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Do sixth-grade writers need process strategies?

Mark Torrance[1]*, Raquel Fidalgo[2] and Patricia Robledo[2]

[1]Division of Psychology, Nottingham Trent University, UK

[2]Department of Psychology, Sociology and Philosophy, Faculty of Education, University of León, Spain

Background. Strategy-focused writing instruction trains students both to set explicit product goals and to adopt specific procedural strategies, particularly for planning text. A number of studies have demonstrated that strategy-focused writing instruction is effective in developing writing performance.

Aim. This study aimed to determine whether teaching process strategies provides additional benefit over teaching students to set product goals.

Sample. Ninety-four typically developing Spanish sixth-grade (upper primary) students.

Method. Students received 10 hr of instruction in one of three conditions: Strategy-focused training in setting product goals and in writing procedures (planning and revision; Product-and-Process), strategy-focused training in setting product goals (Product-Only), and product-focused instruction (Control). Students' writing performance was assessed before, during, and after intervention with process measures based on probed self-report and holistic and text-analytic measures of text quality.

Results. Training that included process instruction was successful in changing students' writing processes, with no equivalent process changes in the Product-Only or Control conditions. Both Process-and-Product and Product-Only conditions resulted in substantial improvements in the quality of students' texts relative to controls, but with no evidence of benefits of process instruction over those provided by the Product-Only condition. Teaching process substantially increased time-on-task.

Conclusions. Our findings confirm the value of strategy-focused writing instruction, but question the value of training specific process strategies.

Typically developing students with uninterrupted schooling will reach sixth grade with sufficient handwriting, spelling, and linguistic skills to produce well-formed written sentences. These skills are not, on their own, sufficient to ensure that students produce communicationally effective extended text. Writing persuasive essays and engaging narratives, clear recounts, and so forth requires an understanding of readers' expectations about how text is structured and of what makes text cohere. This can, in part, be gained by studying model texts. However, although knowledge about what constitutes good text is necessary for effective writing, it may not be sufficient. Knowing how a particular text type is typically structured will not benefit text quality unless students actually retrieve and apply this knowledge when completing a writing task. And if students are to write independently then prompts to retrieve this information need to be generated internally by the student rather than by their teacher.

*Correspondence should be addressed to Mark Torrance, Division of Psychology, Nottingham Trent University, Burton Street, Nottingham NG1 4BU, UK (email: mark.torrance@ntu.ac.uk).

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Strategy-focused writing instruction (e.g., Harris & Graham, 1996) teaches students to regulate their own writing behaviour through explicit self-questioning and self-instruction ('Do I need to add more to my plan before starting to write?', 'This is an opinion essay so it needs the following components. . .'.). It aims to give students both strategies for setting appropriate *product goals* – goals for what the final text should look like – and *process strategies* – explicit knowledge about writing procedures by which these goals might be achieved. For example, Sawyer, Graham, and Harris (1992) describe a successful intervention for developing narrative writing skills. Students were first taught product goals, in the form of a story grammar based around seven questions (Who is the main character? How does the story end?. . .). They were then taught a process strategy that involved a five-step planning procedure. One of the steps in this planning procedure involved asking the seven story grammar questions.

Evaluations of strategy-focused instruction in full-range classrooms with primary age children have consistently found large positive effects. This is true for students from second to sixth grade, writing in their first language, from schools in Germany, Spain, North America, and Portugal (Brunstein & Glaser, 2011; De La Paz & Graham, 2002; Glaser & Brunstein, 2007; Harris, Graham, & Mason, 2006; Limpo & Alves, 2013; Torrance, Fidalgo, & Garcia, 2007). The interventions evaluated in these studies were all based, to varying degrees, in the Self-Regulated Strategy Development (SRSD) approach to writing instruction (Harris & Graham, 1996). Meta-analyses comparing a range of different approaches to writing instruction for both secondary and primary aged students suggest that strategy-focused instruction in general, and SRSD in particular, is more effective than all other approaches to writing instruction that have received systematic evaluation (Graham, McKeown, Kiuhara, & Harris, 2012; Graham & Perin, 2007).

Programmes of strategy-focused writing instruction tend to share most or all of the following features (see, for example, De La Paz, 2007): (1) As we have already noted, students are taught both how to set goals for the finished text and procedures aimed as supporting the setting and pursuit of these goals. This procedural instruction focusses on planning in advance of writing (pre-planning) and on reviewing and editing (revision), two activities that student do not typically engage in unless specifically instructed to do so. (2) Instruction typically involves teachers modelling these writing procedures by thinking aloud while completing a writing task in front of the class. (3) Both product-goal setting and process strategies are supported by external memory aids (graphic organizers) and by mnemonics. (4) Support in the form of teacher and peer prompts is initially used extensively with responsibility for regulating writing being gradually passed to the individual student. Students practise strategies collaboratively and then alone.

It would be helpful, as De La Paz argues, to identify which of these components are necessary and which, if any, are superfluous. To date, however, although the efficacy of strategy-focused writing instruction is well established, little is known about the mechanisms by which effect is achieved.

Our aim in the present study was to test what we see as a central assumption underlying strategy focused writing instruction, namely that for students to establish and then work to fulfill product goals it is essential that these be supported by process strategies. There are (at least) two mechanisms by which adopting explicit process strategies might result in the production of better quality text. Process strategies may be necessary for self-regulation. It may be that for students to set product goals and to apply knowledge of the features of good text to their own compositions, spontaneously and independently of external prompts, then this knowledge must be developed within a process-strategy framework. There is some experimental evidence from writing-related

tasks that students perform better when set process goals (Schunk & Swartz, 1993; Zimmerman & Kitsantas, 1999). Second, writing must be completed within the constraints of limited cognitive resources. In developing writers, processing associated with spelling and mechanics may reduce students' capacity to produce compositionally sophisticated text (Graham, Berninger, Abbott, Abbott, & Whitaker, 1997). Developing writers may therefore benefit from process strategies, and particularly planning strategies, that deliberately separate higher- and lower-level processes.

There is some evidence that requiring adult writers to outline before writing full text results in better quality compositions (Glynn, Britton, Muth, & Dogan, 1982; Kellogg, 1988; Rau & Sebrechts, 1996; but see Johnson, Mercado, & Acevedo, 2012), and the Graham's and Perin's (2007) meta-analysis found a significant but small benefit of requiring adolescent writers to engage in prewriting procedures. Note, however, that these findings relate to the direct effect of imposing pre-planning as a constraint on how writers perform a writing test. In contrast, our present focus is on whether extended training that focuses on pre-planning and/or revision processes produces students who, when then given writing tasks with no specific instruction to pre-plan or revise, then produce better text. The relationship between process training and improvements in text quality is not straightforward. Torrance, Fidalgo, and co-workers (Fidalgo, Torrance, & Garcia, 2008; Torrance *et al*., 2007) found that strategy-focused instruction produced large positive effects on both the quality of students' texts and students' tendency to plan in advance of writing. However, use of process strategies only very weakly predicted quality improvements. Butler (1995, 1998) argues that, in some contexts at least, self-regulation is better achieved by helping students to develop appropriate task goals but without specifying strategies by which these might be achieved.

In this study, we directly tested the hypothesis that in the context of instruction aimed at improving students' writing skills, learning process strategies gives benefits over and above those afforded by learning to set explicit product goals. We manipulated instructional content across three training conditions. In the *Product-and-Process* condition students were taught (1) to set and then pursue product goals and (2) planning and revision strategies for applying this knowledge within their writing processes. In the *Product-Only* condition training included the first of these components but not the second. In other respects instructional components closely followed those typically found in strategy-focused writing instruction. These were contrasted with a practice-matched *Control* condition in which students were taught with a traditional approach based around emulating model texts, with an emphasis on grammar, spelling, and vocabulary. This control is similar to that used in previous studies evaluating strategy-focused writing instruction (e.g., De La Paz & Graham, 2002) and was also similar to the participants' normal writing instruction.

Outcome was measured in terms of effect on students' writing processes (whether or not they adopted explicit planning and revision strategies), on text-analytic measures of the extent to which students made use of specific coherence-maintaining devices, and on holistic (reader-based) ratings of text structure, coherence, and overall quality. Process measures indicated whether or not process-focused instruction was effective in changing students' writing procedures. Text-analytic measures provided a relatively direct test of whether students set product goals and applied new discourse knowledge to meet these goals. If process strategies play an essential role in ensuring that students set and successfully pursue product goals then we expected an increase in the use of sophisticated coherence-maintaining devices in students in the Product-and-Process treatment conditions, but little increase in the use of these devices in the Product-Only

condition. Finally, holistic (reader-based) measures of text quality permitted comparison with previous research. Ultimately, it is the changes in these measures that are important if research of this nature is to impact classroom practice.

Method

Design

Four existing, parallel-ability classes of full-range Spanish Grade 6 students were randomly allocated to the intervention and Control conditions, with one class in the Control condition, one class in the Product-Only condition, and two classes in the Product-and-Process condition. Students in all three conditions received ten 1-hr sessions of writing instruction. Differences among conditions are summarized above and in Table 1. For the two groups in the Product-and-Process condition, we varied the order in which planning-focused and revision-focused instruction was delivered. One group (*Plan-Revise*) was taught planning in the first five sessions of the intervention, followed by revision in the second five sessions. This was reversed in the *Revise-Plan* group. Varying order in this way allowed us to determine whether changes in students' writing processes resulted directly from process-focused instruction.

We assessed writing performance prior to the start of training (pre-test), at the mid-point of training (mid-test), immediately after the end of training (post-test), and 1 week after the end of training (transfer test). The transfer test involved students writing a different type of text from that focused on during instruction. This tested the extent to which learning generalized to a genre other than that focused on during training.

Participants

Sample details are given in Table 2. We found no statistically significant differences among groups in age or on standardized measures of verbal and non-verbal reasoning ability

Table 1. Summary of features of the three training conditions

	Process-and-Product	Product-Only	Control
Instructional content			
Structural and linguistic features of compare–contrast essays	+	+	+
Product goals (the OAIUE mnemonic)	+	+	–
Planning and revision strategies	+	–	–
Instructional approach			
Discussion of model texts	+	+	+
Writing practice	+	+	+
Feedback on student's written products, concurrent with production	+	+	–
Strategy-focused instruction supported by mnemonics and graphic organizers	+	+	–
Teacher modelling of specific process strategies	+	–	–
Feedback on students' writing processes, concurrent with production	+	–	–
Feedback on students' finished texts	–	–	+

Table 2. Participant details

Condition	*N* (of which female)	Mean (*SD*) age in months	Mean (*SD*) verbal ability	Mean (*SD*) non-verbal ability
Product-Only	25 (10)	139.6 (4.3)	36.6 (5.7)	20.9 (3.3)
Product-and-Process (Plan-Revise)	25 (13)	137.7 (4.5)	35.4 (5.9)	22.2 (2.2)
Product-and-Process (Revise-Plan)	24 (10)	138.6 (4.9)	35.9 (5.7)	21.3 (3.3)
Control	20 (10)	137.7 (4.2)	37.4 (4.3)	22.4 (2.1)

(Thurstone & Thurstone, 2004). Two students were dropped from the Control condition because of incomplete data on one or more tests.

The school – a *colegio concertado* (mixed state and private funding) – served a middle-class, suburban, native Spanish population. Participants' previous writing instruction had followed patterns that are typical in Spanish primary schools (García, de Caso-Fuertes, Fidalgo-Redondo, Arias-Gundín, & Torrance, 2010). This is similar to the instruction received by students in the control group in this study.

Training conditions

Training in all conditions focused on the writing of compare–contrast essays. Intervention content is described in detail in Table 3 and is summarized below.

Product-Only

The Product-Only condition aimed to develop in students product-focused self-reflections of the form 'does my text have genre-appropriate structure', 'what should I include to make sure my text is adapted to audience needs', and so forth. In the first two sessions students were introduced to the concepts underlying the OAIUE mnemonic. This captures the areas in which product goals need to be set in order to ensure good expository text (objective, audience, content, coherence, and structure). They were also introduced to the specific structural characteristics of compare–contrast texts, again supported by mnemonics and by graphic organizers. In a third session students were presented with product models – examples of good and mediocre compare–contrast texts – which were discussed and analysed with reference to product goals structured around OAIUE. They then wrote texts that attempted to emulate the good examples, first working in pairs (Session 4) and then alone (Session 5). The teacher provided students with feedback during this phase, focusing on the extent to which emergent text met product goals. Session 6 recapped the first two sessions. Sessions 7–10 followed the same pattern and sessions 2–5, but with different example texts and writing tasks.

Product-and-Process

As in the Product-Only intervention, students were first introduced to the OAIUE mnemonic, but initial sessions also gave direct instruction about process strategies, also supported by mnemonics. In the third session, the teacher modelled these strategies, first presenting a coping model (making some mistakes that were later identified and solved)

Table 3. By-session summary of training contents in both forms of the Product-and-Process condition, and of the Product-Only condition

	Process-and-Product		
	Plan-Revise	Revise-Plan	Product-Only
1	Direct instruction and whole class discussion relating to the importance and relevance of being able to write well the importance of planning before drafting Direct product-focused instruction suggesting that texts vary in their aims and objectives that texts contain coherently linked ideas and tend to have introductions, bodies, and conclusions that there are different textual genres and these are associated with various typical text structures the importance of considering audience Direct instruction about planning processes, and specifically the role of planning in setting goals, generating ideas and organizing them into a coherence structure, and considering audience. The teacher made explicit the idea that planning is a strategy that helps to achieve texts that conform to the ideals introduced in the product-focused teaching	Direct instruction and whole class discussion relating to the importance and relevance of being able to write well the importance of revising (reviewing and editing) after drafting Direct Product-focused instruction suggesting that texts vary in their aims and objectives that texts contain coherently linked ideas and tend to have introductions, bodies, and conclusions that there are different textual genres and these are associated with various typical text structures the importance of considering audience Direct instruction about revision processes, and specifically the role of revision in checking that the text has achieved its aims, contains sufficient ideas, is coherent and well structured, and is audience appropriate. The teacher made explicit the idea that revision is a strategy that helps to achieve texts that conform to the ideals introduced in the product-focused teaching	Direct instruction and whole class discussion relating to the importance and relevance of being able to write well Direct Product-focused instruction suggesting. . . that texts vary in their aims and objectives that texts contain coherently linked ideas and tend to have introductions, bodies, and conclusions that there are different textual genres and these are associated with various typical text structures the importance of considering audience

Continued

Table 3. (*Continued*)

	Process-and-Product		
	Plan-Revise	Revise-Plan	Product-Only
2	Direct instruction providing understanding of effective planning strategies, illustrated with reference to compare–contrast essays, and structured around the following mnemonics. . .	Direct instruction providing understanding of effective revision strategies, illustrated with reference to compare–contrast essays, and structured around the following mnemonics. . .	Direct instruction focused on understanding features of good compare–contrast texts. This was based around the teaching of the following mnemonics
	OAIUE: Key considerations when planning text. *Objetivo* (objective) – what is purpose of the text? *Audiencia* (audience) – for whom is it intended? *Ideas* (ideas) – what ideas might be included? *Unir ideas* (unite ideas) – how might my ideas be unified and organized into a coherent whole? *Esquema* (structure) – organize the text into a draft (supported by an additional mnemonic –	OAIUE: Key considerations when revising text. Objetivo (objective) – does my text fulfil its purpose? Audiencia (audience) – does my text accommodate its readers? Ideas (ideas) – does my text include several good ideas? Unir ideas (unite ideas) – does my text cohere? Esquema (structure) – is my text appropriately organized?	OAIUE introduced within the IDC structure. The text must be orientated for a specific audience (*Audiencia*). Introductions need to present the objective (*Objetivo*). The body of the text needs to address ideas (*Ideas*), which need to be made to cohere linking ideas, paragraphs (*Unir ideas*), which must be structured and organized along the text (*Estructura o esquema*)
	IDC. *Introducción* (introduction), *Desarrollo* (development), *Conclusión* (conclusion)	FIN (*finalidades*) focuses students' attention on what they hope to achieve with their text	IDC. Compare–contrast texts should have the following structure: *Introducción* (introduction), *Desarrollo* (idea development), *Conclusión* (conclusion)
	POD provides students with an overview of how planning functions. *Piensa* (think) – before writing always stop and think. *Organiza tu pensamiento* (organize your thoughts) – your thoughts must be organized (specifically around OAIUE). *Desarrolla tu texto* (develop the text) – then you can write your text, but maintain planning (organized around OAIUE) while you are doing this	LEA for substance: *Lee* (read) – read the text carefully and critically paying attention to content, structure, audience appropriateness, and so forth (following the OAIUE mnemonic). *Evalúa* (evaluate) – while reading, evaluate the text, with these substantive issues. *Actuar* (act) – make changes in response to your evaluation	

Continued

Table 3. (*Continued*)

	Process-and-Product		
	Plan-Revise	Revise-Plan	Product-Only
		LEA for mechanics: *Lee* (read) – read the text quickly paying attention to spelling, verb–noun agreement, and punctuation. *Evalúa* (evaluate) and *Actúa* (act)	
3	The teacher then modelled these planning strategies by thinking aloud while planning a text in front of the class. This 'think aloud' was partially scripted and emphasized the steps of the planning strategy and the OAIUE principles	The teacher then modelled these revision strategies by thinking aloud while revising a text in front of the class. This 'think aloud' was partially scripted emphasizing the steps of the revision strategy and the OAIUE principles	Students analysed the structural features of two texts, a good example of a compare–contrast text and poor example, making explicit reference to OAIUE. With the poor example, students were encouraged to identify ways in which it might be improved
	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; Have I forgotten any steps? That's lots of good ideas*	This included self-regulatory statements such as *Now I need to remember FIN – what were my aims? This introduction doesn't really address the audience very well. Does this middle section really contain enough ideas? I don't think that these two paragraphs link very well. Have I forgotten any steps, any vowels? Have I assessed all substantive features of the text? This text contains lots of good ideas*	
4	Working in pairs students planned and wrote compare–contrast essay. Students took it in turns to plan while thinking aloud, while their partner commented on the extent to which the planning strategies being adopted emulated the processes taught and modelled in previous sessions	Working in pairs students revised an existing compare–contrast essay. Students took it in turns to revise while thinking aloud, while their partner commented on the extent to which the revision strategies being adopted emulated the processes taught and modelled in previous sessions	Working in pairs, students wrote a compare–contrast essay

Continued

Table 3. (*Continued*)

	Process-and-Product		
	Plan-Revise	Revise-Plan	Product-Only
	The teacher patrolled the class, listening to think aloud, and providing guidance and encouragement	The teacher patrolled the class, listening to think aloud, and providing guidance and encouragement	The teacher patrolled the class commenting on the emerging texts, with reference to the extent to which it met product goals, structured around the OAIUE mnemonic
5	This repeated the previous session, with students planning a different compare–contrast essay, but this time working alone. Students continued to think aloud while writing and again the teacher provided guidance and encouragement relating to the planning strategies that they were adopting	This repeated the previous session, with students revising a different compare–contrast essay, but this time working alone. Students continued to think aloud while revising and again the teacher provided guidance and encouragement relating to the revision strategies that they were adopting	This repeated the previous session, with students writing a different compare–contrast essay, but this time working alone. The teacher provided encouragement and feedback on the emerging texts
Mid-test			
6	Direct instruction and whole class discussion of the importance of revising (reviewing and editing) after drafting	Direct instruction and whole class discussion of the importance of planning prior to drafting	Reminder of product-focused instruction delivered in Session 1
	Reminder of product-focused instruction delivered in Session 1	Reminder of product-focused instruction delivered in Session 1	Students were given texts with a range of different genres and analysed their features
	Direct instruction about revision processes (as for Revise-Plan condition, Session 1)	Direct instruction about planning processes (as for Plan-Revise condition, Session 1)	
7–10	Revision-focused training, replicating Sessions 2–5 in the Revise-Plan condition. Writing topics were different from those used in the first half of the intervention	Planning-focused training, replicating Sessions 2–5 in the Plan-Revise condition. Writing topics were different from those used in the first half of the intervention	Repetition, using different examples and writing topics, of Sessions 2–5 in this condition

and then mastery. Modelling involved 'thinking aloud' while composing a text in front of the class. Think aloud was mainly scripted. In the fourth and fifth sessions, students wrote texts in ways that aimed to emulate the mastery model, first working in pairs and then alone. The students themselves thought aloud during emulation (both in pairs and alone), thus allowing peers and the teacher to comment on, and support, appropriate use of planning and revision strategies. Sessions 6–10 repeated this pattern. In the *Plan-Revise* group, process instruction in sessions 1–5 focused on planning and in sessions 6–10 focused on revision. In the *Revise-Plan* group, this order was reversed.

Control

Instruction in the Control condition was product-focused but without the metacognitive elements of the other two conditions (i.e., without teaching explicit strategies for setting product goals). This involved instruction relating to the structural and linguistic features of the compare–contrast essay, and students reading and discussing good examples of this text type. Students then wrote texts aiming to emulate the genre-specific features of the example texts. The teacher provided written feedback on idea development and organization, spelling and grammatical accuracy, and quality of handwriting. Students wrote alone, without collaboration or comment from peers or teacher. Writing practice – the number of writing tasks completed in total – was same in this condition as in the Product-Only and Product-and-Process conditions. In other respects, this condition was similar to the students' normal writing instruction.

Training delivery and treatment fidelity

Instruction was delivered by the same instructor for all sessions in all conditions over ten 1-hr sessions. Previous studies evaluating strategy-focused writing instruction have found large and persistent effects with interventions of roughly similar length (Limpo & Alves, 2013; Torrance *et al.*, 2007) and with substantially shorter interventions (Brunstein & Glaser, 2011). The instructor was the students' normal literacy teacher. She was also part of the research team with previous experience both of the interventions used in this study and of controlled intervention studies in general. The instructor therefore had a detailed understanding of the differences among treatment conditions, and the importance of ensuring that there was no bleed between them. Session content was closely prescribed, with the instructor following detailed scripts. Aside from (scripted) declarative instruction and modelling, sessions involved specific tasks all requiring written output. The instructor met with the research team before each session both to discuss the delivery of the previous session (in each of the four conditions) and to go through the structure of instruction in the upcoming sessions.

Written outputs from each session were collected and analysed. These indicated that the correct tasks were completed by all students in all sessions. However, strongest evidence of treatment fidelity comes from differences in the students' writing processes following instruction. Successful manipulation of our key independent variable – whether or not students learned process strategies – was evidenced (as we discuss below) by students in the Product-and-Process conditions (but not in the Product-Only and Control conditions), modifying their writing processes in line with the process strategies taught in these interventions. Changes in process on the mid-test and post-test tasks also coincided with differences between the Plan-Revise and Revise-Plan forms of the Product-and-Process treatment.

Measures

Writing assessment tasks

Assessment involved students writing compare–contrast essays (e.g., 'Compare and contrast mammals and birds'), except for the transfer task when students wrote a problem–solution essay ('Discuss the problem of environmental contamination and suggest possible solutions'). Each task was accompanied by supporting literature comprising about 500 words of text. Students were told that they should produce full, polished prose, and to write to the best of their ability. Students were provided with separate sheets of paper for rough work and for the final product. They were explicitly told that they were free to use the rough work sheet if they wished, but that there was no requirement to do so. Students were free to write for as long as they needed.

Text-based text-quality assessment

These involved counting the number of times in each text that students used specific rhetorical and linguistic devices. We identified four devices that are typical of the rhetoric of expository text: Use of structural ties marked, for example, by structures such as *first. . ., second. . ., finally*; reformulation (e.g., *in conclusion. . ., that is to say. . ., in other words*; argumentation (e.g., *for example, however, despite this*); and use of metastructural markers (e.g., *Now I will describe. . ., The following paragraph talks about. . .*). We contrasted these with devices that are less specific to expository text and are learned earlier: Lexical repetition, use of coordinating conjunctions, and anaphoric reference using pronouns. Texts were coded independently by two trained raters to give counts of the number of times that each type of device occurred in each text. Inter-rater correlations of these counts averaged across the four writing tests gave a mean across all coherence-device types of .98 and varied for specific types between .90 and 1.0. To control for text length, these are reported as cohesion tie densities: Number of ties per 100 words.

Reader-based assessment

Holistic (reader-based) text assessment was adapted for the present context from a coding scheme originally described by Spencer and Fitzgerald (1993). Structure was assessed on a 4-point scale based on the extent to which it was possible to identify background information introducing the text, cues indicating text structure, an introductory topic or thesis sentence, clear organization of ideas based around a definite scheme, thematic unity within paragraphs and across the whole essay, and a conclusion that reiterated the purpose of the paper. Coherence was also assessed on a 4-point scale and was based on whether a topic or theme was identified and remained a focus for the essay, the text included a context that orientated the reader, information was organized in a discernible pattern which was sustained through the text, sentences and paragraphs were cohesively tied, and the discourse flowed smoothly. Holistic quality was assessed on a 6-point scale and gave a global evaluation of the extent to which the text had a clear sequence of ideas with little or no irrelevant detail, clear organization, fresh and vigorous word choice, varied and interesting detail, correct sentence structure, and accurate punctuation, capitalization, and spelling.

All texts were rated separately by two trained readers who were blind to condition. We found inter-rater correlations, averaged across the four tests, of .90 for structure, .85 for coherence, and .85 for holistic quality. Differences were resolved by taking the mean of

the two ratings. Correlation among the three reader-based quality measures was relatively high (correlations averaged across test: Structure and holistic quality, $r = .65$; coherence and holistic quality, $r = .82$; coherence and structure, $r = .73$).

Writing processes assessment

Students' writing processes were explored using an established time-sampled self-report method (e.g., Olive & Kellogg, 2002; see Piolat, Roussey, Olive, & Farioli, 1996, for evidence against significant reactivity). Students were provided with a 'writing log' booklet divided into sections each of which listed seven activities (*Reading reference materials*, *thinking about content*, *outlining*, *writing text*, *reading own text*, *changing text*, and *unrelated*). Each activity was represented by a simple graphic. When they heard a tone (random intervals of between 45 and 135 s), they indicated the activity that they were engaged at precisely the time that the tone sounded.

Students were first trained in use of the writing log. The reliability of their coding was then tested by a researcher 'thinking aloud' (actually scripted) while composing text and stopping at 25 different points for students to code her current activity. Mean agreement between student codes and those of an expert across all activity categories was .89 (mean Cohen's $\kappa = .87$) and was above .8 for all categories. Number of words written as rough notes was significantly positively correlated with reported time spent outlining (.48, .49, and .63 for mid-test, post-test and transfer tasks, respectively). We explored, through simulation, the extent to which the specific time-sampling parameters used in this study introduced error into the estimates of time in specific activities. Our findings indicated no systematic bias and random error of around 5%.

Testing procedure

Testing was conducted by the research team in students' normal classrooms. All test sessions involved a brief description of the writing task. They then performed the writing task, which included providing self-reports via the writing log. Pre-test sessions started with training in use of the writing log and ended with verbal and non-verbal ability tests. All instruction, testing, and written output were in Spanish.

Results

Written products

Cell means from the 4 (group: Product-Only; Process-and-Product Plan-Revise; Product-and-Process Revise-Plan; Control) by 4 (test: Pre-test, mid-test, post-test, transfer) interaction were estimated with linear mixed-effects models which we then systematically constrained to provide planned comparisons (e.g., Quené & van den Bergh, 2004). This approach permits the estimate of between-participant variance independently for each test-by-condition and of within-group covariance across test. Incremental constraint setting establishes the best model fit across all cell means simultaneously, evaluating the probability of this relative to other candidate models. This planned-contrast approach partly avoids problems associated with conducting multiple isolated pairwise comparisons.

Analysis proceeded as follows: We first constrained all means to be equal. Where this model provided poorer fit than the unconstrained model, we imposed constraints at pre-test (Step 1), then at post-test (Step 2), then at mid-test (Step 3), and finally at transfer (Step

4). At each step, we tested three models: All means constrained to be equal; Process-and-Product (Plan-Revise and Revise-Plan) and Product-Only conditions constrained to be equal; and Process-and-Product groups equal and Product-Only and Control conditions equal. Constraints from the best-fit model from previous steps were carried forward to the next step. Where the best-fit model suggested equivalent effects of treatment across the Product-Only and Product-and-Process groups, we then performed a separate planned contrast (*t*-test with df = 74) comparing the Product-Only condition with each of the Product-and-Process groups (Plan-Revise and Revise-Plan). Model fit was evaluated by a sample-size-corrected version of AIC (AICc; Sugiura, 1978). Because we are not testing a nested hierarchy of models, we compared models in terms of likelihood ratio (LR) in preference to chi-square change tests. We report the likelihood of competitor models relative to the best-fit model. LR values of .031 or less can be considered strong evidence for rejecting a competitor model (Royall, 2000). Model fits are reported in Table 4, and observed means are reported in Table 5.

Text-based assessment

We first summed across values to give two variables – Advanced Cohesion-Device Density and Basic Cohesion-Device Density. As indicated in Table 5, use of advanced cohesion devices increased substantially from pre-test to mid-test in both the Product-and-Process and Product-Only conditions and then remained well above baseline in subsequent tests. There was no similar increase in the Control condition. The best-fit model (Table 4) indicated a statistically reliable benefit of both the Product-Only and Process-and-Product forms of strategy training relative to controls, but no evidence that Process-and-Product training provided benefits over and above those provided by Product-Only training (LR $<$ .001 for all competing models). Subsequent comparisons indicated no statistically reliable differences between the Process-and-Product and the Product-Only conditions at any of mid-test, post-test, and transfer ($p > .05$).

Standardized effect size estimates (Cohen's *d*) relative to the control group based on estimated means from the best-fit model and observed standard deviations weighted by group size suggested large effects throughout (for the Plan-Revise, Revise-Plan, and Product-Only groups, respectively: Mid-test, 1.2, 1.6, 1.2; post-test, 3.4, 3.4, 3.8; transfer, 1.7, 2.3, 2.1).

There was no evidence of an increase in the use of basic coherence devices as a result of training. Basic devices were, however, used substantially less often when writing the problem–solution essay (the transfer task) for all groups, suggesting that students did, in fact, write linguistically different texts in response to our request for a different genre. For brevity, fit indices and means are not reported for this variable.

We did not find evidence of an effect of intervention on text length (AIC_c = 3,697 for both the unconstrained model and the model in which all means were constrained to be equal).

Reader-based assessment

Best-fit models for all three reader-based measures followed the same pattern as for advanced-cohesion-device density with a statistically reliable benefit of both the Product-Only and Process-and-Product forms of strategy training relative to controls, but no evidence that Process-and-Product training provided benefits over and above those provided by Product-Only training.

Table 4. Model fits (AIC_c with likelihood relative to best-fit model in parenthesis) for comparisons among Product-Only (P), both forms of the Product-and-Process condition (Plan-Revise, PR; Revise-plan, RP), and Control (C) groups at pre-test, post-test, mid-test, and transfer test, for text-quality measures and time-on-task

Step	Constraints	Cohesion tie density – advanced	Reader rating – coherence	Reader rating – structure	Reader rating – global quality	Time-on-task
0	General model	1,327 (<.001)[a]	710 (<.001)[a]	703 (.008)[a]	959 (<.001)[a]	2,485 (.013)[a]
	All means equal	1,435 (<.001)	860 (<.001)	868 (.001)	1,075 (<.001)	2,590 (<.001)
1. Pre-test	All means equal	1,320 (.001)	730 (<.001)	703 (.006)	973 (<.001)	2,509 (<.001)
	PR = RP = P	1,321 (<.001)[a]	705 (.002)[a]	700 (.038)[a]	953 (.002)[a]	2,481 (.076)[a]
	PR = RP, P = C	1,322 (<.001)	733 (<.001)	706 (.002)	974 (<.001)	2,505 (<.001)
2. Post-test	All means equal	1,383 (<.001)	750 (<.001)	790 (<.001)	1,002 (<.001)	2,503 (<.001)
	PR = RP = P	1,316 (.01)[a]	701 (.013)[a]	695 (.466)[a]	949 (.018)[a]	2,494 (<.001)
	PR = RP, P = C	1,355 (<.001)	740 (<.001)	762 (<.001)	983 (<.001)	2,476[b]
3. Mid-test	All means equal	1,341 (<.001)	714 (<.001)	741 (<.001)	945 (.15)[a]	2,499 (<.001)
	PR = RP = P	1,311 (.081)[a]	697 (.08)[a]	693[b]	947 (.054)	2,483 (.029)
	PR = RP, P = C	1,342 (<.001)	777 (<.001)	762 (<.001)	1,011 (<.001)	2,478 (.311)
4. Transfer	All means equal	1,339 (<.001)	722 (<.001)	828 (<.001)	968 (<.001)	2,519 (<.001)
	PR = RP = P	1,306[b]	692[b]	701 (.023)	941[b]	2,514 (<.001)
	PR = RP, P = C	1,331 (<.001)	722 (<.001)	733 (<.001)	963 (<.001)	2,486 (.005)

Note. [a]Model that is both best fit in current step and better fitting than any model in previous steps. The constraints from this model are incorporated into all models in subsequent steps. General model is the model in which all parameters were free to vary independently.
[b]Best fitting model overall.

Table 5. Observed means for text-based cohesion measures, reader-based quality measures, text length, and time-on-task, by condition and by test. Standard deviations in parentheses

	Pre-test	Mid-test	Post-test	Transfer
Cohesion tie density (advanced)				
Process-and-Product: Plan-Revise	0.34 (0.83)	2.7 (1.5)	3.9 (1.9)	3.3 (3.7)
Process-and-Product: Revise-Plan	0.38 (0.64)	2.9 (1.3)	3.8 (1.7)	3.3 (2.1)
Product-Only	0.42 (0.78)	2.6 (1.2)	4.3 (2.1)	3.0 (2.0)
Control	0.65 (0.93)	0.77 (0.97)	0.42 (0.80)	0.63 (0.86)
Quality – structure				
Process-and-Product: Plan-Revise	1.2 (0.37)	2.4 (0.91)	3.6 (0.86)	3.6 (0.76)
Process-and-Product: Revise-Plan	1.3 (0.61)	2.4 (1.0)	3.6 (0.82)	3.1 (1.0)
Product-Only	1.1 (0.28)	2.0 (0.75)	3.6 (0.65)	2.9 (1.1)
Control	1.5 (0.51)	1.1 (0.31)	1.1 (0.22)	1.1 (0.23)
Quality – coherence				
Process-and-Product: Plan-Revise	1.2 (0.37)	2.3 (0.68)	3.0 (0.73)	2.8 (0.82)
Process-and-Product: Revise-Plan	1.2 (0.41)	2.2 (0.72)	3.2 (0.83)	2.7 (0.89)
Product-Only	1.1 (0.34)	2.0 (0.75)	3.0 (0.75)	2.6 (0.71)
Control	2.1 (0.55)	1.5 (0.51)	1.4 (0.49)	1.4 (0.60)
Quality – holistic quality				
Process-and-Product: Plan-Revise	1.5 (0.59)	2.4 (0.82)	4.2 (1.2)	3.6 (1.4)
Process-and-Product: Revise-Plan	1.5 (0.59)	2.4 (1.0)	4.2 (1.0)	3.6 (1.4)
Product-Only	1.5 (0.51)	2.0 (0.88)	3.9 (1.1)	3.0 (1.0)
Control	2.3 (0.57)	2.2 (0.81)	1.9 (0.55)	1.9 (0.71)
Length (words)				
Process-and-Product: Plan-Revise	96 (37.0)	110 (28.1)	100 (27.5)	130 (73.9)
Process-and-Product: Revise-Plan	93 (30.9)	121 (41.8)	113 (37.1)	132 (73.3)
Product-Only	97 (26.9)	106 (31.2)	102 (24.8)	95 (35.4)
Control	115 (25.9)	105 (46.2)	93 (50.7)	100 (28.9)
Total time-on-task (minutes)				
Process-and-Product: Plan-Revise	15.2 (7.0)	26.0 (7.4)	28.8 (7.2)	36.2 (13.6)
Process-and-Product: Revise-Plan	15.6 (6.0)	24.7 (9.4)	29.0 (9.9)	25.4 (11.0)
Product-Only	16.9 (4.7)	20.9 (6.2)	21.1 (7.2)	17.3 (4.9)
Control	25.3 (5.7)	17.5 (5.0)	21.8 (7.2)	16.7 (4.0)

As can be seen from Table 4, models that tested the null hypothesis of equivalence of Control and other conditions gave LRs $< .001$ for all three measures at each of mid-test, post-test, and transfer. Means for both of the strategy-focused conditions show a clear pattern of increased quality from baseline to mid-test, then from mid-test to post-test, and then a slight decline in quality for the transfer task. There were no similar changes in the control group. Mid-test, post-test, and transfer scores were greater in the strategy-focused conditions than in the Control condition (the one exception to this pattern was for structure ratings, which showed only weak evidence of difference at mid-test, and no difference on the transfer task). Models that tested the null hypotheses that means were equivalent across all four conditions or that the Product-Only condition was equivalent to control showed substantially poorer fit than models in which Process-and-Product and Product-Only conditions were hypothesized to be equal, but different from control. Subsequent analysis contrasting the Product-and-Process groups with the Product-Only group showed no statistically significant difference at any of mid-test, post-test, and transfer on any of the three measures ($p > .05$).

Table 6. Activities engaged in during writing tasks. First value is estimated mean time-in-activity (minutes). Second value is estimated proportion of students engaging in that activity at least once. Data from writing logs

	Pre-test	Mid-test	Post-test	Transfer
Reading references				
Process-and-Product: Plan-Revise	2.2, 0.96	4.1[a], 1.0	4.2[a], 0.92	7.1[a,b], 0.96
Process-and-Product: Revise-Plan	1.9, 0.68	3.7[a], 0.88	5.5[a], 0.80	5.3[a], 0.84
Product-Only	3.1, 0.92	4.5, 1.0	4.6, 0.88	3.9, 0.92
Control	4.0, 1.0	3.4, 1.0	4.1, 0.95	3.6, 0.85
Thinking about content				
Process-and-Product: Plan-Revise	1.9, 0.76	3.3[a], 0.84	3.5[a], 0.72	3.5, 0.72
Process-and-Product: Revise-Plan	1.5, 0.48	2.2, 0.60	2.7, 0.52	1.3, 0.44
Product-Only	2.6, 0.88	1.8, 0.71	2.8, 0.75	2.1, 0.67
Control	2.7, 0.80	1.9, 0.60	2.4, 0.75	1.7, 0.60
Writing outline				
Process-and-Product: Plan-Revise	1.9, 0.52	5.8[a,b], 0.88	5.9[a], 0.84	7.6[a,b], 0.80
Process-and-Product: Revise-Plan	1.6, 0.32	2.8, 0.44	4.6[a], 0.52	3.8[a], 0.48
Product-Only	1.4, 0.42	2.9, 0.58	3.8, 0.67	2.4, 0.54
Control	3.7, 0.65	3.0, 0.55	4.1, 0.60	2.3, 0.40
Writing full text				
Process-and-Product: Plan-Revise	5.5, 1.0	8.6[a], 1.0	11.7[a], 1.0	14.9[a,b], 1.0
Process-and-Product: Revise-Plan	7.9, 1.0	12.4[a,b], 1.0	12.9[a,b], 1.0	13.1[a,b], 1.0
Product-Only	6.4, 0.92	8.1, 1.0	7.1, 1.0	7.0, 0.96
Control	11.3, 1.0	7.1, 0.95	8.3, 0.95	7.3, 1.0
Reading text				
Process-and-Product: Plan-Revise	1.9, 0.64	1.9, 0.68	1.7, 0.56	1.6, 0.52
Process-and-Product: Revise-Plan	1.5, 0.52	1.4, 0.44	1.6, 0.40	0.8, 0.24
Product-Only	1.8, 0.71	1.7, 0.71	1.5, 0.50	0.9, 0.50
Control	1.4, 0.50	1.1, 0.40	1.2, 0.50	0.5, 0.30
Changing text				
Process-and-Product: Plan-Revise	1.0, 0.56	1.5, 0.60	1.0, 0.48	0.7, 0.32
Process-and-Product: Revise-Plan	0.5, 0.32	1.4, 0.52	0.8, 0.28	0.2, 0.08
Product-Only	0.9, 0.42	1.1, 0.54	0.6, 0.29	0.3, 0.17
Control	1.5, 0.60	0.3, 0.20	0.9, 0.40	0.6, 0.25
Off-task				
Process-and-Product: Plan-Revise	1.7, 0.40	1.6, 0.48	2.1[b], 0.52	1.8, 0.48
Process-and-Product: Revise-Plan	1.0, 0.36	0.7, 0.32	1.8, 0.44	0.8, 0.36
Product-Only	1.6, 0.54	1.4, 0.50	1.3[b], 0.50	1.1, 0.38
Control	1.6, 0.30	0.7, 0.30	0.2, 0.15	0.3, 0.25

Note. [a]Significantly greater than at pre-test ($p < .016$, Wilcoxon signed-rank test).
[b]Significantly greater than control group ($p < .016$, Mann–Whitney *U*-test).

The control group performed slightly but reliably better at pre-test than other groups. The quality of their texts declined at mid-test and then remained at similar levels at post-test and at the transfer task.

Standardized effect size estimates relative to control suggested large effects at post-test ($d > 1.5$) and at transfer ($d > 0.9$) for all three treatment conditions on all three reader-based ratings. Effect sizes at mid-test were large for the structure rating ($d > 1.1$), smaller ($d > 0.7$) for coherence, and, as noted above, non-significant for holistic quality.

Quality measures were only weakly correlated with text length (.29, .33, and .37 for correlation with structure, coherence, and holistic quality, respectively) and showed moderate correlation with advanced-cohesion-device density (.64, .55, and .53). This suggests good discriminant validity of these measures: Reader-based quality measures were largely independent of text length, and captured aspects of quality that were not due simply to the text features were counted in the text-based analysis.

Writing processes

Time-in-activity was strongly positively skewed with a number of students not reporting engaging in the activity at any time during production of their text (with the exception of writing full text). Results are summarized in Table 6. We first made comparisons, separately for each condition, between time-in-activity at pre-test and at each of mid-test, post-test, and transfer (Wilcoxon signed-ranks test, with Bonferroni correction within each set of three comparisons, familywise $\alpha = .05$). Then, at each of pre-test, mid-test, post-test, and transfer, we made pairwise comparisons between each intervention condition and the control (Mann–Whitney *U*-test with a similar Bonferroni correction). Test results are flagged in Table 6 but for brevity are omitted in the text.

Students in the Plan-Revise group spent more time outlining at each of mid-test, post-test, and transfer, relative to pre-test. In the Revise-Plan group, consistent with planning being taught after the mid-test, there were only significant increases at post-test and at transfer. Neither the Product-Only nor the control groups showed changes in tendency to plan as a result of intervention. There were no statistically reliable increases within groups between pre-test and subsequent tests in the time students spent reading back over or making changes to their own text. Systematic analysis of edits (deletions, insertions, substitutions) that students made to their texts, which for economy we do not report in detail, also failed to show intervention effects. There were statistically significant increases in time spent composing full text, relative to control in both of the Product-and-Process groups, at each of mid-test, post-test, and transfer. Both of these groups showed reliably more time composing text than control at transfer and, for just the Revise-Plan group, also at mid-test and post-test.

Time-on-task (the sum across estimated time in each of the separate activities) was roughly normally distributed and was therefore analysed using the same methods as used for the product data. The best-fit model (Table 4) suggested that at post-test, time-on-task for the Product-and-Process groups was substantially higher than for students in the other two conditions. This trend was also present at mid-test and transfer, although the best-fit model indicated differences among all conditions on these tests. Means are reported in Table 5. At pre-test, students in the control condition spent more time-on-task than other groups. This may explain their elevated pre-test quality scores.

Discussion

Teaching process strategies resulted in students modifying their writing procedures. Time spent pre-planning increased following Product-and-Process training, but not in the Product-Only or Control conditions. Comparison between the Plan-Revise and Revise-Plan groups at mid-test showed that increased tendency to pre-plan resulted directly from those training sessions in which planning strategies were taught. The methods used in the

interventions evaluated in this study were, therefore, effective in teaching the independent use of pre-planning strategies. Teaching revision strategies did not result in an increased tendency to read and edit but did result in an increase in time spent writing full text. Product-and-Process instruction resulted in students taking 50% longer to produce their texts than at pre-test, with no parallel increase in the number of words written. There was no increase in time-on-task in either the Product-Only condition or the Control condition.

Consistent with a considerable body of existing research (Graham & Perin, 2007; Graham *et al.*, 2012) students who were taught both explicit product goals and process strategies – the Product-and-Process condition – showed substantial and statistically reliable improvement in the quality of their texts. Effects were independent of text length, indicating that students produced better-formed text rather than simply writing more. Quality benefits transferred to students' performance on a task that required a text type that was different from that focused on during instruction.

The main aim of this study was to test the hypothesis that for strategy-focused writing instruction to be successful, it needs necessarily to teach not only product-goal setting, but also processes strategies by which these product goals can be set and fulfilled. Our findings do not support this hypothesis. Text-quality improvements in the Product-Only condition were large, and not reliably less than those achieved by teaching Product-and-Process. Moreover, total time-on-task at post-test and on the transfer test was much shorter than in the Product-and-Process conditions and similar to time-on-task for the control. Therefore, students who were taught just to set explicit product goals produced substantially better text than at baseline, with no costs to efficiency: They 'wrote smarter'. Process instruction prolonged the writing process with no associated benefit to text quality.

We argue, like previous researchers (e.g., De La Paz & Graham, 2002; Limpo & Alves, 2013; Torrance *et al.*, 2007), that the positive effects of this form of intervention result from the students learning to regulate their writing by adopting effective writing strategies: Improvement occurred as a result of students learning what they were taught. This assumption is supported in a study by Brunstein and Glaser (2011) who found that the positive effects of teaching self-regulation strategies to fourth-grade writers were mediated by the extent to which the students adopted the strategies that were the focus of instruction. Given the package nature of the intervention used in this and previous studies, it remains possible that effects relative to control result from factors to do with how the instruction was delivered, rather than to students learning writing strategies. For example, it may be that writing in pairs, which was a feature of the both intervention conditions but not the control, may in itself have resulted in improved performance independent of strategy learning, perhaps by increasing student motivation. Although our design, and that of previous studies, does not rule out this possibility, we do not believe that it fits well with our findings. Students in intervention conditions did not write longer texts, but rather texts that showed evidence of greater rhetorical sophistication. Students in the Product-and-Process condition specifically added pre-planning strategies to how they wrote. These findings, particularly the latter, are difficult to explain simply in terms of differences in approach to delivery (as opposed to differences in the content that was delivered). They suggest that students' writing performance improved because they learned instructional content (i.e., product-goal setting and process strategies). These findings are also difficult to explain simply in terms of depressed performance in the control group, as a result of particularly ineffective or demotivating instruction in that condition.

Our results therefore suggest that teaching explicit process strategies – particularly teaching students to pre-plan – does not provide additional benefit over and above that afforded by teaching students to set explicit product goals. This conclusion, however, needs qualifying in several ways.

First, it is possible that weaker writers receive more benefit from process-focused instruction. Our sample size was not sufficiently large to properly test this hypothesis. We did, however, inspect mean change from pre-test to post-test, for students scoring in the bottom quartile at pre-test. Across both intervention conditions, these students showed marginally greater improvement than the rest of the sample. Improvement for weaker students in the Product-Only condition was greater than for students in the Product-and-Process condition.

Second, evaluation texts in this study were relatively short (although of a typical length for class-written essays in this age group and of a similar length to those used for evaluation in other studies). Explicit pre-planning may become more important when the task requires longer texts although the reverse may also be true (Davies, 2003).

Third, it may be that process strategies are important for long-term maintenance. This was not explored in the present study. If process strategies are important to ensure that students do not experience cognitive overload, then we would expect benefits to emerge immediately following intervention. However, if process strategies play a role in prompting students to set and pursue product goals, then it is possible that this role becomes more important at greater temporal distance from the intervention. It is worth noting, though, that although Fidalgo *et al.* (2008) found benefits of an intervention identical to the Product-and-Process condition that were maintained at 12 weeks and 2 years post-intervention, they found no evidence that this was due to persistent use of process strategies. Therefore, while further research is needed to establish whether maintenance is poorer in students who do not learn process strategies, we would hypothesize that this is not the case.

Finally, our claim that students did not gain additional benefit from learning processes strategies necessarily relies on failure to reject a null hypothesis. Our sample size is small, making the probability of a type 2 error relatively high. It therefore remains possible that there are some small additional benefits from learning and using explicit process strategies. However, our findings are not consistent with the strong argument that process strategies are a necessary accompaniment to explicit setting and pursuit of product goals. This argument is based on the assumption that without explicit process strategies, and particularly strategies for pre-planning text, students will neglect product goals (i.e., process strategies are necessary for self-regulated performance) and/or attempts to pursue explicit product goals while also struggling with the lower-level demands of translating thought into text will result in cognitive overload. If this were the case, then the fact that students in the Product-Only condition were not taught, and did not subsequently adopt, explicit pre-planning and revision strategies, should present very substantial constraints on performance. This was not what we found.

Planning, as used within the writing research literature, is a broadly defined concept (Torrance, in press). On one level, any systematic improvements to the quality of the text that a student produces must necessarily result from a change in how the student plans their text. However, there is a distinction between setting new goals and allowing students to modify their own writing process to accommodate these, and telling students 'You must write a plan'. Our claim here

is not that students in the Product-Only condition showed improvement without changing process. It is that they showed improvement without being taught and without subsequently adopting, explicit procedures for planning in advance of writing and for revising what they had written. Teaching process increased students' tendency to pre-plan and substantially increased total time-on-task, but gave no significant benefits for the quality of their text.

Strategy-focused writing instruction provides a complex package of content and instructional methods. Our present study adds to the previous extensive evidence that this package, implemented as a whole, is effective in developing writing skills. One possible (perhaps probable) explanation for the effectiveness of this form of intervention is that it gives students explicit strategic knowledge by which they can regulate what and how they write. Developmentally, this is consistent with the argument that there is the need for a self-control stage in which students consciously and deliberately draw on writing-relevant metaknowledge, prior to them achieving full self-regulation (Zimmerman & Risemberg, 1997). Our findings suggest, however, that this metaknowledge need not necessarily extend to students learning explicit process strategies. Teaching late-primary students explicit planning and revision processes may, in fact, result in them taking longer to produce their texts, with no gain in the quality of the finished product.

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