, produced better quality and more reader-focused writing, and were more likely to show an awareness of the importance of text structure. These findings suggest persistent benefits for strategy-focused writing instruction.

Keywords: Self-regulation; Cognitive strategies; Text production; Writing development

1. Introduction

Traditionally instruction for young writers has focused on features of the finished product. Writing tasks are introduced and writing performance is assessed with reference to

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* Corresponding author.
E-mail address: mark.torrance@ntu.ac.uk (M. Torrance).

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depth and breadth of content, conformity to genre conventions, and accuracy of spelling and grammar. However, there is increasing recognition that in addition to knowing about desirable features of completed texts, students also need to know how to manage the processes by which these texts are produced (e.g., DFES, 2001). More specifically, it appears that developing writers benefit from training in the kinds of planning and revising skills that are often observed in mature writers. These skills are needed so that rather than relying on unregulated transfer of content from mind to paper, students shape their text to accommodate reader needs and achieve rhetorical goals. Scardamalia and Bereiter (1991) characterize this development as movement from "knowledge telling" to "knowledge transforming", and observe that the latter requires both greater sophistication in the cognitive strategies employed and substantially more writer effort.

Findings from a number of studies suggest that teaching strategies for managing text production is an effective way of improving the writing of students with learning disabilities or poor writing skills (De la Paz, 1999; García & Arias-Gundin, 2004; García & de Caso, 2004; García-Sanchez & Fidalgo-Redondo, 2006; Graham, Harris, & Mason, 2005; Graham, Harris, & Troia, 2000; Graham, Macarthur, Schwartz, & Pagevoth, 1992; Harris, Graham, & Mason, 2006). A smaller number of studies have found that this kind of intervention is also effective in typically-able students (Braaksma, Rijlaarsdam, van den Bergh, & van Hout-Wolters, 2004; De La Paz & Graham, 2002). Graham (2006) recently conducted a meta-analysis of 20 group-comparison studies, with both learning disabled and typically-developing students, and concluded that strategy instruction showed large positive effects on writing quality. Seven of these studies also explored maintenance over time and evidence from these suggested that effects on text quality remain 4–10 weeks after the intervention. In a broader meta-analytic comparison of studies evaluating a range of both traditional and innovative forms of writing instruction Graham and Perin (2007) found that strategy-focused instruction tended to provide the greatest text quality gains. As might be expected the benefits of strategy instruction are contingent on the use of appropriate teaching methods. Successful interventions typically involve students observing and then emulating a teacher modelling competent writing processes (Braaksma, van den Bergh, Rijlaarsdam, & Couzijn, 2001; Zimmerman & Kitsantas, 2002). Peer support also appears to be important (Harris et al., 2006). Without these students may acquire declarative metaknowledge about mature writing strategies but this is unlikely to transfer to practice.

There is therefore good evidence that strategy-focused instruction substantially benefits the quality of young writers' text. What is not known is whether these benefits persist beyond, for example, the academic year in which the intervention occurred. It is possible that over time students loose the procedural or motivational gains that were present shortly after training. It is also possible that training simply brings forward the development of skills that the students would in time have acquired anyway if they had remained within a traditional, product-focused curriculum. To our knowledge, long-term effects have not been explored in previous research. In the absence of evidence of enduring effects it is difficult to make firm recommendations about the value of strategy-focused instruction.

This paper aims to fill this gap by presenting findings from a long-term follow-up study of the effects of a strategy-focused intervention for normally-developing sixth-grade students. We called this intervention Cognitive Self-Regulation Instruction (CSRI). CSRI was designed as a prototypical example of a strategy-focused intervention, and as such

was similar in both content and instructional approach to interventions evaluated in the studies reviewed by Graham (2006) and particularly to the Self-Regulated Strategy Development approach developed by Harris and Graham (1996). CSRI involved teaching students to pre-plan and to revise their texts through a combination of direct teaching, modelling, and emulation. Evaluation of the short-term effects of CSRI with Spanish sixth-grade students indicated reliable and substantial gains in the quality of students' texts, gains that were not apparent in normal-curriculum controls (Torrance, Fidalgo, & García, 2007). Process measures, derived from students' probed, concurrent self-reports, showed a large effect of CSRI on the extent to which students planned their text, but no evidence that CSRI resulted in a greater tendency to revise. We found strong positive effects on holistic evaluations of the structure, coherence, and overall quality of students' texts. More detailed textual analysis suggested an increased use of the kinds of coherence tie that are likely to be associated with the writer giving consideration to reader needs. Both process and product effects remained 12 weeks after the intervention.

Findings from the initial evaluation of CSRI therefore provide further evidence for the short-term benefits of strategy instruction, and also demonstrate that these findings generalize to a non-North-American linguistic and educational context. To the extent that CSRI is typical of a broader class of strategy-focused interventions—and we believe that it is—long-term benefits of CSRI, if found, would suggest that strategy-focused interventions in general have enduring positive effects.

The main purpose of the present research was, therefore, pragmatic: before teachers of sixth-grade students bring strategy-focused instruction into their classes they will want to know that it will result in long-term benefit for students' writing. We also had two further aims. First we wanted to explore motivational effects. There is evidence that strategy instruction can result in benefits not just to the quality of students' texts but also to their writing-related motivation and self-efficacy (Graham & Harris, 1989; Graham et al., 2005), although these effects are probably less robust than effects on text quality (Harris et al., 2006) and may not generalize to typically-able writers. The initial evaluation of CSRI did not explore motivational effects, but these are explored in the present study. Second, if CSRI does in fact show long-term benefits for text quality it is worth then asking about the mechanisms by which these effects are achieved. Although the aim of strategy training is to make procedural changes to how students write, interventions necessarily also teach students something about what good texts should look like. Existing evaluations have tended to focus on writing quality as the measure of intervention success and, when positive effects are found, infer that these have resulted from a change in students' writing processes. These effects may instead (or also) be mediated by increased linguistic and rhetorical knowledge. Therefore, while the short-term benefits of strategy interventions on text quality are clear and welcome, their effects on process and the relationship between process and product are less well established. In the initial evaluation we found some evidence that the benefits of the intervention were associated with changes in writing strategy. However, the relationships between effects on process and effects on quality were relatively weak.

The research reported in this paper therefore compared students who had received CSRI 28 months previously with students who have not experienced CSRI. Our aim was to explore whether CSRI had lasting effects on (a) performance—the quality of students' written composition, (b) process—the strategies that they used when they wrote, (c) declarative knowledge—the ways in which students understood and therefore talked

about writing processes and products, and (d) writing self-efficacy—students' beliefs about their writing competence. We also explored the relationships among these variables with a view to identifying a more general model of factors that predict writing performance in eighth-grade students.

2. Method

2.1. Design

Students in both control (non-CSRI) and intervention (CSRI) groups wrote a compare-and-contrast essay under controlled conditions. Intervention and control students were taken from the same classes in the same school and showed very similar academic aptitude and achievement. Writing processes were assessed using a concurrent, probed self-report method and the quality of the completed texts was evaluated using both holistic (reader-based) measures and more formal text analyses focussing on the use of lexical and syntactic devices for maintaining coherence. Students also completed questionnaires exploring writing-related metaknowledge, motivation, and self-efficacy.

2.2. Participants

Participants in the evaluation comprised all 77 students in an eighth-grade cohort at a single school who were present on the days that testing took place. This sample included both students who had received CSRI in sixth-grade and students who had not.

The intervention sample ($n = 56$, 36 male, 20 female; mean age 14 years 1 month) represented 79% of the 71 students that formed the intervention group in the previous study. Shortly after the intervention these students moved on to secondary education in the same school, a *colegio concertado*—a religious foundation with mixed state and private funding—drawing on a middle-class, suburban, native-Spanish population. Measures taken immediately before the intervention and reported in Torrance et al. (2007) showed no evidence that pre-intervention writing ability or writing processes differed from those in a neighbouring primary (elementary) school. The 15 students from the earlier sample who did not participate in this study had either moved to a different school or were absent on the days that testing took place. Reanalysis of data from the initial study found no systematic differences in writing performance between these omitted students and the present intervention sample either prior to or following the intervention.

Students in the normal-curriculum control group ($n = 21$; 14 male, 7 female; mean age = 14 years 4 months) had attended other local primary (elementary) schools. These schools were demographically similar to the intervention school and followed the same literacy curriculum. (Primary (elementary) curricula in Spain are set by regional government who prescribe both the learning objectives that need to be achieved and the number of hours per week that should be devoted to different subject areas.) At the start of their secondary education control students joined the same school as the intervention sample. Therefore, for the 2 years prior to collection of the data presented in this paper both control and intervention students had attended the same classes in the same secondary school. They had therefore received the same literacy and Spanish-language curriculum under the same teacher. This curriculum was heavily product-focussed with considerable importance placed on spelling, grammar, presentation, and conformity to genre conventions.

Instruction tended to involve the teacher introducing a particular genre, students writing texts in this genre, and then the teacher correcting their work.

Average grades in five different curriculum areas showed no statistically significant differences in academic ability between control and intervention students. A by-group MANOVA with performance in science, social-science, Spanish language, English language, and mathematics as dependent measures gave $F(5,71) = 1.02$, $p = .40$. Univariate analyses did not show statistically significant differences between groups in any individual subject area. In response to comments by reviewers of an earlier version of this paper, we also administered a standardized scholastic aptitude test (SAT) assessing verbal, numeric, and non-verbal reasoning skills (Thurstone & Thurstone, 2004) 1 year after completion of the writing assessment. It was not possible to obtain SAT scores for 4 participants form the intervention group and 4 participants from the control group. Mean scores for the remaining students were near-identical for the two groups ($F(3,64) < 1$ for a by-group MANOVA).

2.3. Intervention

CSRI was delivered in the second half of intervention students' sixth-grade year over ten sessions—one per week—with each session lasting between 60 and 75 min. The aim of the intervention was to develop in participants the knowledge and motivation to use, without external prompting or support, cognitive strategies for planning, drafting, and revising their texts. Instruction for each strategy comprised four stages. Stage 1 involved presentation of information about the strategy by direct from-the-front teaching with the aim of providing students with a vocabulary and framework within which subsequent modelling and emulation could be understood. Stage 2 involved the teacher modelling these principles to the students by composing a text and "thinking aloud" in front of the whole class. This thinking aloud was designed to appear spontaneous but was in fact partially scripted with the teacher using a previously-learned set of self-regulatory phrases relevant to the strategy and following a set sequence of steps, both prescribed by the researchers. Initially the teacher provided a coping model: she occasionally deliberately deviated from an optimal strategy, but when this occurred would immediately correct herself. She then moved on to a mastery model in which the strategy was modelled flawlessly. Self-regulatory phrases were both strategy-focussed (e.g., when planning: "Are there any more ideas I could include here"; when revising "If I say that will my reader be able to see what I mean there?") and motivational (e.g., "I made a really big effort with this"; "If I do the right things I can write a really good essay.").

Stage 3 involved the students emulating the teacher's use of the strategy in their own writing. For some of this emulation stage the teacher listened while the student thought aloud, either spontaneously or, if necessary, in response to teacher prompts. The teacher then provided feedback on how well the students had used the strategy. Towards the end of the intervention this exercise was also repeated with peers listening and providing feedback. In Stage 4 students were encouraged to use the strategies independently, both in class and as a homework task. This approach to teaching strategies has been adopted successfully in the number of previous studies (Braaksma et al., 2004; Englert, 1992; Graham et al., 2000; Harris & Graham, 1992; Schunk & Zimmerman, 1997; Zimmerman & Kitsantas, 2002).

The ten sessions were structured as follows. Session 1 aimed to motivate students both by stressing the general importance of being able to write well, focusing on the communicative function of writing, and by making a specific case for developing appropriate writing processes rather than simply focussing on the finished product. Sessions 2 and 3 taught planning as a distinct activity engaged in prior to starting to draft text and, following Hayes and co-workers (Hayes & Flower, 1980; Hayes & Nash, 1996), involving setting rhetorical goals, collecting and generating content, and developing structure. This was supported by two devices: Students were taught the mnemonic OAIUE: Objective (*objective*)—what is purpose of the text? Audience (*audiencia*)—for whom is it intended? Ideas (*ideas*)—what ideas might be included? Organization (*uno*) of ideas—what are the main and subordinate points? Schema (*esquema*)—what generic form might the text take? Idea generation was supported by asking students to complete an empty table with columns for ideas relating to *what*, *how*, *when*, and *why*. Once appropriate declarative knowledge had been established the teacher then modelled good planning strategies by "thinking aloud" while planning a text in front of the class. This included self-regulatory statements such as *What is the first thing that I must do*? *Now I must remember the "five vowels" planning strategy*. *What is the goal of my text*? *I need to think of some more ideas here.* Following this session students were asked, as a homework exercise, to emulate the teacher's planning, providing both written plans and a written commentary reflecting the strategies that they had used. The teacher then provided feedback on the extent to which they had used appropriate planning strategies.

Sessions 4 and 5 focussed on the drafting (or "translating"—Hayes & Flower, 1980) component of the writing process. The teacher explicitly suggested three features that students should incorporate in their own texts: conformity to genre conventions in for text structuring, effective use of paragraphing, and use of different kinds of coherence tie. This was then followed by another cycle of teacher modelling and student emulation. Sessions 6 and 7 provided direct instruction on reading and changing texts that the students had written, with a focus on the distinction between surface level revision and revision of deep structure. Students were taught the mnemonic LEA: Read (*lee*) the text; Evaluate (*evalúa*) the text; Act (*actúa*)—make the necessary changes. Teaching about evaluation was supported by a list of different kinds of surface and deep revision (e.g., correcting spelling errors; finding additional evidence to support and argument). Direct teaching was again followed by modelling and emulation. The final three sessions and accompanying homework tasks aimed to give practice in the range of self-regulatory strategies introduced in previous sessions. In Session 8 the teacher modelled the writing of a whole essay, starting with pre-planning, then drafting, and finally revising what she had written. The students emulated this, with a different topic, as a homework task. In Session 9 students worked in pairs, each observing and commenting while the other planned, drafted and revised, thinking aloud throughout. The teacher provided additional commentary. In the last session students worked alone, again with commentary from the teacher. At the end of this session the students produced a list of their own self-regulatory statements for use as a mental prompt when producing future texts.

Instruction was delivered by the students' normal literacy teacher who was trained prior to the start of the intervention and then met with one of the researchers after each session to help establish that the intervention was being delivered correctly.

2.4. Evaluation writing task

Students were asked to write an essay comparing and contrasting *Spain in the Middle Ages with the Spain of today*. This theme was derived from topics covered in the students' seventh-grade (first year secondary) history curriculum, for which all students had attended the same classes. The task was supported by three pages (1300 words) of reference materials that students were free to use as they saw fit. Students were told that they should write full prose and not just list ideas, and that they should write to the best of their ability because the resulting essay would be seen by their teacher and compared with essays by students from other parts of the country. They were not set a time limit.

2.5. Measures

Writing process and written product measures were identical to those used in the original evaluation (Torrance et al., 2007). Students' writing metaknowledge was assessed by a method used previously by García and Fidalgo (2003) which in turn was based on methods described by Graham, Schwartz, and MacArthur (1993), and Wong, Butler, Ficzere, and Kuperis (1996). A writing self-efficacy measure was developed specifically for this study.

2.5.1. Writing processes

Students' writing processes were explored using time-sampled self-report. While performing the writing task students heard a 1-s tone played at random intervals of between 60 and 120 s, with a mean interval of 90 s. On hearing the tone students indicated the activity in which they were currently engaged, chosen from seven listed in a writing-log booklet. These activities were labelled and defined as follows: *reading references*—reading information and data about the topic; *thinking about content*—thinking about things to say in the essay; *outlining*—making a scheme or notes about the essay that I am going to write; *writing text*—writing my essay; *reading text*—reading through part or all of my text; *changing text*—making changes to my writing (correcting spelling mistakes, changing words, adding words...); and *unrelated*—doing or thinking something unrelated to the text (talking to my partner, looking for a pen, looking out of the window...). Students were told to report the activity in which they were engaged at precisely the time that the tone sounded and not their main activity since the previous tone. These activities were marked in the writing logs by simple graphics which helped to minimize the extent to which completing the log diverted attention from the writing task.

Prior to completing the writing task students were taught the activity categories and then practiced using them by watching video-taped examples of writers thinking aloud. After training we determined students' categorization accuracy by playing another videotape of a writer thinking aloud whilst composing text and asking students to indicate the writer's activity at each of 25 different points. Comparing students' categorization with that of an expert judge showed a mean agreement of .88 ($\kappa = .87$) with by-category agreement varying from .88 for *writing text* to 1.0 for *unrelated*.

2.5.2. Written products

We assessed final texts both in terms of holistic (or ''reader based'') criteria, and by more formal analysis based on counts of the linguistic features believed to contribute to a text's coherence.

Reader-based assessment involved scoring each text for structure, coherence, and general quality according to a rating scheme described and evaluated by Spencer and Fitzgerald (1993) with slight modification to provide a better fit to expository text. *Structure* was assessed on a four point scale from 1 = unstructured to 4 = well structured. Ratings were based on the extent to which judges thought that the text included (a) background information introducing the text, (b) cues indicating text structure, (c) an introductory topic or thesis sentence, (d) clear organization of ideas based around a definite scheme, (e) unity of theme within paragraphs and across the whole essay, and (f) a conclusion that reiterated the purpose of the paper. *Coherence* was also assessed on a four point scale, from 1 = incoherent to 4 = very coherent with ratings based on the extent to which judges perceived that (a) a topic or theme was identified and remained a focus for the essay, (b) the text included a context that orientated the reader, (c) information was organized in a discernible pattern which was sustained through the text, (d) sentences and paragraphs were cohesively tied, and (e) the discourse flowed smoothly. *Quality* was assessed on a six point scale from 1 = difficult to understand to 6 = excellent with ratings based on the extent to which the text demonstrated (a) a clear sequence of ideas, with little or no irrelevant detail, (b) clear organization, (c) fresh and vigorous word choice, (e) varied and interesting detail, (f) correct sentence structure, and (g) accurate punctuation, capitalization and spelling.

All texts were rated by two independent judges, both of whom were blind to group membership. Judges were researchers with education and psychology qualifications and extensive writing-research experience. Correlations (Pearson's *r*) between judges' ratings were .91, .83, and .89 for, respectively, structure, coherence, and quality. Subsequent analyses were based upon the mean of the two judges' ratings.

More formal analyses identified seven different kinds of coherence marker: anaphoric reference (e.g., *Peter is a young man. He likes playing football.*), lexical reference (*Peter is a young man. Peter likes playing football.*), metastructural ties (*Now I will describe...*, *The following paragraph talks about...*), structural ties (*first...*, *second*, ..., *finally*), connective ties (*and*, *also*, *as well as*), reformulation ties (*in conclusion...*, *that is to say...*, *in other words...*), and argumentational ties (*for example*, *however*, *despite this*). All texts were scored independently of reader-based quality ratings by two raters with qualifications similar to those of the judges who performed the reader-based ratings.

Argumentational ties were more or less absent in the students' texts. Correlations between judges for the remainder of the coherence scores were equal to or greater than .92 with a mean of .95. Subsequent analyses were based upon the mean of the two ratings. To control for effects of the overall length of texts, coherence-tie measures were analysed and reported as the number of ties of a specified type per 100 words of text.

We also counted paragraphs and words and recorded whether or not texts included introductory and concluding paragraphs.

2.5.3. Writing metaknowledge and motivation

Students provided written responses to eight open-ended questions designed to encourage them to talk about their own writing practices and experiences, and their perception of those of others (e.g., *What things do you do when you write*? *Why do some people have trouble writing*? *What do you like best about writing an essay*?). Responses to all eight questions were then pooled and divided into idea units (Kroll, 1977). Each idea unit was then allocated to one of 18 different categories relating to substantive processing, low-level processing, ability, and motivation. These categories are detailed and illustrated in Table 3.

Responses from all participants were independently coded by two judges with similar qualifications to the judges who rated text quality. Both were blind to group (CSRI/control) membership. Mean inter-rater reliability (correlation between raters and across participants in counts of idea units allocated to each category) was .92. Reliabilities for the *grammar* and *task* categories were .75 and .83, respectively. Reliability for the 16 remaining coding categories were greater than .85. Disagreements were resolved through discussion.

2.5.4. Writing self-efficacy

Writing self-efficacy—students' beliefs in their ability to successfully produce text—was assessed both in the writing metaknowledge interview and more directly using a 19 item summative rating scale. This scale was developed following guidelines on self-efficacy scale construction suggested by Bandura (2001) and on response format suggested by Pajares, Hartley, and Valiante (2001) and was specifically tailored to Spanish language writing. It was divided into four subscales: *self-efficacy for managing surface structure*—belief in ability to construct grammatically and correctly punctuated sentences, and to choose appropriate vocabulary; *self-efficacy for managing deep structure*—belief in ability to generate and organize appropriate content; *self-efficacy for presentation*—belief in ability to present their text well; and *self-efficacy for spelling*. Internal reliability was high for all four subscales (Cronbach's alpha $> .80$). The full scale can be found as an Appendix.

2.6. Procedure

Students were tested as whole-class groups. They were first trained to use the process self-report method, and their coding reliability was assessed, as describe above. They then completed the writing self-efficacy questionnaire. Next students completed the writing task. Finally students provided written answers to the writing metaknowledge questions. Students participated in four class-groups each of which contained a mixture of control and CSRI participants. Control participants were roughly evenly distributed across all four classes.

3. Results

We first describe differences between CSRI and control in writing process, based on measures from writing logs. We then describe differences in the texts that the two groups produced. Next we examine differences in writing metaknowledge and in self-efficacy. Finally we explore the extent to which process, self-efficacy, and metaknowledge variables predict text quality. For ease of comparison across different statistical analyses, all effect sizes are reported as the square of the correlation between a dummy variable representing treatment condition (intervention vs. control group) and the dependent variable (r^2—Rosnow & Rosenthal, 1996). This represents the proportion of the variance in the dependent variable accounted for by group membership.

3.1. Writing processes

Estimated times spent in different writing activities are summarized in Table 1 and Fig. 1. Table 1 shows, for each activity, estimated time-in-activity and time expressed

Table 1
Estimated mean time in minutes and estimated percentage of total time spent in different activities for CSRI and normal-curriculum groups

	Control	CSRI
Estimated time (min)		
Reading references materials	5.9 (4.1)	6.4 (3.6)
Thinking about content	2.4 (2.4)	2.9 (2.8)
Writing outline**	4.1 (10.3)	7.3 (8.2)
Writing text	22.7 (13.2)	18.4 (11.0)
Reading text	2.4 (3.0)	2.8 (3.8)
Changing text	1.6 (2.5)	1.7 (2.3)
Unrelated*	3.2 (2.9)	1.7 (2.0)
Total time on task	42.4 (20.7)	41.5 (16.2)
Percentage of total time		
Reading reference materials	15 (12)	18 (12)
Thinking about content	6 (7)	7 (7)
Writing outline**	7 (15)	17 (16)
Writing text*	53 (15)	43 (17)
Reading text	6 (7)	6 (7)
Changing text	4 (6)	4 (5)
Unrelated*	9 (8)	5 (6)

Standard deviations are shown in parentheses.
Notes: $^{*}p < .05$, $^{**}p < .001$ (Mann–Whitney U) for differences between CSRI and normal-curriculum groups.

as a percentage of total time-on-task. Fig. 1 plots the distribution of writing activities across the writing period. Times-in-activity were substantially positively skewed and so we used a distribution-free inferential test (Mann–Whitney U) to determine statistical significance.

Groups did not differ significantly in overall time on task, suggesting that any differences in quality between texts were not due simply to one group devoting more time to their text, although there was some evidence that the CSRI group were a little more task-focused, spending a mean of 5% of overall time on off-task activities, compared to 9% for the control group ($U = 394$, $p = .021$, $r^2 = .08$ for time and $U = 398$, $p = .025$, $r^2 = .09$ for percentage of total time). There was no statistically significant difference between the groups in reported time spent in reading reference materials or in thinking about content.

Deliberate and explicit planning activity, in the form of outline-writing, was greater for the CSRI group with 17% of total task time being devoted to outlining compared to 7% for the control group ($U = 284$, $p < .001$, $r^2 = .03$ for time and $U = 281$, $p < .001$, $r^2 = .07$ for percentage of total time). There was, however, considerable within-group variation in reported outlining time. Simply counting numbers of students who reported outlining at some point while completing the task suggested that 47 (82%) of students in the CSRI group engaged in outlining at some point during their writing, compared to only 7 (33%) of the control group ($\chi^2(1) = 18.7$, $p < .001$, $r^2 = .24$). The control group spent a slightly greater proportion of their time writing out full text (53% of total task time compared to 43% for the CSRI group; $U = 395$, $p = .027$, $r^2 = .07$). This difference did not, however, reach statistical significance when raw rather than percentage times were compared.

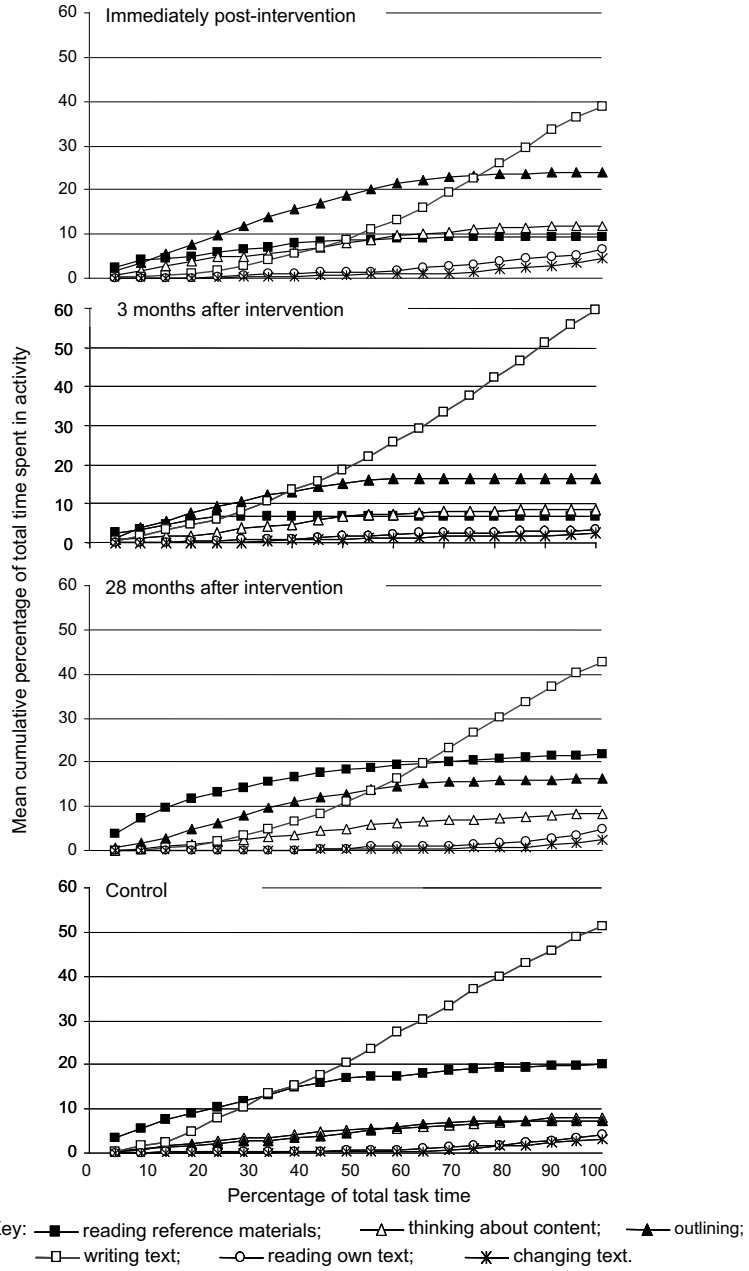

Fig. 1. Distribution of time-in-activity across the writing period, for the intervention group immediately following, 3 months after and 28 months after cognitive self-regulation instruction, and for a control group at 28 months. Data in the first two panels are from Torrance et al. (2007). Data in the second two panels were collected as part of the present study.

As was the case immediately following the intervention, we found no evidence of a greater tendency for the CSRI group to engage in revision-related activity. Estimated times spent both reading and changing text were similar, and relatively low, in both groups.

The writing process time-courses of the CSRI students at 28 months suggests three distinct phases (Fig. 1, third panel). There was an initial period—roughly the first 15% of the writing process—during which students tended to focus on reading reference materials. After this, and until around a third to a half of the way through the writing process, this group then focused on outlining. The final phase was taken up with writing full text. In the control group (Fig. 1, fourth panel) the second (planning) phase was largely missing, with students launching straight into writing full text after a brief reading of the reference materials.

The first three panels of Fig. 1 show change in the writing processes of the CSRI group from immediately post-intervention, to 3 months after intervention and then to 28 months after the intervention (data reported in the first two panels are from Torrance et al., 2007). Immediately post-intervention, outlining played a dominant role. By 3 months this had reduced but was still the focus of the first third of the writing process, and this pattern is sustained at 28 months. The main difference between these students' writing in sixth-grade and 2 years later appears to be that much more use was made of reference materials when performing the most recent task.

3.2. Written products

Table 2 summarizes findings from product measures. There was considerable variation among students in the length of their completed texts, with a tendency for students in the control group to write more, although this was not statistically significant. Both groups used paragraphing to structure their text and there were no statistically significant

Table 2
Reader-based and text-based evaluations of students' texts for CSRI and normal-curriculum groups

	Control	CSRI
Reader-based measures		
Quality[a,*]	2.1 (.77)	2.8 (.94)
Coherence[b,**]	2.52 (.93)	3.18 (.79)
Structure[b,**]	2.95 (1.20)	3.73 (1.14)
Text-based measures		
Word count	370 (258)	284 (136)
Paragraph count	9.1 (8.1)	7.0 (4.4)
Argumentational ties	.0 (.0)	.02 (.06)
Connective ties	4.5 (1.21)	5.0 (1.84)
Lexical ties	5.8 (2.67)	6.5 (2.28)
Anaphoric ties	2.9 (1.38)	2.8 (1.59)
Reformulation ties[*]	.14 (.23)	.31 (.48)
Structural ties	.19 (.36)	.3 (.48)
Metastructural ties[**]	.05 (.12)	.16 (.26)

Standard deviations are shown in parentheses.
Notes: $^{*}p < .05$, $^{**}p < .005$ for differences between groups.
Cohesion tie measures are for tie-density calculated as 100 × (number of ties/number of words in text).
[a] Minimum = 1, maximum = 6.
[b] Minimum = 1, maximum = 4.

differences between the groups in either number of paragraphs or number of words per paragraph (as a measure of paragraph use that controls for text length).

Reader-based (holistic) measures suggested large and statistically significant effects of group on text quality, with students in the CSRI group producing consistently better texts. This was true for ratings for overall quality ($t(75) = 2.64$, $p = .01$, $r^2 = .10$), for coherence ($t(75) = 3.09$, $p = .003$, $r^2 = .13$), and for structure ($t(75) = 3.08$, $p = .003$, $r^2 = .13$). Correlations among the three reader-based quality measures were high ($r > .79$), however, suggesting poor discriminant validity.

The presence of reformulation, structural, metastructural, and argumentational coherence ties in the text can, arguably, be interpreted as evidence that the writer is paying attention to reader needs. There was a tendency for CSRI students to make greater use of metastructural and reformulation ties (metastructural ties, $t(73) = 2.67$, $p = .009$, $r^2 = .04$; reformulation ties, $t(69.3) = 2.10$, $p = .04$, $r^2 = .03$; analyses incorporate correction for heterogeneity of variance). Structural ties were used more by the CSRI group than the control, although this effect did not reach statistical significance. Argumentational ties were more or less absent across all texts. There was no difference between groups in the use of lexical or anaphoric ties.

We also looked at whether students included introductory and concluding text. 21 (38%) of students in the CSRI group included an introduction, compared with only 2 (10%) of the control students ($\chi^2(1) = 5.7$, $p = .02$, $r^2 = .07$). However, there was no evidence of group differences in whether or not texts included a conclusion (19 (34%) in the CSRI group and 6 (29%) in the control).

3.3. Writing metaknowledge

Table 3 indicates the numbers of students who mentioned various different themes at least once in their responses to the eight writing metaknowledge questions. CSRI and control groups differed in five respects: CSRI students were more likely to mention organizing or structuring content ($\chi^2(1) = 5.9$, $p = .02$, $r^2 = .08$), CSRI students were more likely to mention spelling ($\chi^2(1) = 6.1$, $p = .01$, $r^2 = .08$). There was also evidence that CSRI students were less likely to provide irrelevant responses or indicate that they could not answer one or more questions ($\chi^2(1) = 4.5$, $p = .04$, $r^2 = .06$). No other categories showed statistically reliable differences between groups.

3.4. Writing self-efficacy and motivation

Mean self-efficacy scores for the CSRI group were higher than control group scores on all four measures of writing self-efficacy. (Self-efficacy for surface structure: CSRI, $M = 521$, $SD = 100$; control, $M = 521$, $SD = 128$. Self-efficacy for deep structure: CSRI, $M = 492$, $SD = 107$; control, $M = 460$, $SD = 137$. Self-efficacy for neatness: CSRI, $M = 221$, $SD = 57$; control, $M = 210$, $SD = 49$. Self-efficacy for spelling: CSRI, $M = 134$, $SD = 39$; control, $M = 122$, $SD = 55$). However, none of these differences was statistically reliable ($t(75) < 1.1$, $p > .2$ for all four measures).

Previous research (Pajares & Valiante, 1999) has suggested gender differences in writing self-efficacy. We found that females in our sample, independently of group, had greater self-efficacy for writing neatly (female, $M = 241$, $SD = 42$; male, $M = 206$, $SD = 58$; $t(75) = 2.8$, $p = .006$, $r^2 = .09$) but found no other statistically reliable differences.

Table 3
Writing metaknowledge and motivation

Theme	Example	Control	CSRI
Substantive processes			
Content generation	I think hard about the right things to put in my text	19 (90%)	55 (98%)
Audience consideration	I try to think of who will read the text	4 (19%)	6 (11%)
Other knowledge	It helps if you have a wide vocabulary	12 (57%)	29 (52%)
Structuring*	I make sure my text has an introduction and a conclusion	7 (33%)	36 (64%)
Writing/drafting	I try to outline before I draft my text	6 (29%)	13 (23%)
Reviewing/editing	I read through my text to see if it can be improved	3 (14%)	14 (25%)
Monitoring for errors	I carefully look for errors while I am writing	9 (43%)	25 (45%)
Low-level processes			
Neatness/appearance	I try to make my handwriting as clear as possible	6 (29%)	17 (30%)
Spelling*	I think spelling is important for good text	3 (14%)	25 (45%)
Grammar	Good writers use punctuation correctly	2 (10%)	4 (7%)
Ability and motivation			
Own ability, positive	I write well	3 (14%)	6 (11%)
Own ability, negative*	I don't feel that I am a very good writer	9 (43%)	11 (20%)
Motivation	I like being given essays to write	9 (43%)	28 (50%)
Lack of motivation*	I hate writing essays	13 (62%)	18 (32%)
Other			
Writing environment	To be a good writer you must have a quiet place to work	1 (5%)	4 (7%)
Task	You must understand what the teacher wants	3 (14%)	10 (18%)
Practice	I would be a better writer if I practiced more	1 (5%)	9 (16%)
Unrelated*	I don't know the answer to that question	7 (33%)	7 (13%)

Values represent the number and percentage of students in each group mentioning the specified theme in responses to one or more question.
* $p < .05$ from group (control/CSRI) by response (present/absent) χ^2 tests.

Analysis of the motivation-related categories from the coding of the open-ended questionnaire suggested that intervention participants were less likely to offer a negative evaluation of their own ability ($\chi^2(1) = 4.3$, $p = .04$, $r^2 = .06$), and were less likely to indicate that they lacked motivation when writing ($\chi^2(1) = 5.6$, $p = .02$, $r^2 = .07$). Few students in either group volunteered positive evaluations of their own writing ability, although around half of the students gave some indication of positive motivation to write. Again this did not differ between groups.

3.5. Correlations with text quality

Our findings therefore demonstrate differences between the control and CSRI groups in writing process, writing metaknowledge and in quality of text. One possible conclusion from this is that quality differences result from process and knowledge differences. In the regression analyses that follow we explore whether this was likely to have been the case and, more generally, seek to determine which process, metaknowledge, and self-efficacy factors predict text quality.

We first determined the extent to which group membership (CSRI vs. control) alone predicted writing quality. We then conducted a series of staged analyses to establish the degree to which self-efficacy, process, and metaknowledge predicted

quality, looking first at the effects of self-efficacy and motivation (Model 1), then at the combined effects of self-efficacy and writing process (Model 2), and then at the combined effects of self-efficacy, writing process, and metaknowledge variables (Model 3). Last we added group membership as a final independent variable (Model 4) to explore whether the effects of group are subsumed by the effects of self-efficacy, process, and metaknowledge. All analyses had as dependent variable a single holistic quality measure calculated by summing reader-based quality, structure, and coherence measures.

As indicated above, group (CSRI or control) contributed significantly to quality, explaining 10% of the variance in the combined quality rating (adjusted $R^2 = .10$, $F(1,75) = 9.7$, $p = .003$). Self-efficacy measures from the self-efficacy scale and responses to the four motivation items from the writing metaknowledge questionnaire together, explained 15% of the variance is overall quality (Model 1: adjusted $R^2 = .015$, $F(8,68) = 2.7$, $p = .01$). None of the self-efficacy subscale scores, taken individually, showed a statistically significant effect. However, quality was positively related to tendency to report positive motivation for writing (standardized regression coefficient (β) = .24, $p = .03$) and negatively related to students' tendency to express a negative evaluation of their own ability ($\beta = -.27$, $p = .02$). Adding process variables gave a model that explained an additional 29% of quality variance (Model 2: R^2 change = .29, $F(7,61) = 5.3$, $p < .001$; overall for model, adjusted $R^2 = .41$, $F(11,65) = 4.5$, $p < .001$). Taken individually, three process variables contributed significantly to this effect: time spent writing text ($\beta = .23$, $p = .02$), time spent reading text ($\beta = .26$, $p = .02$), and time spent changing text ($\beta = .27$, $p = .02$). Time spent outlining—the activity that showed most difference between control and intervention groups—was a weaker and only marginally significant predictor of quality ($\beta = .18$, $p = .07$). This remained the case even when the analysis was repeated with just process variables as predictors.

For the purposes of analyses involving metaknowledge, variables were treated as dichotomous, with 0 = did not mention theme in answers to the metaknowledge questionnaire, and 1 = did mention theme. Entering metaknowledge measures gave a model that explained an additional 25% of variance in quality (Model 3: R^2 change = .25, $F(14,47) = 3.9$, $p < .001$; overall for model, adjusted $R^2 = .65$, $F(29,47) = 5.8$, $p < .001$). Taken individually, the following factors contributed significantly to this effect: whether students mentioned structuring content ($\beta = .25$, $p = .008$), whether they mentioned monitoring their text for errors ($\beta = .21$, $p = .02$), mentioning spelling ($\beta = .30$, $p = .003$), and not mentioning grammar ($\beta = -.23$, $p = .01$).

Adding group membership (CSRI or control) to the model did not result in a significant change in amount of variance predicted (Model 4: R^2 change $< .01$, $F < 1$). This suggests that variation in the measures already entered (self-efficacy, process, and metaknowledge) explained the 10% of variance in quality that we found to be associated with group membership.

Finally we conducted a single, stepwise multiple regression analysis with all self-efficacy, process and metaknowledge variables as predictors to give some indication of which factors contributed most to overall quality scores. This suggested that the following nine variables best explained text quality, ranked by size of standardized regression coefficient (β) with largest first. Measures are from the writing metaknowledge questionnaires unless otherwise indicated: time spent reading the text when performing the writing task, mentioning structuring or ordering, not mentioning grammar, mentioning

monitoring text for errors, identifying spelling as a concern, not giving irrelevant answers, time spent thinking about text content (as opposed to deliberate outlining) when performing the writing task, not offering a negative assessment of their own writing ability, and mentioning the importance of neatness and appearance. We have not reported regression coefficients for this analysis because in the context of stepwise regression these represent poor estimates of population parameters (Miles & Shevlin, 2001, pp. 38–39).

4. Discussion

Previous research has shown that strategy-focused interventions typically result in an improvement in the quality of young writers' texts, and this improvement remains when students are retested several weeks after the end of the intervention. Torrance et al. (2007) developed this work by showing that, consistent with their intended effect, strategy-focused interventions are capable of not only of improving the quality of students' texts, but also changing their writing processes (see also Braaksma et al., 2004).

Findings from the present study suggest that both quality and process effects are enduring: compared with normal-curriculum controls, intervention participants produced better quality texts and tended to spend more time planning. Students who had received CSRI were more likely to use linguistic devices that signpost text structure and content and devices that allow repetition of content in a different form (e.g., "to put that another way..."). They were also more likely to include introductory text at the start of their essays giving readers forewarning of what is to come. Responses to writing-metaknowledge questions suggested that CSRI students were more aware of the importance of finding structure for their text, although they were no more likely to mention audience considerations. Concerning process, CSRI students were more likely to report outlining as part of their writing processes, and typically spent more time in this activity but did not spend more time reading reference materials or thinking about content. Taken together these findings suggest the writing of CSRI participants showed a more regulated writing strategy and a greater tendency to express their knowledge in a way that accommodated writer needs. Compared with normal-curriculum controls, therefore, they appeared to show greater evidence of "knowledge transforming" (Scardamalia and Bereiter, 1991).

There was also some evidence of greater writing self-efficacy amongst CSRI participants. In responding to the metaknowledge questionnaire they were less likely to make negative statements about their own ability and were less likely to give metaknowledge answers suggesting that that they lacked motivation for writing. Scores on the writing self-efficacy measure were also consistent with higher self-efficacy in the CSRI group, although this effect did not reach statistical significance.

Before interpreting these group differences as evidence for the benefits of strategy-focussed writing instruction, it is worth exploring possible alternative explanations. The most robust design for a follow-up study of the kind reported in this paper would have involved a control group who had completed assessments of baseline writing ability in sixth-grade and who had not been exposed to the intervention, but who otherwise had identical educational experience to that of the intervention group. For long-term follow-up studies that span the transition from primary (elementary) to secondary education

this design is, in practice, difficult to achieve. However, whether or not a fully randomised control design is possible in this context, the design of the present study falls short of this ideal and this leaves open the possibility that inter-group differences in writing performance were due to factors other than one group having been exposed to the intervention. There are, however, four reasons why we believe that our findings can best be explained in terms of intervention effects, and that alternative explanations based on other group differences are unlikely. First, in their primary school career prior to intervention control and intervention participants will have been exposed to similar literacy curricula taught in a similar number of hours-per-week. Consistent with this, pre-intervention assessment (reported in Torrance et al., 2007) found that intervention participants did not differ from students in another local primary school either in the quality of their writing or in their writing processes. Second, for almost all of the period between the intervention and the assessment reported in this study both intervention and control participants studied the same curriculum in the same classes in the same school. During this time they were exposed to the same literacy and writing instruction and the same teaching about the topic of the writing task used in the present study. Third, we found no evidence that the intervention participants had systematically higher academic aptitude than the controls. Finally, differences in the performance of between control and intervention students in the present study follow a very similar pattern to differences found at post-test and delayed-post-test in the original study. This was true not just for product differences, which would be consistent with general ability differences between intervention and control, but also in the pattern of differences in the process data and use of particular linguistic structures. Therefore, for these reasons, and although it is not possible to entirely rule out alternative explanations, we think that the most plausible explanation for our findings is that the better performance of the intervention group occurred as a result of them participating in the intervention.

We believe, then, that our results provide robust evidence that strategy-focussed instruction delivered to sixth-grade students results in an increased tendency to pre-plan and in improvements in text quality that persist at least until eighth-grade. This finding has two implications. First it suggests that writing instruction that encourages independent and self-regulated use of cognitive strategies delivers long-term gains even when instruction after the intervention reverts to a traditional product-focussed curriculum. Second it suggests that students whose writing curriculum does not include strategy-focussed instruction remain at a disadvantage: strategy-focussed instruction in sixth-grade does not simply bring forward development that would in due course have occurred anyway under a traditional curriculum. Comparison of our findings with those of previous studies reviewed in Graham and Perin's (2007) meta-analysis suggests that the observed long-term effect on quality was very similar in size to the mean short-term effect found in other evaluations of strategy-focussed instruction, and greater than that found for the short-term effects of other forms of writing instruction. Effect sizes in the present study were, however, much smaller than the very large effects that we observed immediately post-intervention and at 12 weeks.

Two additional questions are worth addressing. The first concerns the failure of CSRI to affect the degree to which students revised their text. The second concerns the extent to which differences in text quality between the groups could be explained by differences in writing process—the main focus of the intervention—rather than differences in their understanding of what constitutes good text.

Our failure to find differences between the groups in the extent to which students read or changed their text repeats findings from the original study. Then we found no effects of intervention on tendency to revise, with reading text and changing text taking, respectively, a mean of 7% and 4% of total time-on-task (averaging across groups and tasks). These proportions remained very similar after 28 months, and again we found no difference between intervention and control groups. In the earlier paper we suggested that the failure of CSRI to increase students' tendency to revise may have been due to a combination of a lack of student motivation—why revise if you've already extensively planned?—and/or that the substantial demands that revision places on cognitive capacity might put it beyond the capability of the average sixth-grade student. It is possible that revision strategies might be more manageable and be perceived as more relevant as students get older. We found no evidence that this was the case. This is consistent with existing research that suggests that even at eighth-grade students need external support if they are to manage the cognitive demands of revising their text (De La Paz, Swanson, & Graham, 1998).

The regression analyses reported in the final section of the results sets the effects of CSRI in a broader context. They suggest that only 10% of the variation in writing quality can be explained by whether or not students had received the intervention. As might be expected this effect appeared to be subsumed within process and metaknowledge effects. Process variables taken together explained 29% of the variance in quality. However, time spent outlining—the process variable most associated with differences between CSRI and control groups—had only a relatively minor effect on text quality. This contrasts with our findings from immediately after the intervention. Then we found evidence that the extent to which students outlined was positively associated with text quality.

Therefore, although CSRI appeared to have a sustained effect on both time spent outlining and writing quality, we did not find convincing evidence that these effects were causally related. Instead, process effects on quality appeared to be associated with time spent writing full text, and time spent revising. The effect for time spent writing full text is not surprising: there was a correlation of .70 between reported time spent writing full text and number of words in the text, and of .44 between number of words and evaluation of overall quality. The effects of revising behaviour on quality are more interesting. Similar regression analyses immediately and shortly after the intervention found only weak and non-significant effects of these revising on quality. This suggests that by eighth-grade revising time plays a more important role in determining text quality, at least in the context of the short expository essay tasks that were the focus of this and the previous study.

An alternative candidate for a factor that mediates the effect of CSRI on writing quality is writing metaknowledge. Overall metaknowledge factors explained an additional 25% of the variance in writing quality. This was associated with writers mentioning error checking, the importance of spelling, the importance of attending to text structure, and (negatively) with mentioning grammar. Two of these themes—structuring and spelling—were significantly and substantially more prevalent in the responses of CSRI students than those of controls. Developing structure (but not spelling) was an important focus of the intervention.

In summary, therefore, we believe that this study presents the best (and probably only) evidence currently available that strategy-focussed writing instruction is capable of

delivering long-term effects on students' writing processes and long-term benefits for text quality. However, in the present context at least, it appears that the change affected by CSRI in students' writing processes—specifically an increased tendency to pre-plan their text—is only weakly associated with quality gains. Conversely, CSRI failed to increase students' tendency to read and edit their texts, but across both groups we found evidence that this revision activity was associated with a better quality end product. These findings suggest, perhaps, that as students mature knowing how to take account of reader needs when considering a writing task might be more important than the particular strategic writing activities within which this consideration takes place. Students can think about structure and audience when they pre-plan. These concerns can, however, also be managed concurrently with producing full text and/or by rearranging and rephrasing already-written text. As students mature and the lower level requirements of text production become less cognitively demanding there may be less need to partition planning from production, and revision may become a more important framework within which to ensure text is reader-focussed.

Appendix

Spanish. writing self-efficacy scale

English translations of items are shown in italics. Internal reliability for subscales (Cronbach's alpha) is shown in parenthesis. Participants responded on a scale from 1 = *very definitely not able to do this* (*muy seguro de no poder hacerlo*) to 100 = *very definitely able to do this* (*Muy seguro de poder hacerlo*).

¿En qué medida crees que … *How certain are you that…*	Factor loading
Surface structure (.93)	
18. …puedes usar los enlaces necesarios para unir entre sí los párrafos del texto? …*you can make the necessary connections to link together the individual paragraphs of the text*?	0.76
3. …puedes conjugar y escribir correctamente los verbos de tu texto? …*you can conjugate the verbs of you text correctly*?	0.76
9. …puedes usar un vocabulario adecuado para el texto? …*you can use a suitable vocabulary*?	0.76
17. …puedes usar los enlaces necesarios para unir entre sí las oraciones de un párrafo? …*you can use appropriate cohesive ties to link sentences into a paragraph*?	0.71
2. … puedes escribir las oraciones de tu texto con una correcta puntuación? …*you can write the sentences of your text with proper punctuation*?	0.71
8. …puedes escribir las frases con una correcta concordancia entre sujeto y predicado? …*you can get agreement between the subject and predicate of a sentence*?	0.69

Appendix (*continued*)

¿En qué medida crees que ... *How certain are you that...*	Factor loading
4. ...puedes escribir las oraciones de tu texto sin errores gramaticales (por ejemplo: errores de concordancia en el tiempo o la persona en los verbos)? *...you can write sentences without grammatical mistakes (for example, agreement mistakes with person or number)*?	0.60
Substance/deep structure (.92)	
13. ...puedes conseguir una variedad de detalles interesantes en tu texto? *...can you get a variety of interesting details in your text*?	0.84
14. ...puedes conocer todo lo que necesitas sobre los temas del texto? ...you can have the necessary knowledge about the themes of the text?	0.82
10. ...puedes incluir muchas ideas en tu texto? *...you can include lots of good ideas*?	0.77
12. ...puedes conseguir una clara organización de las ideas en el texto? *...you can get a clearly developed organization of the ideas in the text*?	0.67
15. ...puedes escribir tu texto de modo que sus lectores lo entiendan? *...you can write it so people understand*?	0.66
11. ...puedes organizar las oraciones en un párrafo de forma que exprese claramente una idea? *...you can organize sentences into a paragraph so as to clearly express an idea*?	0.66
16. ...puedes expresar claramente el objetivo de tu texto? *...you can cleary express the purpose of your text*?	0.58
Presentation (.80)	
5. ...puedes escribir tu texto con una buena presentación? *...you can write your text neatly*?	0.86
7. ...puedes escribir tu texto con una buena caligrafía? *...you can write in good handwriting*?	0.75
19. ...puedes escribir tu texto sin tachones ni borrones? *...you can write your text without blots or corrections*?	0.62
Spelling (.87)	
1. ... puedes escribir tu texto con una correcta ortografía? *...you can write the words of your text with correct spelling*?	0.87
6. ...puedes escribir tu texto con todas las tildes? *...you can put in the accents in your text*?	0.80

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