The online management of writing processes and their contribution to text quality in upper-primary students

Paula López[1], Mark Torrance[2], and Raquel Fidalgo[1]
[1] Universidad de León and [2] Nottingham Trent University

Abstract

Background: The online management of writing processes is an important factor related to the composition of high-quality texts. In the present study we analysed the time that upper-primary students devoted to writing processes, the distribution of those processes during composition and the contribution of both aspects to text quality. **Method:** 120 upper-primary students were asked to write an argumentative text in pairs under thinking aloud conditions. Verbalizations were analysed considering different writing processes and sub-processes. **Results:** Upper-primary students rarely used planning and revising processes. Planning, which basically involved content generation, was mostly activated at the beginning of the writing task. Revision, which mainly included reading, appeared at the end. The time devoted to writing processes or the time at which they were activated had no effect on text quality. **Conclusions:** Not only did upper-primary students make little use of planning and revising processes, it was also ineffective. Thus, there is a need to provide them with high-quality instruction in school from early on.

Keywords: Writing, writing processes, online management, online measures.

Resumen

La distribución temporal de los procesos de escritura y su contribución a la calidad textual al final de Educación Primaria. **Antecedentes:** el manejo temporal de los procesos de escritura es un factor importante que influye en la composición de textos de calidad. En este estudio se analiza el tiempo que los estudiantes de 5º-6º de Primaria dedican a los procesos de escritura, su distribución temporal durante la composición y en qué medida ambos aspectos contribuyen a la calidad textual. **Método:** 120 estudiantes de 5º-6º de Primaria escribieron un texto argumentativo en parejas usando pensamiento en voz alta. Las verbalizaciones fueron analizadas en base a diferentes procesos y subprocesos de escritura. **Resultados:** los estudiantes hacen escaso uso de procesos de planificación y revisión textual. La planificación, relacionada principalmente con la generación de información, suele activarse al inicio del proceso de escritura. La revisión, que básicamente implica lectura, aparece al final del proceso escritor. El tiempo empleado por los escritores en los diferentes procesos o el momento en que son activados durante la composición no se relaciona con la calidad textual. **Conclusiones:** los estudiantes de 5º-6º de Primaria no solo hacen un escaso uso de procesos de planificación y revisión, sino que este es ineficaz. Por ello, es necesario instruir al alumnado en el uso de dichos procesos desde edades tempranas.

Palabras clave: escritura, procesos de escritura, distribución temporal, medidas online.

Following the appearance of the first process model of writing in 1980 (Hayes & Flower, 1980), a considerable body of research has focused not just on the written product but the processes by which this is produced. The writing process component from Hayes and Flower's model (1980) has been generally used as a theoretical basis, as it was the first model that clearly identified the three cognitive processes involved in writing: planning, translating and revising. Planning involves idea generation, organization and goal setting. Translating involves sentence planning and transcription, and therefore requires knowledge of syntax and the ability to handwrite (or keyboard) and to spell. Revision includes reading, evaluating and editing processes. The last two processes can function at a mechanical (e.g. spelling, handwriting and grammar) or substantive level (e.g. content and organization). The processes that writers engage in, and when these occur during composition may have potential impact on the quality of the resulting text. There is some existing evidence that how and when students engage in specific writing processes impacts the quality of their text (Breetvelt, Van den Bergh, & Rijlaarsdam, 1994; Levy & Ransdell, 1995; Van den Bergh & Rijlaarsdam, 2001).

Previous research has explored the amount of time that writers spend on different writing processes. Researchers have used a variety of online methods including concurrent self-reports (Kellogg, 1988; 2001; Fidalgo, Torrance, & García, 2008; Torrance, Fidalgo, & Robledo, 2015; Torrance, Fidalgo, & García, 2007) or thinking aloud (Beauvais, Olive, & Passerault, 2011; Breetvelt et al., 1994; Levy & Ransdell, 1995; Penningroth & Rosenberg, 1995). From those studies, a general pattern of the time that writers spend on different writing processes is discernible. For

instance, Beauvais et al., (2011) studied undergraduate students writing both narratives and argumentative texts. They found that translating filled around half of the total composition time and that about 20% of time was devoted to each of planning and revision. Penningroth and Rosenberg (1995) reported a more fine-grained analysis of planning and revising subprocesses of undergraduate students writing narrative texts. Planning processes were dominated by idea generation with very little time devoted to goal setting or organizing. Although students tended to spend time revising, they rarely evaluated or revised. Similar results were found for secondary school students (Breetvelt et al., 1994; Van den Bergh & Rijlaarsdam, 1999; 2001). As far as we know, just two studies have explored the processing time that upper-primary students devote to writing processes by means of self-reports in the context of instructional studies (Fidalgo et al., 2008; Torrance et al., 2007; Torrance et al., 2015). The results showed that, as with older students, translating was the main process, with significantly less time given to planning and revising. However, these data came from students' concurrent self-reports, which may lack reliability in upper-primary students. Self-reports also provide limited scope for more fine-grained analysis in terms of different writing subprocesses.

However, the ways in which students complete a writing task also vary in terms of how engagement in particular processes is distributed across the writing timecourse (Kellogg, 1988, 2001; Levy & Ransdell, 1995; Penningroth & Rosenberg, 1995; Piolat, Kellogg, & Farioli, 2001). In these studies time-on-task was divided into three equal periods. The results showed that whereas translating occurs throughout the writing process, toward the end of composition there are fewer episodes of planning and more of revision. Similar results were also found with secondary school students (Breetvelt et al., 1994; Van den Bergh & Rijlaarsdam, 1999; 2001). However, this pattern may change according to the demands of writing. For example, Penningroth and Rosenberg (1995) showed that adult writers revise from earlier when they face a particularly demanding writing task. As far as we know, no studies have explored how upper-primary students distribute writing processes during composition.

An important question therefore is how the time spent in different processes and their temporal distribution during composition contribute to text quality. Beauvais et al., (2011) found that the quality of undergraduate students' argumentative texts was positively related with a higher percentage of composition time devoted to planning. This effect was absent, however, when students wrote narratives. This finding is consistent with studies that found positive benefits of requiring adult writers to plan before writing full text (Kellogg, 1988; 1990). Levy and Ransdell (1995) showed that text quality depends on the time that undergraduate writers spend on revision in a writing task without genre constraints. However, other researchers studying secondary school students found no relationship between the total time spent in any of a number of different writing processes and sub-processes, and the quality of the resulting text (Breetvelt et al., 1994; Van den Bergh & Rijlaarsdam, 1999; 2001).

However, it might be the case that when a process occurs during composition affects the extent to which that process influences text quality. Most obviously, planning at the start of the writing process is, arguably, more likely to benefit text quality than planning towards the end. A series of studies by Van den Bergh and co-workers (Breetvelt et al., 1994; Van den Bergh & Rijlaarsdam, 1999; 2001)

seem to confirm this. For example, Breetvelt et al., (1994) found that if 15-years-old students evaluate their plans at the beginning of the task, this tends to have a positive effect on text quality of their final composition. However, in later stages this relation became negative or absent. This could be explained by the fact that evaluation at the beginning would possibly involve the composition of different options trying to fit with the writing assignment. Moreover, they also found a negative relation between engagement in revision and text quality when revision occurred at the start or the middle of the writing task. No effects on text quality were found when revision occurred at the end of the composition. However, other studies have found that particularly the revision implemented at the end of the writing task has a positive impact on text quality in undergraduate students (Levy & Ransdell, 1995). There is some evidence, therefore, that the way in which writers distribute these cognitive activities during the writing process is related to the quality of the resulting text and varies between writers and contexts.

In summary, therefore, students, at least at university and secondary school levels, vary both in the extent to which they engage in particular planning, translating and revising sub-processes, and in how these processes are distributed across the writing timecourse. There is also evidence that for some processes both total time, and distribution across timecourse predict the quality of the final text. Few attempts have been made, however, to explore these effects in primary-aged children. Limpo and co-workers (Limpo & Alves, 2013; Limpo, Alves, & Fidalgo, 2014) studied written outlines produced by upper-primary children and found that the quality of their written planning in advance of text production did not predict the quality of their final text. Fidalgo and co-workers (Torrance et al., 2007) used concurrent self-reports to determine writing processes in students who had received specific instruction in how to plan and revise their text. The authors found significant but weak correlations between time spent planning and text quality. This pattern was reversed in the same students, followed up two years later (Fidalgo et al., 2008). Torrance and colleagues (Torrance et al., 2015) successfully trained students to engage in pre-planning processes, but did not find evidence that this benefitted the quality of their texts.

Therefore, studies exploring process use across the writing task in upper-primary writers have, at best, relied on self-reports to determine what process is engaged in and when. Consequently, these studies have yielded very mixed findings about the effects of process on written product. The present study aims to move forward understanding in this area by answering the following three research questions: (1) How much time do upper-primary students devote to different writing processes when they write short argumentative texts?, (2) How are these processes distributed during composition? and importantly (3) Does the overall time in process and/or distribution of process across time-on-task predict the quality of the final text?

Collecting processes data in younger writers is, however, somewhat problematic. This was particularly the case of our study, in which we differentiated between a relatively large number of different sub-processes. Passing responsibility for determining processes onto the student in the form of concurrent self-report (e.g., Torrance et al., 2015) is probably sub-optimal in this context. However asking students to think aloud while writing – something that some adult writers find difficult – is likely to be reactive and there is likely to be considerable, non-random variation in students' ability to comply. A novel alternative, which we used in

the present study, is to record what students say when they work in pairs and are asked to explicitly communicate their thoughts and actions to their partner. This allowed us to follow the coding scheme described by Penningroth and Rosenberg (1995), which is considerably more fine-grained than has been possible in previous studies with children in the age range.

Method

The data was collected in the context of the intervention (at pretest) and has been not reported in other manuscripts.

Participants

The sample comprised 120 Spanish students of 5th (N = 62) and 6th (N = 58) grades from six classes within the same school in León (a city in the north of Spain). Students were divided into 60 pairs (see procedure). Students' age ranged from 10 to 12 years (MD = 10.8; SD = .68), with a similar percentage of boys (51.4%) and girls (48.6%). Most came from families living on medium to high incomes.

Writing instruction in the Spanish educational context is focused on the features of different textual genres and on grammatical and spelling accuracy, without any kind of strategy-focused instruction in the use of planning and revision processes.

Instruments

Writing task

Students completed an argumentative writing task in which they should defend if they were for or against reading books or the captivity of wild animals in the zoo. The topics provided were close to the students so that they did not need additional information to write the text. Also, topics were evenly distributed controlling class and grade. For the writing task students were provided with a draft sheet, whose use was optional, and a final text sheet. Students wrote their texts with a digital pen. The digital pen was a LiveScribe 2GB Echo smartpen which has a regular appearance but hosts an infrared camera at its tip and an integrated microphone. These devices allowed us to collect not only the thinking aloud but also the digital trace of what was written. Thus, the whole writing process of each pair was recorded. The pens have their own data storage so they were used in a whole-class context. Data were downloaded from the pens through the use of the Livescribe Desktop application. Thus, for each pair we got a PDF file with the audio and the writing process.

On-line Writing Processes Measures

Once the verbal reports had been transcribed, reports were divided into segments, each segment containing just one of the writing processes considered in the coding system.

According to previous studies (Beauvais et al., 2011), and based on Hayes & Flower's (1980) writing model, three processes were considered in the coding system: planning, translating and revision. First, regarding the planning process, three sub-processes were included: (1) generation of ideas, when students generated content for their text ("*animals have to be free because they need space like humans*"); (2) organisation, when students were

organising or talking about how to organise the content ("*first we have to say whether we are for or against*"); and (3) setting goals, the elaboration of objectives to be achieved in the text ("*I want to make a good text*").

Second, the translating process was related to the creation of the text. That is, when students were verbalizing aloud or dictating what they were writing.

Third, in the revision process, five sub-processes were considered: (1) reading, when one of the members of the pair read any part of the written text or the text in the planning sheet; evaluation, which refers only to the evaluation act without making changes to the text. It was also considered whether (2) the evaluation was mechanical ("*I think adventure is with b*") or (3) substantive ("*I don't know if this idea is well explained*"). In the last sub-process, edition, which refers only to the act of making changes to the text, it was also considered whether (4) the edition was on a mechanical or (5) substantive aspect. Finally, an additional category called "*Others*" was added, which included verbalizations that were not related to the writing task.

Through the use of macros in excel, the duration of each segment was calculated. This allowed us to calculate both the total time devoted to each process and sub-process, and the percentage of time depending on the total duration of the writing task.

To determine intercoder reliability, a contingency coefficient was calculated over 1597 categorizations coded by two independent coders out of a total of 7897. This represented the 20% of the total categorizations. Cohen's kappa equaled .94 showing a very good reliability of the coding schema.

Text quality measures

Texts were evaluated holistically by means of reader-based measures. Reader-based measures involved assessing aspects related to the structure, coherence and quality of the texts, using an adapted version of the procedure used by Spencer and Fitzgerald (1993). The authors showed that these measures taped different aspects of the writing performance.

Structure was rated on a 4-point scale (1-lack of structure and 4-well structured). The score was based on the extent to which students created a global framework to present the topic and their opinion, used different connectors, mentioned the main goal of the text and the thesis or the use of the typical parts of a text like introduction, development and conclusion. *Coherence* was assessed on a 4-point scale (1-incoherent and 4-very coherent). The score was based on whether it was possible to identify the main topic, there was a clear development without digressions, they provided a clearly defined general context, details were organized, they used cohesion marks and fluent speech and there was a conclusion. *Quality* was assessed on a 6-point scale (1- incomprehensible and 6-unsurpassable). It was based on the presence of a clear sequence of ideas, good global organization, suitable vocabulary, a variety of interesting details, correct sentence structure and correct punctuation and spelling.

Two raters scored all texts. Inter-rater reliability (r) was high (Structure, .82; Coherence, .85; Quality, .92).

Procedure

Students were evaluated collectively in a natural context within the regular Language classes with about 20-25 students per class.

Students were given 50-55 minutes to complete the task, although no one needed more than 30 minutes.

The session began with the instructor explaining the assessment task. Students had to write an argumentative text in pairs while thinking aloud. Students were grouped in pairs to facilitate the verbalization of their actions and thoughts. Pairs were formed by the ordinary Spanish Language teacher. The teacher was asked to match students who had a similar level of competence in this subject. Each student within the pair received a different role. One of them was in charge of writing the text while thinking aloud, verbalizing everything they did and thought. The other one was in charge of monitor and help his partner to create the best possible text.

Before starting the task, students performed a brief thinking aloud training aimed to familiarize them with this procedure. First, students observed a modelling in which the instructor verbalized all her actions and thoughts while completing a crossword puzzle. Then students, in the already created writing-pairs, completed the crossword puzzle through the use of thinking aloud. During the training task and assessment the instructor encouraged students to verbalize absolutely everything they thought or did.

Data analysis

Descriptive data is first presented. Then linear mixed effects models were carried out to determine the distribution of processes over time, and the relationship between processes and quality. These models are specified in the relevant sections in the text below.

Results

Time spent in different processes

Table 1 presents the descriptive data concerning students' use of the writing processes. The table shows the average time spent by students for each writing process and the maximum and minimum time. We also report the percentage of time that students spent on the main writing processes (i.e. planning, translating, revising, others) considering each student's total composition time. For each

main writing process (e.g. planning and revision) the percentage of time devoted to its specific sub-processes is also provided. Finally, the percentage of pairs that used each writing process is presented.

As can be seen in Table 1, the dominant process was translating with less time devoted to planning and even less to revising. Regarding planning and revising subprocesses, it is worth highlighting that upper-primary students mainly used idea generation and reading respectively. Very little time was devoted to processes such as organizing, setting goals and evaluating and editing both substance and mechanical aspects.

How are writing processes distributed during composition?

Following an approach adopted in several previous studies (e.g. Van den Bergh & Rijlaarsdam, 1999), we determined, for each sub-process, the probability that students were engaged in that process at each point in time during completion of the composition task. To do this we evaluated a series of nested logistic mixed-effects regression models. Our dependent variable was whether or not the student was engaged in the process during a particular second of the writing time-course (dummy coded as 1= engaged in process, 0 = not engaged in process). We started with an intercept-only (baseline) model with random by-student-pair intercepts, and by-student-pair slopes from time (Model 0). We then added a fixed effect for time (Model 1). Significantly improved fit of Model 1 would indicate variation in process use over time. Models were fitted with a binomial (logit) link function by maximum likelihood, using the Laplace Approximation and implemented in LME4 (Bates, Mächler, Bolker, & Walker, 2015). Model fits were compared by χ^2 difference test.

As might be expected, we found strong evidence of change in tendency to engage in a particular process over time for nearly all of the processes that we identified. This was true when probability of engagement in a specific process was estimated as a function of raw time (in minutes) (Figure 1) and when time was normalised across students by taking percent of task completed (Figure 2). For raw time, Model 1 provided a significantly better fit than Model 0 for all processes except for Editing Substance and Editing Mechanics – which, as can be seen in Table 1, occurred quite rarely across students pairs ($\chi^2(1) = 1.7$ and .26 for Editing mechanics and substance respectively; $\chi^2(1) > 4.8$, p < .03 for Evaluating Mechanics and for Reading; $\chi^2(1) > 8.4$, p < .003 for all other processes). For percent time, Model 1 provided significantly better fit than Model 0 for all processes except for Editing Substance ($\chi^2(1) > 9.4$, p < .003 for all other processes).

As Figures 1 and 2 show, planning content (generating) and, particularly, goal setting, tended to occur near the beginning of the writing task, with very few pairs continuing to plan later on. Translating occurred across the whole writing process. Students tended to spend very little time reading and revising what they had written. As might be expected, where this did occur, it tended to be towards the end of the time spent on the task.

Are the allocation of time to different composing activities or its distribution during composition related with text quality?

We determined relationship between text quality and an overall tendency to engage in a specific process with a similar model to the one described above, starting with an intercept-only model with random by-student-pair intercepts and then adding quality rating

Table 1
Engagement of student-pairs in specific writing activities, summarized across time-on-task

|	Total time spent in process (seconds)		Percentage of time-on-task	Pairs who used this process
	M (SD)	Min-Max	M (SD)	
Planning	223 (117)	46-556	19 (9)	100%
Generation	196 (111)	46-540	86 (10)	100%
Goal setting	5 (10)	0-55	3 (4)	47%
Organization	17 (16)	0-69	9 (8)	89%
Translating	604 (235)	210-1290	52 (11)	100%
Revision	59 (52)	0-271	5 (4)	93%
Reading	40 (44)	0-228	57 (36)	82%
Evaluating mechanics	6 (10)	0-55	14 (22)	55%
Evaluating substance	6 (11)	0-57	12 (23)	51%
Editing mechanics	3 (9)	0-63	5 (11)	33%
Editing substance	2 (5)	0-33	4 (11)	18%
Other	282 (160)	46-637	24 (9)	100%
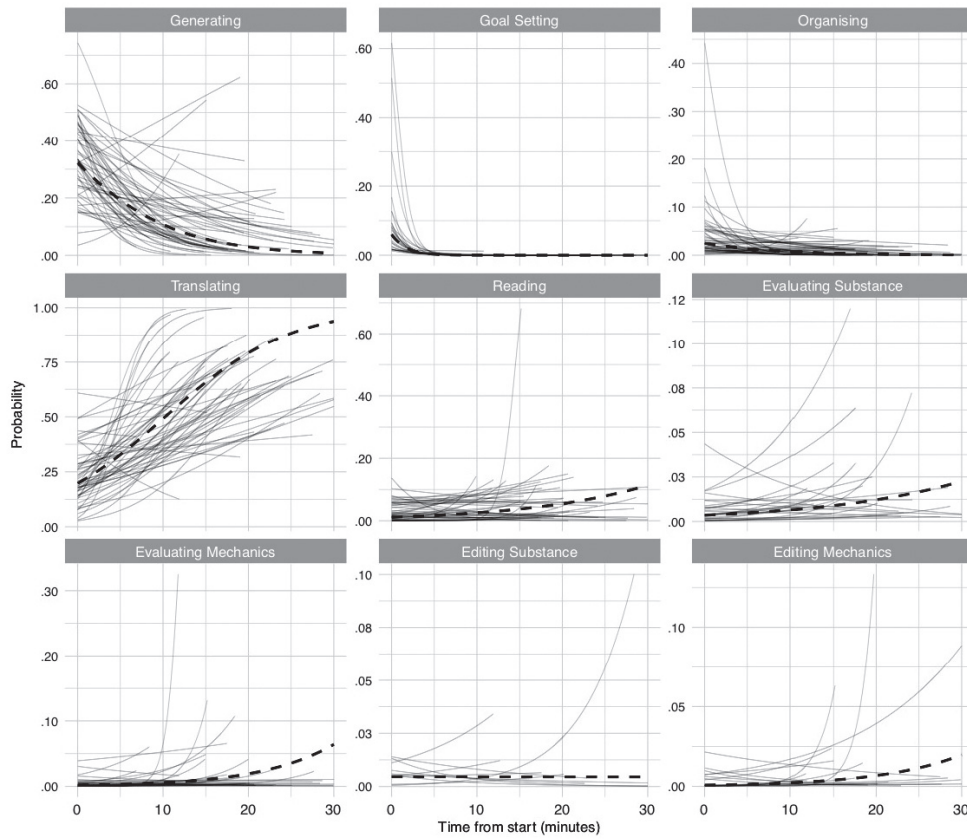
Figure 1. Probability of engagement in specific writing sub-processes as a function of time from start of task. Estimates for individual students, with the mean shown as a dashed line
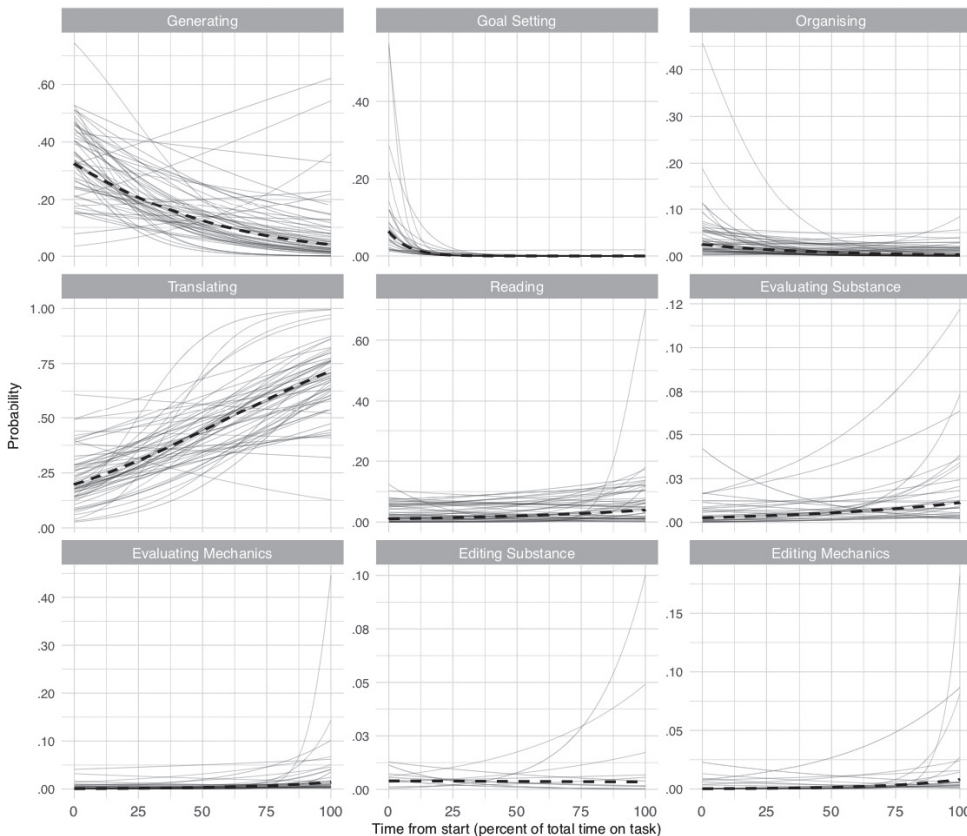

Figure 2. Probability of engagement in specific writing sub-processes as a function of percent of total time on task completed. Estimates for individual students, with the mean shown as a dashed line

as a fixed effect. This model did not provide significantly improved fit. We, therefore, did not find evidence that the total time spent in a specific process, regardless of when this occurred during the writing task, affected the quality of the final text.

However, it is possible that the important factor is not the extent to which a particular process is engaged in, but when this occurs during the writing task. To determine whether this had an effect we started with Model 1, described in the previous section, then added a fixed effect for quality rating (Model 2), and finally the interaction between time and quality rating (Model 3). Model 3 did not provide significantly improved fit relative to Model 2. We, therefore, did not find evidence that any effect of engaging in a specific process on the final product was moderated by time-on-task (i.e. no evidence that the quality of the final text was dependent on when the students engaged in each specific process).

Discussion

The first goal of the present research was to explore the time that upper-primary students spent on different writing processes. According to previous studies developed with older writers (Beauvais et al., 2011; Breetvelt et al., 1994; Levy & Randsdell, 1995; Penningroth & Rosenberg, 1995; Van den Bergh & Rijlaarsdam, 1999; 2001), translating was the dominant process, covering half of the total composition time. As might be expected, therefore, at least for the writing tasks typically used in these studies, time on task is dominated by writing full text (Alves, Castro, & Olive, 2008; Olive, Kellogg, & Piolat, 2001). Compared with previous studies with upper-primary students (Fidalgo et al., 2008; Torrance et al., 2007; Torrance et al., 2015), the present research provides a relatively fine-grained analysis of planning and revising subprocess. Regarding planning, the main subprocess was idea generation, with very little time devoted to organizing and setting goals. These last two processes, however, are thought to be particularly important when completing the argumentative writing task that was the focus of this study (Beauvais et al., 2011; Breetvelt et al., 1994). Similar, with regard to revision, although students typically spent at least some time reading their text, evaluation and editing were almost entirely absent (see also Torrance et al., 2007). Previous research has suggested that students at this age probably need external support if they are to revise their text (De La Paz, Swanson, & Graham, 1998). Arguably, therefore, students in the present study tended to adopt what is sometimes described as a knowledge-telling approach to writing (Bereiter & Scardamalia, 1987). They wrote down content as they thought of it rather than engage in strategic thinking about how best to present their ideas to their audience.

Our second question concerned the distribution of writing processes across the composition task. As we predicted, planning mostly occurred at the beginning of the writing process, while revision, on the rare occasions where it occurred, tended to be engaged in towards the end of the task. Again, this was predictable, although in principle it would be possible to compose text in smaller plan-write-revise cycles. These results are in line with previous studies conducted with adult writers (Kellogg, 1988, 2001; Levy & Ransdell, 1995; Penningroth & Rosenberg, 1995; Piolat et al., 2001) and secondary school students (Breetvelt et al., 1994; Van den Bergh & Rijlaarsdam, 1999; 2001). They seem to indicate that, despite the recursive nature of writing (Hayes & Flower, 1980), writing processes are not equally likely to be activated at any time

during composition. It might be that, at schools, teachers promote the use of these processes in a linear way (Gilbert & Graham, 2010). Nevertheless, more studies are needed in order to explore how students distribute writing processes during composition in other genres (Beauvais et al., 2011).

Perhaps our most important finding, however, is a failure to find any relationship between the writing process and the quality of upper-primary students' texts. Generally, the writing process has been related to the written product in older writers (Beauvais et al., 2011; Levy & Ransdell, 1995). However, this relationship is not straightforward in the literature with upper-primary students. From the best of our knowledge, just one study found a weak relation between upper-primary students' writing process and text quality after students have received specific instruction (Torrance et al., 2007). Several reasons might explain the findings of the present study.

First of all, it could be the case that the method used in this study disrupted the writing process of students to the extent that its effects on text quality disappeared. However, this explanation does not fit well with our findings, as students' texts were at least mainly coherent and similar in quality to what might be expected for writers at this age. In the present study, students wrote poorly structured texts (M = 1.16, SD = .37), with low coherence (M = 1.38, SD = .49), and, consequently, low overall text quality (M = 2.11, SD = .69), as it has been found in previous studies with the same measures and students of the same age writing alone (see Fidalgo et al., 2008; Torrance et al., 2007; Torrance et al., 2015). That is, writing-in-pairs while they articulated their thoughts did not prevent them from writing. Also, it could be argue that our collaborative task influenced students' use of writing processes or its distribution during composition. However, this seems unlikely because our findings matched with previous studies in which students wrote alone (Fidalgo et al., 2008; Torrance et al., 2007; Torrance et al., 2015).

From our point of view, there is a more plausible explanation. Planning and revising subprocesses have shown to make a difference in text quality in older students (Beauvais et al., 2011; Levy & Ransdell, 1995). However, these processes rarely occurred in our sample. Regarding planning, upper-primary students mainly generate ideas. Previous studies found that when generating occurred at the beginning of the writing task it has a negative effect on text quality (Breetvelt et al., 1994; Van den Bergh & Rijlaarsdam, 1999; 2001). In our study, however, there was no relation at all between text quality and idea generation. Additionally, upper-primary students did not engage in other sub-processes such as goal setting and organizing, in spite of their apparent importance (Breetvelt et al., 1994). That is, at least for argumentative writing, not only retrieving ideas is important. Writers also need to take the audience into account by stablishing communicative goals. Thus, to achieve the communicative goals students are required to plan and to organize ideas appropriately and deliberately (Beauvais et al., 2011). In fact, a meta-analysis of writing interventions showed that goal-setting was particularly effective to improve upper-primary students' writing skills (Koster, Tribushininaa, De Jong, & Van den Bergh, 2015).

With regard to revision, the evidence is even more clear. If they do not revise, as we found in the present study, revision cannot have an effect on text quality. Also, it should be considered that revision mainly involved reading without evaluation and editing. Several reasons might explain this fact. First, students at this age may lack

the critical reading comprehension skills needed to construct an accurate representation of their text and detect problems (Hayes, 2004). Second, it could be that young writers tend to overestimate the quality of their texts when reading them (Beal, 1996) so they may not see problems in their texts.

In conclusion, the findings of the present study suggest that, without specific instruction, upper-primary students rarely engage in planning and revising processes and, even if they use them, they do not contribute to text-quality. In the present study, therefore, we did not find evidence of a relationship between upper-primary students' writing process and text quality.

Finally, as an educational implication, it is important to note that previous research have shown that children as young as 6 years (Arrimada, Torrance, & Fidalgo, 2018) can benefited from instruction targeting planning skills. Therefore, in order to move students toward a more expert-like writing, it would be critical to provide teachers in regular schools with evidence-based practices to support young writers' use of planning and revising, not only in writing but also in reading-writing tasks (Fidalgo, Torrance, Arias-Gundín, & Martínez-Coco, 2014). Several studies have demonstrated the efficacy of strategy-focused writing instruction with typically developing upper-primary students (Fidalgo, Torrance, & Robledo, 2011; Fidalgo, Torrance, Rijlaarsdam, van den Bergh, & Álvarez, 2015; García & Arias-Gundín, 2004; García & De Caso, 2002; Torrance et al., 2007) or students with learning disabilities (González Seijas, 2003). These studies demonstrate the value of providing explicit knowledge about what to plan. Therefore, it would be critical to implement this kind on intervention in schools from early on. Early intervention would improve students' writing competence and contribute to academic performance in later stages, where the use of strategies have also proved particularly effective (Iniesta, López-López, Corbil, Pérez, & Costa, 2017; Roces & Sierra, 2017).

References

Alves, R., Castro, S. L., & Olive, T. (2008). Execution and pauses in writing narratives: Processing time, cognitive effort and typing skill. *International Journal of Psychology*, *43*(6), 969-979.

Arrimada, M., Torrance, M., & Fidalgo, R. (2018). Effects of teaching planning strategies to first-grade writers. *British Journal of Educational Psychology*. Advance online publication. doi:10.1111/bjep.12251

Bates, D., Maechler, M., Bolker, B., & Walker, S. (2015). lme4: Linear mixed-effects models using Eigen and S4. R package version 1.1-9. Retrieved from http://CRAN. *R-project. org/package= lme4*.

Beal, C. (1996). The role of comprehension monitoring in children's revision. *Educational Psychology Review*, *8*(3), 219-238.

Beauvais, C., Olive, T., & Passerault, J. M. (2011). Why are some texts good and others not? Relationship between text quality and management of the writing processes. *Journal of Educational Psychology*, *103*(2), 415-428. http://dx.doi.org/10.1037/a0022545.

Bereiter, C., & Scardamalia, M. (1987). *The psychology of written composition*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Breetvelt, I., Van den Bergh, H., & Rijlaarsdam, G. (1994). Relations between writing processes and text quality: When and how? *Cognition and Instruction*, *12*, 103-123. doi.org/10.1207/s1532690xci1202_2

De La Paz, S., Swanson, H. L., & Graham, S. (1998). The contribution of executive control to the revising by students with writing and learning difficulties. *Journal of Educational Psychology*, *90*, 448-460. doi: 10.1037/0022-0663.90.3.448

Fidalgo, R., Torrance, M., & García, J.N. (2008). The long-term effects of strategy-focused writing instruction for grade six students. *Contemporary Educational Psychology*, *33*(4), 672-693. doi. org/10.1016/j.cedpsych.2007.09.001

Fidalgo, R., Torrance, M., & Robledo, P. (2011). Comparison of two self-regulated and strategic instructional programs for improving writing competence. *Psicothema*, *23*(4), 672-680.

Fidalgo, R., Torrance, M., Arias-Gundín, O., & Martínez-Cocó, B. (2014). Comparison of reading-writing patterns and performance of students with and without reading difficulties. *Psicothema*, *26*(4), 442-448.

Fidalgo, R., Torrance, M., Rijlaarsdam, G., van den Bergh, H., & Álvarez, M. L. (2015). Strategy-focused writing instruction: Just observing and reflecting on a model benefits 6th grade students. *Contemporary Educational Psychology*, *41*, 37-50.

García, J. N., & Arias-Gundín, O. (2004). Intervention in writing composition strategies. *Psicothema*, *16*(2), 194-202.

García, J. N., & de Caso-Fuertes, A. M. (2002). Is it possible to improve writing composition in learning disabilities (LD) and/or low achievement (LA) students without changes in reflexivity toward writing? *Psicothema*, *14*(2), 456-462.

Gilbert, J., & Graham, S. (2010). Teaching writing to elementary students in grades 4 to 6: A national survey. *The Elementary School Journal*, *4*, 494-518.

González-Seijas, R. M. (2003). A proposal on training cognitive processes and textual structures in children with writing disabilities. *Psicothema*, *15*(3), 458-463.

Hayes, J. R. (2004). What triggers revision? In L. Allal, L. Chanquoy & P. Largy (Eds.), *Revision: Cognitive and instructional processes*. Dordrecht: Kluwer Academic Publishers.

Hayes, J. R., & Flower, L. (1980). Identifying the organization of writing processes. In L. W. Gregg & E. R. Steinberg (Eds.), *Cognitive processes in writing* (pp. 3-29). Hillsdale, NJ: Lawrence Erlbaum Associates.

Iniesta, A. J., López-López, J. A., Corbí1, R. G., Pérez, P. M., & Costa, J. L. C. (2017). Differences in cognitive, motivational and contextual variables between under- achieving, normally-achieving, and over-achieving students: A mixed-effects analysis. *Psicothema*, *29*(4), 533-538. doi:10.7334/psicothema2016.283

Kellogg, R. T. (1988). Attentional overload and writing performance: Effects of rough draft and outline strategies. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *14*, 355-365.

Kellogg, R. T. (1990). Effectiveness of prewriting strategies as a function of task demands. *The American Journal of Psychology*, 327-342.

Kellogg, R. T. (2001). Competition for working memory among writing processes. *American Journal of Psychology*, *114*, 175-191. doi:10.2307/1423513

Koster, M. P., Tribushinina, E., De Jong, P., & Van den Bergh, H. (2015). Teaching children to write: A meta-analysis of writing intervention research. *Journal of Writing Research*, *7*(2), 299-324.

Levy, C. M., & Ransdell, S. (1995). Is writing as difficult as it seems?. *Memory & Cognition*, *23*(6), 767-779.

Limpo, T., & Alves, R. A. (2013). Modeling writing development: Contribution of transcription and self-regulation to Portuguese students' text generation quality. *Journal of Educational Psychology*, *105*, 401-413. http://dx.doi.org/10.1037/a0031391.

Limpo, T., Alves, R. A., & Fidalgo, R. (2014). Children's high-level writing skills: Development of planning and revising and their contribution to

writing quality. *British Journal of Educational Psychology, 84*, 177-193. doi:10.1111/bjep.12020

Olive, R., Kellogg, R. T., & Piolat, A. (2001). The triple task technique for studying the process of writing. In G. Rijlaarsdam (Series Ed.), T. Olive & C. M. Levy (Vol. Eds.), *Studies in writing: Volume 10: Contemporary tools and techniques for studying writing* (pp. 31-59). Kluwer Academic Publishers: Dordrecht.

Penningroth, S. L., & Rosenberg, S. (1995). Effects of a high information-processing load on the writing process and the story written. *Applied Psycholinguistics*, *16*(2), 189-210.

Piolat, A., Kellogg, R. T., & Farioli, F. (2001). The triple task technique for studying writing processes: On which task is attention focused? *Current Psychology Letters Brain, Behavior and Cognition*, *4*, 67-83.

Roces, C., & Sierra, B. (2017). The effectiveness of a learning strategies program for university students. *Psicothema*, *29*(4), 527-532. doi: 10.7334/psicothema2016.171

Spencer, S. L., & Fitzgerald, J. (1993). Validity and structure, coherence,

and quality measure in writing. *Journal of Reading Behavior*, *25*, 209-231. http://dx.doi.org/10.1080/10862969309547811.

Torrance, M., Fidalgo, R., & García, J.N. (2007). The teachability and effectiveness of cognitive self-regulation in sixth-grade writers. *Learning and Instruction*, *17*(3), 265-285. doi:10.1016/j.learninstruc.2007.02.003

Torrance, M., Fidalgo, R., & Robledo, P. (2015). Do sixth-grade writers need process strategies? *British Journal of Educational Psychology*, *85*(1), 91-112. doi:10.1111/bjep.12065

Van den Bergh, H., & Rijlaarsdam, G. (1999). The dynamics of idea generation during writing: An online study. In G. Rijlaarsdam & E. Espéret (Series Eds.), M. Torrance, D. Galbraith (Eds.), *Studies in writing: Knowing what to write: Cognitive perspectives on conceptual processes in text production* (pp. 99-120). Amsterdam: Amsterdam University Press.

Van den Bergh, H., & Rijlaarsdam, G. (2001). Changes in cognitive activities during the writing process, and relations with text quality. *Educational Psychology*, *21*, 373-385. doi:10.1080/ 01443410120090777