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Development of the Writing Process from Primary to Secondary Education

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Abstract

The aim of this study was to analyse the differences that arise between different educational levels in the writing process and product, and in the variables moderating writing, using an online technique of immediate retrospection. Participants consisted of 1,231 students presenting normal academic performance and attending compulsory education from the 4th year of Primary Education to the 4th year of Secondary Education. The results show that although students in their final year of compulsory Secondary Education (CSE) comprised the group which obtained the best outcomes, development from Primary Education (PE) was not as steady as might be expected. Engagement in the writing process was observed to diminish at the start of CSE, and there were more interruptions during the first phase of the process and less engagement in planning and producing a written text. Data on the variables modulating writing indicate that inexperienced writers presented more positive attitudes and a greater motivation to write and overestimated their self-efficacy, indicative of having less knowledge, practice and expertise in the process, product and quality of writing. These results suggest that the orchestration of younger students' writing process during the production of a written text is not the most suitable, and results in lower quality. The implications, limitations and future perspectives are discussed.

Keywords: Writing skills, orchestration, writing process, writing product, modulating variables.

Resumen

El estudio persigue analizar las diferencias que se producen en el proceso escritor a través del uso de una técnica de retrospección directa on-line, a medida que se avanza de nivel educativo, y del producto y variables moduladoras del escritor. Participaron 1.231 alumnos, con un rendimiento promedio, de la enseñanza obligatoria (de 4.º de EP a 4.º de ESO). Los resultados muestran que, aunque el alumnado de último curso de ESO es el grupo con mejores resultados, la evolución desde EP no es lo gradual que cabría esperar, evidenciándose un decremento en la implicación en el proceso escritor al comienzo de ESO, incluyendo más interrupciones, durante la primera parte del mismo, y una menor participación en la planificación y edición textual. Los datos de las variables moduladoras de la escritura indican que los escritores inexpertos presentan actitudes más positivas y una mayor motivación hacia la escritura, sobrevalorando sus creencias de autoeficacia, indicativo de un menor conocimiento, práctica y pericia con el proceso, producto y calidad de la escritura. Dichos resultados sugieren que la orquestación del proceso escritor del alumnado menor no es la más adecuada durante la producción textual, dando como resultado menor calidad. Se discuten las implicaciones, limitaciones y perspectivas futuras.

Palabras clave: Competencia comunicativa escrita, orquestación, proceso escritor, producto textual, variables moduladoras.

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Introduction

Writing is a very demanding task that requires the coordinated, simultaneous and cyclical application of a wide range of mental processes, thus entailing considerable effort on the part of the writer and the need to constantly overcome obstacles (Tillema, 2012). Research on this subject has largely focused on an analysis of questions such as how a writer produces a text, and even more importantly, what process is involved in ensuring the production of a quality text (Bean, 2011). To date, attempts to answer these questions have resulted in the proliferation of a large number of theoretical models which attempt to describe the structure, components and cyclical organisation of the writing process, together with the elements moderating this process and related, among other things, to the motivation, attitudes and self-efficacy of the writer, or to cognitive processes such as working memory capacity or attention levels (Rijlaarsdam et al., 2008).

The subject of writing skills has been recognised in recent years as being an important and valuable area of research (MacArthur, Graham, & Fitzgerald, 2006) due to the importance of these skills in academic, occupational, personal and social contexts. However, only a limited, albeit pertinent, amount of research has been conducted to date on this question in Spain, especially as regards the orchestration or temporal organisation of the cognitive activities involved in writing production (García & Fidalgo, 2008), despite the core role that this plays in the writing process, which requires continuous recycling of the general cognitive processes involved in planning, transcription and revision, and the mental tasks or operations involved in each (Alamargot & Chanquoy, 2001), and in spite of the decisive role that this plays in the quality of the writing product (Beauvais, Olive, & Passerault, 2011). Thus, the manner in which a writer distributes the use of cognitive processes throughout the entire writing process, in terms of when they are used, the length of time devoted to them and the frequency with which each of these cognitive processes is activated and deployed, among other aspects, would appear to be decisive factors in the quality of the writing product (Van Weijen, 2008).

The study of how the writing process is orchestrated has facilitated a better understanding of the key steps and thought patterns involved throughout the process in the case of effective and experienced writers, and has generated knowledge about the most efficient forms of instruction, especially as regards teaching inexperienced writers or individuals with learning difficulties related

to writing (Becker, 2006). Thus, the results obtained, and more specifically, those obtained from a comparison of experienced versus inexperienced or younger writers, indicate that although the writing process is based on the same mental operations, it clearly differs in the form in which these are engaged (Ferretti, Lewis, & Andrews-Weckerly, 2009). In line with the above, inexperienced writers do not seem to plan their texts, or limit planning to the generation of content, and do not perform other activities involved in the planning process, such as those related to the formulation of objectives or meeting the needs of the audience and/or requirements of the subject matter, etc. As regards the production process, until writing skills become efficient and relatively automatic they require an additional cognitive effort on the part of the writer which may interfere with the deployment and orchestration of all the other writing processes (Graham, 1999). In terms of the revision process, whereas experienced writers revise, rereading the text they have written with relative frequency and revising diverse aspects, inexperienced writers seem to basically focus their attention on the correction of errors of form (Alamargot & Chanquoy, 2001), making very few changes to their texts, similarly to students with learning difficulties (Rodríguez et al., 2009). Likewise, novice or inexperienced writers sometimes appear to initiate and implement certain cognitive activities at the wrong time, either earlier or later than an experienced writer would, which, as mentioned at the beginning of the paragraph, together with the above and other aspects, determines the quality of the text (Van Weijen, 2008).

Hence, given the paucity of research in this specific field of study in the Spanish scientific literature, and the recognition, within the context of linguistic communicative competence, of writing as one of the eight core competencies in education (LOE, 2006), we conducted a study in order to analyse the differences that arise during compulsory education in the orchestration of the writing process and product. Furthermore, based on the concept of writing as a task which is conditioned by a diversity of psychological factors and one which requires the use and control of multiple cognitive resources (Olive, Favart, Beauvais, & Beauvais, 2009), we also evaluated the various factors which modulate the writing process —considered central components in current theoretical models (see Rijlaarsdam et al., 2008)— both on a psychological level, assessing self-efficacy, attitudes and motivation towards the task of writing, and a cognitive level, assessing the differences in attention and working memory capacity. In line with the above, we hypo-

thesised that the higher the level of education, the greater the use, deployment and orchestration, or more complex temporal distribution, of the various cognitive activities involved in the general processes of planning, producing and revising, and therefore the better the writing products obtained. However, it was expected that the patterns of writing development would prove complex and would depend on the role of interactions with modulating variables, such as motivation towards and self-efficacy beliefs about writing, and on the role of the cognitive requirements of attention and working memory, among others.

Method

Participants

Participants consisted of a sample of 1231 students (50.3% males and 49.7% females) aged between 9 and 17 years old, attending compulsory education from the 4th year of Primary Education (PE) to the 4th year of Secondary Education (CSE), as shown in Table 1. The sample was obtained through the participation of 13 schools within the province of Leon. In accordance with the characteristics of the study, students belonged to complete school groups in each of the school years, presenting normal academic performance.

Table 1

Distribution of Participants by School Year and Sex

	4th year PE	5th year PE	6th year PE	1st year CSE	2nd year CSE	3rd year CSE	4th year CSE	Total for sex
Male	139	158	153	52	35	46	37	620
Female	121	135	155	68	44	54	34	611
Total for school year	260	293	308	120	79	100	71	1,231

Instruments

Data on the writing process was collected through the use of an adapted version of the *writing-log*, or writing journal, assessment technique (Torrance, Thomas, & Robinson, 1999). The version was modified by increasing the number of categories within the processes of planning and revision used to date when applying this technique in Spain with school age writers (García & Fidalgo, 2008). The

technique involves direct and immediate retrospection on the cognitive activities and tasks deployed in the execution of a writing task, which is recorded in a log concurrently with performing the writing task itself. The instrument was applied as follows: prior to writing a text, each student received a log sheet divided into nine categories, eight of which were related to writing activities, and thus referred to any one of the three general processes of planning (reading background information; thinking about the purpose and audience of the text; thinking about what to write; drawing up an outline/taking notes), production (writing the text) and revision (reading the text; correcting the text, changing aspects of the text), and a final category unrelated to the writing process, which would involve any other kind of activity carried out that was not linked to the process of writing production.

Whilst students were engaged in the writing task, an auditory signal was sounded at random intervals (mean interval of 45 seconds, interval range of 45 to 120 seconds). On hearing the sound stimulus, students were required to momentarily interrupt their writing task and record on their log sheet the specific activity (category) that they were involved in at the precise moment when they heard the auditory signal. The students were asked to repeat this action each time they heard an auditory signal whilst engaged in producing the text. It should be noted that prior to application of this technique, the students were trained in its use, the categories considered and their meaning. Furthermore, in order to determine student accuracy in categorising the activities involved in writing production, in other words, to confirm the reliability of the technique, a pilot test was applied whereby a writer thought aloud whilst producing a text, and on the basis of what was said, students were asked to categorise 25 activities corresponding to the writer's activity at different times during the process. A comparison of the categorisation performed by the sample with that conducted by an expert yielded a *Kappa* index of agreement of .90.

To assess the writing product, students were given the task of producing a text of similar characteristics, subject matter and level to that written for evaluation of the writing process, although in this case unaccompanied by any kind of assessment during execution of the writing task itself. Two types of measure were used to analyse the text. The first were formal and objective text-based measures, based on the identification and collation of certain characteristics related to the dimensions of productivity, coherence and text structure (García & Marbán, 2001), and the second were global and subjective reader-based measures, focusing on the interpretation of a reader in order to

determine whether certain aspects related to the dimensions of quality, coherence and text structure, were present or not in the text, and if so, to what extent (Spencer & Fitzgerald, 1993). At this point, it should be noted that in order to ensure the reliability of the analyses, 50% of the texts were randomly selected for independent scoring by two researchers. The percentage of estimated coefficients with regard to the indicators evaluated, situated between moderate (.4-.6) and very good (.8-1) rates of agreement, were as follows: within the text-based measures, productivity accounted for 95.7% of the coefficients, coherence for 76.8% and structure 96.5%, and within the reader-based measures, structure accounted for 98.5% of the coefficients, coherence for 95.2% and quality 97.7%.

As regards assessment of the various variables modulating writing skills, the psychological variables evaluated included attitudes towards writing, causal attributions of success or failure in writing (understood as determinants of motivation) and self-efficacy in the deployment and implementation of the cognitive processes entailed in writing. To this end, we applied the following assessment tools: the *Attitudes towards Writing Scale* (García, Marbán, & de Caso, 2001), consisting of 10 statements related to likes or habits concerning writing, to which subjects are asked to respond yes, no or don't know according to the extent to which they agree with each statement, and an adapted version of the *Motivation to Write Questionnaire II* (García et al., 2001), consisting of 32 statements to which subjects are asked to respond on a scale of 1 (= totally disagree) to 5 (= totally agree) according to the extent to which they agree with each statement. This questionnaire explores the dimensions of success and failure, which can be attributed to various aspects such as luck, effort, capacity to perform the task or the difficulty of the task. We also used a third instrument, the *Self-efficacy in Cognitive Writing Processes Questionnaire*, based on research conducted in the field (Bandura, 2006; Pajares, 2003), consisting of 20 questions to which subjects are asked to respond using a 7-point scale where 1 = very difficult and 7 = very easy, according to the extent to which they feel capable of deploying the 9 cognitive processes involved in the writing task they are given. In experimental validation, these instruments presented acceptable psychometric properties, obtaining a *Cronbach's alpha* of .72, .70 and .87, respectively, for reliability. We also measured the cognitive variables of attention and working memory using the following standardised tests: the Spanish version of the *"d2 Test of Attention"* (Seisdedos, 2004) and the extended Spanish version of the *Working Memory*

Test Battery (Pickering, Baqués, & Gathercole, 1999).

Procedure

Using a counterbalanced measures design, the instruments or evaluation tests described above were administered in two different sessions lasting approximately 2 hours each. In one session the students completed the self-efficacy questionnaire related to the processes involved in the writing task. Then they were taught the *writing-log* technique before producing a text whilst recording the processes deployed whenever the auditory signal was sounded during the writing process. Another session focused exclusively on to the task of writing a text naturally, without any interruptions in the students' process of production or the requirement to complete any of the other pertinent tests forming part of the study. Once the raw data had been collected, the completed tests were scored and the information was entered onto a computer database in order to perform statistical analyses using the software package *Statistical Package for the Social Sciences* (SPSS), version 17.0. The results are presented below.

Results

Parametric techniques were used to analyse the data, since the scores the various groups obtained for the dependent variables met the skewness and kurtosis criteria for normal distribution (values between –1 and +1) and presented acceptable homoscedasticity (homogeneous variances).

Thus, we conducted multivariate analyses of variance (one-way ANOVA and *post hoc* analysis), using educational level as the between subject factor (4th, 5th and 6th years of PE and 1st, 2nd, 3rd and 4th years of CSE) whilst the dependent variables were the scores for each of the variables related to the writing process, the temporal organisation of the process and the writing product, and for the psychological and cognitive variables. The multivariate contrasts revealed statistically significant differences for many variables and a large effect size ($F_{(762, 5428)} = 1.630$; $p = .001$; $\eta^2 = .186$).

Results relating to the writing process and its orchestration/ temporal organisation

The results related to the writing process and its temporal organisation were analysed in terms of *activation frequency* and *time devoted,* both throughout the writing production process as a whole and as regards discrete phases of the process corresponding to when the auditory signals were sounded (1st phase: 1st third of the auditory signals, 2nd phase: 2nd third of the auditory signals and 3rd phase:

3rd third of the auditory signals). Both aspects could be applied to the *general writing production process* (considering all the categories in the writing log, i.e. actions which were both related and unrelated to the writing task), to the *specific writing process* (considering only those categories which were related to the writing task and excluding the category referring to actions unrelated to it), or to *each individual category* considered in the writing log. The activation frequency was obtained by counting the number of times that the writer recorded activities related or unrelated to the writing task (general writing production process), related activities (writing process) and each individual category (a specific activity) in the writing log when the auditory signal was heard. The time devoted was obtained by dividing the activation frequency by the number of times the writer recorded activities related or unrelated to the writing task (general writing production process), related activities (writing process) and each individual category (a specific activity) in the writing log whilst producing a written text.

For the writing process and its orchestration, the tests for between subject effects revealed statistically significant differences for the indicator related to the frequency with which the writer engaged in activities that were related and unrelated to writing a text (general process) during the process of producing a written text. Similarly, statistically significant differences were found for the indicators related to activation frequency and time devoted to activities inherent to written composition (writing process), and more specifically, for those related to the planning process (reading background information, thinking about what to write and drawing up an outline/ taking notes) and for the sole production process category, termed writing text (see Table 2).

The *post hoc* analyses demonstrated the existence of differences in 81.81% of the variables shown in Table 2, both between the two different educational levels considered (PE and CSE) and between groups in the same level. Thus, students in their 4th year of CSE differed from all other school years in that they obtained the highest scores for frequency of engagement in the general writing production process ($p < .001$), for the writing process, i.e. in writing process activities ($p < .001$) and for the time devoted to the process ($p < .001$). However, the development of the writing process was not as expected, since a dramatic decrease in the scores for these variables was observed in the 1st year of CSE, differentiating this latter group from the last two groups of PE as follows: frequency of engagement in the general writing production process: 1st year of CSE versus 6th year of PE ($p < .009$);

Table 2

Between Subject Test Results, by School Year, for the Writing Process and its Orchestration

	Frequency									
	4th year PE M (SD)	5th year PE M (SD)	6th year PE M (SD)	1st year CSE M (SD)	2nd year CSE M (SD)	3rd year CSE M (SD)	4th year CSE M (SD)	*F*	*p*	η^2
General Process	8.85 (3.68)	9.24 (4.20)	9.54 (4.42)	7.75 (2.87)	8.41 (3.09)	8.62 (4.07)	16.00 (3.13)	7.14	.001	.040
Writing Process	8.11 (3.44)	8.34 (4.09)	8.76 (4.24)	6.70 (2.64)	7.08 (2.85)	7.30 (3.83)	14.50 (3.32)	7.95	.001	.044
Reading information	.46 (863)	.57 (975)	.52 (929)	.49 (795)	.05 (278)	.33 (717)	.50 (650)	2.52	.020	.015
Thinking about what to write	1.52 (1.43)	1.73 (1.46)	1.81 (1.54)	1.30 (1.11)	1.36 (1.21)	1.27 (1.12)	1.64 (1.64)	2.41	.026	.014
Drawing up an Outline	.09 (.381)	.06 (.304)	.09 (.582)	.09 (.288)	.03 (.161)	.00 (.000)	.43 (.938)	3.79	.001	.022
Writing Text	4.25 (2.83)	4.43 (3.13)	4.30 (2.92)	3.22 (1.74)	3.74 (2.26)	4.38 (3.15)	10.07 (3.38)	8.28	.001	.046
	Time									
	4th year PE M (SD)	5th year PE M (SD)	6th year PE M (SD)	1st year CSE M (SD)	2nd year CSE M (SD)	3rd year CSE M (SD)	4th year CSE M (SD)	*F*	*p*	η^2
Writing Process	365.17 (155.10)	375.32 (184.41)	393.98 (191.13)	301.72 (118.80)	318.55 (128.28)	328.39 (172.49)	652.50 (149.50)	7.95	.001	.044
Reading information	20.87 (38.85)	25.53 (43.88)	23.31 (41.81)	22.13 (35.77)	2.37 (12.50)	15.00 (32.26)	22.50 (29.27)	2.52	.020	.015
Thinking about what to write	68.55 (64.62)	77.87 (66.05)	81.51 (69.53)	58.28 (49.99)	60.99 (54.84)	57.32 (50.54)	79.93 (74.06)	2.41	.026	.014
Drawing up an Outline	4.21 (17.13)	2.71 (13.68)	3.98 (26.19)	4.06 (12.94)	1.18 (.725)	.00 (.000)	19.29 (42.19)	3.79	.001	.022
Writing Text	191.30 (127.5)	199.31 (140.85)	193.37 (131.50)	144.96 (78.58)	168.16 (101.92)	197.14 (141.94)	453.21 (152.32)	8.28	.001	.046

Note. Only statistically significant results are included ($p<.05$); η^2 (eta-squared statistic) = effect size estimates. Cohen's rule (1988) states that .01-.06 (small effect); > .06-.14 (medium effect); > .14 (large effect).

frequency of engagement and time devoted to the writing process: 1st year of CSE versus 6th year of PE ($p < .001$) and 5th year of PE ($p < .012$). As regards the planning process, for the activation frequency dimension it was the PE students who obtained the highest scores, compared to the 2nd year of CSE, for the activity related to reading background information for written composition, as follows: 4th year of PE versus 2nd year of CSE ($p < .045$), 5th year of PE versus 2nd year of CSE ($p < .002$), 6th year of PE versus 2nd year of CSE ($p < .010$). In relation to the general writing production process, the students who were most frequently engaged in the category related to the activity of writing, and who devoted more time to this than all the other school year groups, were those in their 4th year of CSE ($p < .001$). However, differences were also observed between many PE and CSE years ($p < .001$), and a decrease in scores was once again observed at the beginning of CSE.

Lastly, as regards the division of the writing process into three distinct phases, tests for between subject effects indicated the existence of statistically significant differences, for all phases, between the indicators related to activation frequency and time devoted to a diversity of activities, more specifically, to activities concerning the planning process (reading background information, thinking about the purpose and audience of the text, drawing up an outline) and production. In the first phase of the writing process, i.e. specifically, in the 1st third of the auditory signals, statistically significant differences were found between school years in the activation frequency of the category concerning the performance of activities unrelated to the written composition and therefore not productive as regards writing (see Table 3).

In this case, the subsequent *post hoc* analyses only revealed the presence of statistically significant differences in the first phase of the writing process. Thus, we observed that within the planning process, it was the students in their last year of CSE who made the most frequent use of the activity of drawing up an outline, in comparison to the other school years ($p < .001$), and who devoted the most time to this activity ($p < .001$). However, as regards reading background information, we found differences in the time devoted to this activity between the 2nd year of CSE and the 5th year of PE, with the latter group being the one which devoted most time to this activity ($p < .036$). For the single category involved in the writing production process, termed writing text, it was again students in their 4th year of CSE who made most frequent use of this activity during the first phase of the process compared to the other groups ($p < .001$). Nevertheless, significant differences were also observed between stu-

Table 3

Between Subject Test Results by School Year, for the Writing Process and its Orchestration, divided into Different Phases

Frequency										
1st phase	4th year PE M (SD)	5th year PE M (SD)	6th year PE M (SD)	1st year CSE M (SD)	2nd year CSE M (SD)	3rd year CSE M (SD)	4th year CSE M (SD)	*F*	*p*	η^2
Reading information	.261 (.527)	.320 (.622)	.240 (.543)	.252 (.569)	.039 (.255)	.127 (.397)	.500 (.650)	2.84	.009	.016
Purpose and audience	.100 (.312)	.034 (.177)	.101 (.358)	.115 (.327)	.136 (.349)	.036 (.186)	.071 (.267)	2.27	.034	.013
Outline	.017 (.159)	.015 (.119)	.010 (.105)	.039 (.188)	.013 (.114)	.000 (.000)	.429 (.937)	7.41	.001	.041
Writing Text	1.42 (1.09)	1.42 (1.08)	1.48 (1.09)	.975 (.869)	1.25 (.897)	1.14 (1.18)	2.98 (1.38)	5.05	.001	.029
Unrelated	.229 (.495)	.287 (.575)	.201 (.481)	.402 (.663)	.370 (.630)	.827 (.975)	.500 (.650)	2.70	.013	.016
2nd phase	4th year PE M (SD)	5th year PE M (SD)	6th year PE M (SD)	1st year CSE M (SD)	2nd year CSE M (SD)	3rd year CSE M (SD)	4th year CSE M (SD)	*F*	*p*	η^2
Drawing up an Outline	.044 (.203)	.013 (.110)	.028 (.216)	.013 (.097)	.013 (.114)	.000 (.000)	.000 (.000)	2.46	.023	.014
Writing Text	1.47 (1.13)	1.70 (1.35)	1.65 (1.27)	1.34 (.971)	1.40 (1.07)	1.83 (1.19)	4.08 (1.16)	7.24	.001	.041
3rd phase	4th year PE M (SD)	5th year PE M (SD)	6th year PE M (SD)	1st year CSE M (SD)	2nd year CSE M (SD)	3rd year CSE M (SD)	4th year CSE M (SD)	*F*	*p*	η^2
Drawing up an Outline	.033 (.286)	.032 (.195)	.049 (.340)	.039 (.188)	.000 (.000)	.000 (.000)	.000 (.000)	2.90	.008	.017
Writing Text	1.35 (1.21)	1.30 (1.32)	1.15 (1.19)	.892 (.837)	1.06 (1.13)	1.39 (1.28)	3.03 (1.81)	5.15	.001	.029
Time										
1st phase	4th year PE M (SD)	5th year PE M (SD)	6th year PE M (SD)	1st year CSE M (SD)	2nd year CSE M (SD)	3rd year CSE M (SD)	4th year CSE M (SD)	*F*	*p*	η^2
Reading information	11.74 (23.73)	14.36 (28.00)	10.78 (24.47)	11.31 (25.53)	1.78 (11.48)	5.71 (17.87)	22.50 (29.97)	2.87	.009	.016
Purpose and audience	4.47 (13.97)	1.54 (8.00)	4.58 (16.13)	5.16 (14.65)	6.12 (15.33)	1.61 (8.40)	3.21 (12.02)	2.30	.033	.013
Drawing up an Outline	.77 (7.16)	.69 (5.39)	.48 (4.83)	1.72 (8.44)	.59 (5.16)	.00 (.000)	19.29 (42.19)	7.39	.001	.041
Writing Text	64.02 (49.47)	63.99 (48.92)	66.69 (48.99)	44.02 (39.08)	56.64 (40.21)	51.61 (53.01)	133.93 (62.11)	4.96	.001	.028

2nd phase	4th year PE M (SD)	5th year PE M (SD)	6th year PE M (SD)	1st year CSE M (SD)	2nd year CSE M (SD)	3rd year CSE M (SD)	4th year CSE M (SD)	*F*	*p*	η^2
Drawing up an Outline	1.98 (9.14)	.59 (4.94)	1.27 (9.77)	.61 (4.48)	.59 (5.16)	.00 (.000)	.00 (.000)	2.44	.024	.014
Writing Text	66.38 (50.87)	76.65 (60.95)	74.46 (57.56)	60.74 (43.92)	63.36 (48.22)	82.68 (53.93)	183.21 (52.02)	7.18	.001	.040
3rd phase	4th year PE M (SD)	5th year PE M (SD)	6th year PE M (SD)	1st year CSE M (SD)	2nd year CSE M (SD)	3rd year CSE M (SD)	4th year CSE M (SD)	*F*	*p*	η^2
Drawing up an Outline	1.47 (12.88)	1.44 (8.78)	2.23 (15.34)	1.72 (8.44)	.00 (.000)	.00 (.000)	.00 (.000)	2.90	.008	.017
Writing Text	60.89 (54.37)	58.67 (59.60)	52.23 (53.88)	40.20 (37.65)	48.16 (50.69)	62.86 (57.67)	136.07 (81.19)	5.12	.001	.029

Note. Only statistically significant results are included ($p < .05$); η2 (eta-squared statistic) = effect size estimates. Cohen's rule (1988) states that .01-.06 (small effect); > .06-.14 (medium effect); > .14 (large effect).

dents in their 1st year of CSE, who obtained the lowest score, and students in their 4th year of PE ($p < .028$), 5th year of PE ($p < .021$) and 6th year of PE ($p < .005$). Lastly, students in their 3rd year of CSE made the most frequent use, during the first phase of the writing process, of activities unrelated to the writing task, compared both to other Secondary education groups, namely the 2nd year of CSE ($p < .001$) and the 4th year of CSE ($p < .001$), and to students in their 5th year of PE ($p < .001$).

Results for the writing product

The tests for between subject effects revealed statistically significant differences in the writing product for all the text-based and reader-based measures assessed (see Table 4).

The post hoc analyses revealed that in all cases it was the students in their 4th year of CSE who produced the best texts, compared to the other school years, except as regards the quality indicator included within the reader-based measures, for which no significant differences were observed between this group and the others (see Table 5).

Table 4

Between Subject Test Results by School Year, for Writing Product

	4th year PE M (SD)	5th year PE M (SD)	6th year PE M (SD)	1st year CSE M (SD)	2nd year CSE M (SD)	3rd year CSE M (SD)	4th year CSE M (SD)	*F*	*p*	η^2
Text-Based Measures (TBM)										
Productivity	47.35 (19.40)	55.89 (25.36)	58.68 (25.32)	53.93 (21.79)	66.04 (26.95)	64.32 (30.20)	90.86 (50.28)	5.13	.001	.029
Coherence	6.85 (4.57)	8.35 (5.17)	8.53 (4.69)	7.07 (3.93)	9.68 (5.88)	8.76 (5.16)	13.64 (8.51)	3.31	.003	.019
Structure	1.14 (.412)	1.14 (.385)	1.11 (.353)	1.04 (.199)	1.36 (.795)	1.32 (1.06)	1.93 (.829)	3.62	.001	.021
Reader-Based Measures (RBM)										
	4th year PE M (SD)	5th year PE M (SD)	6th year PE M (SD)	1st year CSE M (SD)	2nd year CSE M (SD)	3rd year CSE M (SD)	4th year CSE M (SD)	*F*	*p*	η^2
Structure	1.31 (.539)	1.33 (.568)	1.39 (.543)	1.38 (.520)	1.82 (.934)	1.54 (.702)	2.29 (.914)	3.47	.002	.020
Coherence	1.78 (.594)	1.93 (.676)	2.07 (.605)	1.69 (.516)	2.17 (.823)	2.30 (.741)	2.50 (.855)	4.15	.001	.024
Quality	2.22 (.751)	2.40 (.790)	2.59 (.719)	2.37 (.632)	2.72 (.988)	2.94 (.827)	2.93 (1.26)	4.64	.001	.026

Note. Only statistically significant results are included ($p < .05$); η2 (eta-squared statistic) = effect size estimates. Cohen's rule (1988) states that .01-.06 (small effect); > .06-.14 (medium effect); > .14 (large effect).

Table 5

Statistically Significant Post Hoc Comparisons for Writing Product Measurements: 4th year CSE versus the Rest of the School Years

	4th year CSE vs. 4th year PE	4th year CSE vs. 5th year PE	4th year CSE vs. 6th year PE	4th year CSE vs. 1st year CSE	4th year CSE vs. 2nd year CSE	4th year CSE vs. 3rd year CSE
TBM						
Productivity	.001	.001	.001	.001	.048	.022
Coherence	.001	.015	.023	.001	n.s.	n.s.
Structure	.001	.001	.001	.001	.017	.008
RBM						
Structure	.001	.001	.001	.001	n.s.	.005
Coherence	.009	n.s.	n.s.	.002	n.s.	n.s.

Note. TBM: Text-Based Measures. RBM: Reader-Based Measures. Includes only statistically significant results ($p < .05$). n.s.: not statistically significant.

Table 6

Statistically Significant Post Hoc Comparisons for Writing Product Measures

	5th year PE vs. 4th year PE	6th year PE vs. 4th year PE	1st year CSE vs. 6th year PE	2nd year CSE vs. 4th year PE	2nd year CSE vs. 5th year PE	2nd year CSE vs. 6th year PE	2nd year CSE vs.1st year CSE	3rd year CSE vs. 4th year PE	3rd year CSE vs. 5th year PE	3rd year CSE vs. 6th year PE	3rd year CSE vs. 1st year CSE
TBM											
Productivity	.012	.001	n.s.	.001	n.s.	n.s.	.029	.001	n.s.	n.s.	n.s.
Coherence	n.s.	.024	n.s.	.003	n.s.	n.s.	.034	n.s.	n.s.	n.s.	n.s.
Structure	n.s.	n.s.	n.s.	n.s.	n.s.	.034	.006	n.s.	n.s.	n.s.	.017
RBM											
Structure	n.s.	n.s.	n.s.	.001	.001	.001	.001	n.s.	n.s.	n.s.	n.s.
Coherence	n.s.	.001	.001	.001	n.s.	n.s.	.001	.001	.001	n.s.	.001
Quality	n.s.	.001	n.s.	.001	n.s.	n.s.	n.s.	.001	.001	.044	.001

Note. TBM: Text-Based Measures. RBM: Reader-Based Measures. Includes only statistically significant results ($p < .05$). n.s.: not statistically significant.

Similarly, we observed the existence of a diversity of differences between the school years (see Table 6), with better writing products being produced as students' educational level progressed.

Results for the psychological and cognitive variables modulating writing skills

Lastly, the tests for between subject effects also revealed the existence of statistically significant differences between some of the measures included within the psychological and cognitive variables assessed, as shown in Table 7.

The *post hoc* comparisons revealed the existence of differences between various school years in the following measures. Focusing first on the psychological variables, PE students showed more positive attitudes towards writing than students in their 2nd year of CSE, and attributed success in the writing task to their own efforts to a greater extent than the other school year groups. This latter is a very positive finding, since this moderating variable is by nature unstable, internal and controllable, and is considered the most effective variable for the performance of cognitive tasks related to wri-

Table 7

Between Subject Test Results by School Year for Moderating Variables

Psychological Variables										
	4th year PE M (SD)	5th year PE M (SD)	6th year PE M (SD)	1st year CSE M (SD)	2nd year CSE M (SD)	3rd year CSE M (SD)	4th year CSE M (SD)	*F*	*p*	η^2
Attitudes	21.53 (4.01)	21.71 (3.91)	21.48 (4.13)	21.30 (4.18)	18.84 (4.83)	19.99 (4.30)	20.93 (5.03)	5.32	.001	.030
CA Success due to effort	17.06 (3.13)	16.76 (2.97)	16.29 (3.07)	15.39 (3.27)	14.84 (3.02)	13.76 (3.36)	14.86 (2.53)	5.61	.001	.032
SE Thinking about purpose	10.66 (2.68)	10.87 (2.26)	10.30 (2.40)	10.43 (2.37)	10.01 (2.57)	9.68 (2.63)	9.64 (1.59)	2.47	.022	.014
SE Thinking about what to write	10.57 (2.78)	10.74 (2.50)	10.41 (2.30)	10.54 (2.44)	9.91 (2.49)	9.43 (2.50)	9.50 (1.74)	2.37	.028	.014
SE Drawing up an Outline	10.21 (2.88)	10.18 (2.81)	9.72 (2.64)	9.36 (2.24)	8.64 (2.60)	7.83 (2.80)	9.29 (1.85)	3.06	.006	.018
SE Unrelated	9.81 (3.06)	9.19 (2.96)	9.22 (2.80)	8.57 (2.94)	8.49 (2.56)	7.38 (2.81)	8.50 (2.56)	4.01	.001	.023
Cognitive Variables										
	4th year PE M (SD)	5th year PE M (SD)	6th year PE M(SD)	1st year CSE M (SD)	2nd year CSE M (SD)	3rd year CSE M (SD)	4th year CSE M (SD)	*F*	*p*	η^2
Attention	290.97 (89.92)	308.44 (81.06)	350.31 (96.10)	336.42 (77.57)	333.54 (91.93)	359.50 (76.87)	330.64 (93.25)	3.04	.006	.017
Working memory	62.10 (36.68)	81.96 (31.43)	87.20 (31.80)	65.14 (38.87)	87.24 (33.26)	82.89 (32.66)	106.79 (16.33)	5.27	.001	.030

Note. CA: Causal attribution, SE: Self-efficacy. Only statistically significant results are included ($p < .05$); η2 (eta-squared statistic) = effect size estimates. Cohen's rule (1988) states that .01-.06 (small effect); > .06-.14 (medium effect); > .14 (large effect).

Table 8

Statistically Significant Post Hoc Comparisons for Psychological Variables

	1st year CSE vs. 5th year PE	2nd year CSE vs. 4th year PE	2nd year CSE vs. 5th year PE	2nd year CSE vs. 6th year PE	3rd year CSE vs. 4th year PE	3rd year CSE vs. 5th year PE	3rd year CSE vs. 6th year PE	3rd year CSE vs. 1st year CSE
Attitudes	n.s.	.001	.001	.001	n.s.	n.s.	n.s.	n.s.
CA Success due to effort	.012	.001	.001	n.s.	.001	.001	.001	.034
SE Thinking about purpose	n.s.	n.s.	n.s.	n.s.	n.s.	.018	n.s.	n.s.
SE Thinking about what to write	n.s.	n.s.	n.s.	n.s.	.043	.007	n.s.	n.s.
SE Drawing up an Outline	n.s.	.003	.003	n.s.	.001	.001	.001	.014

Note. CA: Causal attribution, SE: Self-efficacy. Includes only statistically significant results ($p < .05$). n.s.: not statistically significant.

ting, specifically, to the planning process, thinking about the goal to be achieved by writing the text, thinking about what to write and drawing up an outline (see Table 8). However, in relation to the cognitive variables assessed, the results indicated that CSE students presented higher levels of attention and working memory. Thus, for attention, 3rd year of CSE versus 4th year of PE ($p < .001$) and 5th year of PE ($p < .001$) or 1st year of CSE versus 4th year of PE ($p < .001$), and for working memory, 1st year of CSE versus 5th year of PE ($p < .001$) and 6th year of PE ($p < .003$) or 2nd year of CSE versus 4th year of PE ($p < .001$) or 1st year of CSE versus 5th year of PE ($p < .001$) and 6th year of PE ($p < .001$).

Discussion

These findings support various conclusions about the orchestration of the writing process in students of different ages and levels of experience and writing, and therefore, about the difficulties that inexperienced or novice writers may face. The conclusions presented below are intended to provide a source of theoretical and practical information which can be used to advance the *online* study of the cognitive processes involved in writing. They also have educational implications for professionals involved in education, tending as they do towards a perception of the writing product as being the result of the use and control of multiple cognitive resources which are in turn conditioned by various psychological factors (Olive et al., 2009).

Firstly, it was observed that students in their last year of CSE, the most experienced group due to having practiced writing in school for a longer period of time, was the one which devoted most time to the writing process and also the one which activated and deployed processes related to writing and other activities or tasks unrelated to writing production most frequently. To a certain extent, these results support the belief that the more time that is devoted to the production of a text, the more number of interruptions in the writing process (García & Fidalgo, 2008). However, they call into question the idea that such interruptions affect student engagement in the writing task, since these students were the ones who were most frequently engaged specifically in the task of producing the text and who devoted most time to this task. Nevertheless, it is also true that the results were not as expected, i.e. that it would be the less experienced, PE students who devoted most time to engaging in unrelated activities, whereas in fact, it was students in their 3rd year of CSE who most frequently engaged in the types of activity that are not productive as regards writing, specifically

during the first phase of the writing process. In contrast, PE students were characterised as being the group which paid most attention to the planning process of reading background information in order to write a text, compared to students in their 2nd year of CSE, and to producing a text, compared to students in the initial years of CSE.

With respect to orchestration of the cognitive tasks specifically entailed in the planning process, students in their last year of CSE were observed to devote more time to drawing up an outline during the first phase of the process, whereas PE students placed a greater emphasis on reading background information which would be of help in writing a text. These results can be explained by the level of complexity involved in both planning activities. Thus, drawing up an outline requires a higher degree of self-regulation, an ability which increases with age and experience of writing (De Milliano, Van Gelderen, & Sleegers, 2012) unless learning difficulties are present, for example, attention deficit disorder with hyperactivity, which corresponds to insufficient self-regulation (Miranda, Colomer, Fernández, & Presentación, 2012). In contrast, seeking helpful information is an activity more characteristic of writers with little or no knowledge about a range of subjects or about discourse. Hence, both planning tasks have a positive relationship with writing performance, i.e. the production of polished writing products, when activated during the first phase of the writing process (Breetvelt, Van den Bergh, & Rijlaarsdam 1994). In relation to the process of text production during the first phase of the writing process, it was the students in their 4th year of CSE who were most frequently engaged in this activity, although it is noteworthy that all PE groups devoted more time to this activity than students in their 1st year of CSE. At this point, it should be noted that the results did not permit an in-depth exploration of the cognitive activities specific to the process of revising a text. This impossibility may have been related to developmental aspects, since the ability to revise tends to appear later than the ability to plan. Even in later school years, students with normal levels of development as well as those with learning difficulties related to writing experience serious difficulties with performing detailed revision, whether on a substantive or a mechanical level, restricting themselves to partial copying of their texts rather than rewriting (Rodríguez et al., 2009). On the other hand, it might have been the result of attitudinal factors; when a student has devoted considerable time and effort to planning or production tasks, it may be that he or she is then reluctant to make changes to the text thus produced (Becker, 2006).

One of the main limitations of this study was the lack of data obtained on how the writing process was orchestrated during the second and third phases, and it was not thus possible to construct a procedural pattern which indicated the different cognitive activities that students initiated and implemented throughout the entire writing process (Van Weijen, 2008). Neither was it possible to evaluate the temporal distribution of writing activities which are positively related to writing performance, as did, for example, Van den Bergh and Rijlaarsdam (2001), who stated that planning activities related to representation of the task present a positive relationship at the start of the writing process but gradually assume a negative relationship, in terms of text quality, during the course of the intermediate and final stages of the writing process.

In sum, the results obtained indicate that the development of the writing process is not gradual, nor as expected; with the exception of students in their last year of CSE, none of the CSE student groups were characterised as being more experienced writers than the PE students. In other words, their profile did not confirm the notion that the higher the level of education, the greater the deployment, implementation and orchestration —or more complex temporal distribution— of the various cognitive activities involved in planning, production and revision. Rather, our findings tend to support the hypothesis of the existence of complex patterns which are dependent on the role of the modulating variables. For example, earlier studies have shown that when subjects have little experience of a task, and therefore little expertise, self-efficacy beliefs do not tend to reflect real abilities, which are consequently under- or overestimated, and also that incorrect attributions are made regarding the success or failure of writing (de Caso, García, Díez, Robledo, & Álvarez, 2010). However, the modulating effect of these psychological variables on the writing process does not explain the results obtained for the writing product, which reflect a trend that does not coincide with the generally linear, gradual development of the writing process, nor with the level of attention or working memory capacity, which, perhaps due to their more stable nature, are more impervious.

The mismatch between the progression of the results for the writing process and the writing product may be because PE students' engagement in the writing process is not what it appears or the most appropriate. This conclusion is supported by the results obtained for the writing product, which was of lower quality than that produced by CSE students. In addition, PE students overestimated their self-efficacy as regards deploying writing activities, similarly to students with learning difficulties (García & Fidalgo, 2008). Hence,

the results concerning their engagement may also have been mediated by the variable of social desirability, very evident in younger students, in such a way that they always responded according to what they believed was the appropriate answer rather than according to what they were actually doing. This would indicate the need in the future to employ more sensitive *online* measures using immediate retrospection. All the foregoing provides support for the idea that students' engagement in tasks making very high cognitive demands, such as writing (Miranda et al., 2012), decreases in certain aspects as educational level advances (Ros, Goikoetxea, Gairín, & Lekue, 2012). The need therefore arises for a continuum in the attention given to developing written communication skills. Efforts in the initial years of CSE should be reinforced and the affective and personality aspects of writing skills should be emphasised in instruction (Fernández, Anaya, & Suárez, 2012), as should the management of cognitive resources and efforts (Closas, Sanz de Acedo, & Ugarte, 2011), as indicated by the variables of attention and working memory, and other contextual and educational factors related to students and involved in promoting the process of learning (Etxeberría, Intxausti, & Joaristi, 2013; Robledo & García, 2013; Troia, 2006; Valdivieso, Carbonero, & Martín-Antón, 2013).

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