

Comparison of reading-writing patterns and performance of students with and without reading difficulties

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Abstract

Background: This paper analyses performance and the process used in carrying out a common hybrid task, such as, summarizing a text, from a developmental point of view and comparing the differences between students with and without reading difficulties. **Method:** 548 students typically developing and 54 students with learning difficulties for reading (grades 5 to 8, ages 11 to 14) read and summarized a text using the triple task technique and then they did a comprehension questionnaire. Attention was paid to the various activities undertaken during this task, their cognitive cost, and the organization of reading and writing activities throughout the exercise, together with performance through evaluation of the summary and the reading comprehension questionnaire. **Results:** There were no significant differences in performance or strategies used for the task between students of primary and secondary education. A linear reading-writing process was mostly employed by both, with greater cost and time needed by primary students. Students with reading difficulties did not show any strategies compensating for the greater difficulty and cognitive cost that the task represents for them. **Conclusions:** The effective and strategic use of summarizing as a learning tool seems to demand a specific training for students with or without reading difficulties.

Keywords: hybrid task, cognitive cost, reading difficulties, reading comprehension, strategies of summarizing.

Resumen

Comparación de los patrones de lectura-escritura y el rendimiento de alumnos con y sin dificultades de lectura. Antecedentes: se analiza el rendimiento y el proceso seguido en la realización de una tarea híbrida, resumir un texto, desde un punto de vista del desarrollo y comparativamente entre alumnos con y sin dificultades en lectura. **Método:** 548 estudiantes de rendimiento normal y 54 con dificultades en el aprendizaje de la lectura (5º de Primaria a 2º de Secundaria, 11 a 14 años) realizaron la lectura y resumen de un texto, junto a la técnica de la triple tarea, y posteriormente un cuestionario de comprensión lectora. Se analizaron el tipo de actividades realizadas durante la tarea, su coste cognitivo, la distribución de los procesos de lectura y escritura, y el nivel de comprensión lectora. **Resultados:** no hubo diferencias estadísticamente significativas en el rendimiento o las estrategias usadas durante la tarea entre el alumnado de Primaria y de Secundaria; solo los primeros emplearon un mayor tiempo en la tarea, con un mayor coste cognitivo. Los alumnos con dificultades no mostraron ningún tipo de estrategia para compensar sus dificultades y el mayor coste cognitivo de este tipo de tarea. **Conclusiones:** el uso estratégico del resumen como herramienta de aprendizaje demanda un entrenamiento específico en alumnado con y sin dificultades.

Palabras clave: tarea híbrida, coste cognitivo, dificultades en lectura, comprensión lectora, estrategias de resumen.

In the early stages of education, a key objective is set for students: learning to read and write. This is slowly transformed over the course of schooling into reading and writing to learn. Indeed, reading and writing are two essential tools in learning, all the more so if used in conjunction (Tierney & Shanahan, 1996). Hence, in the field of education, it is common to set tasks requiring students simultaneously to process and to compose texts, so that they will achieve learning (Solé et al., 2005). Nonetheless, despite the frequency of this type of task, its cognitive complexity is considerable, as it involves a triple challenge for the cognitive system of the reader-writer-learner. It requires active processing by the students such as to construct meaning from the original text or

texts, typical of reading comprehension (Kintsch & Rawson, 2005), but it goes further, because during this processing, the reader takes on a new objective as a writer. These texts represent the source of information from which to select, organize and integrate what is wished to express, in the form of a student's own new original text, which must meet a specific aim, be suited to a given audience and comply with its own given rhetorical characteristics. This requires the person to undertake active processing as well (Hayes, 1996; Kellogg, 1996), going beyond what is needed for written composition (Delaney, 2008; Spivey, 1997).

Hence, an efficacious use of this sort of hybrid task as a tool for learning will depend to a great degree upon whether students have a repertoire of effective strategies allowing them to face the heavy cognitive demands imposed by this sort of task and thus build up their learning. In this way, interest has grown in knowing what are the processes and the types of actions that students undertake in this sort of hybrid task. This has been the object of previous research, but mostly carried out with students from higher levels of education. Thus, with university students or students in the final year

of secondary education, it has become clear that in this kind of task, they use more complex and effective strategies, transformational strategies, characterized by the employment of more complex macro-rules (Brown & Day, 1983; Brown, Day, & Jones, 1983), along with greater recursion and mediation in the process of reading and writing (McGinley, 1992; Mateos & Solé, 2009). However, the procedure followed by middle-school students is characterized by the employment of basic and not very effective strategies, copy-delete strategies, typified by the use of macro-rules like deletion, by a more linear or sequential and simpler procedure (Lenski & Johns, 1997; Mateos & Solé, 2009), along with a sparse use of the cognitive and meta-cognitive processes suited to a strategic domain of reading and writing (Mateos, Martín, Villalón, & Luna, 2008). In addition, comparative studies of the process followed in hybrid tasks by students of different age groups in sixth, eighth and tenth grades, analysed through measurements of planning, reviewing the text and the final amount of time given over to the task, did not find significant differences in the procedures used by students from different courses. Only students with greater reading competence were characterized by more elaborate planning and longer time devoted to the task (Spivey & King, 1989). Hence, the literature seems to suggest that despite the employment of this type of task in the field of education, not all students are able to rely on a repertoire of effective strategies permitting them to achieve success in such exercises, and so also in their learning.

Continuing this line of research, the present study concentrated on analysing a hybrid task, summarizing, widely used in education from its initial stages onward. The objective was to investigate the effectiveness attained in such a task and the procedures followed in it, analysing which activities were brought into play in this work, what their cognitive cost, as measured in reaction times, were and how the processes of reading and writing were interwoven and distributed throughout the task. This was done with an extensive sample, from both primary and secondary grades, of students with and without learning difficulties in reading. This made it possible to specify objectives, to determine the extent to which these performances and processes varied with the children's age (over the last two years of primary and the first two years of secondary education) and to discover how far performance and procedures varied in accordance with whether or not a child suffered from a reading-specific learning deficit.

Method

Participants

The initial sample for the study was made up of 772 students in the fifth and sixth grades of primary education and first and second grades of secondary education, from five schools, two of them grant-aided private schools and three of them state schools, in an urban area of Leon in Spain with a middling socio-economic and

cultural level. All the subjects completed a G Factor Intelligence Test (Cattell & Cattell, 2001) and the reading comprehension test from the PROLEC-SE standardized reading test (Ramos & Cuetos, 2009). In addition, those students identified as having reading problems by their teachers, or who had a significantly low score in the reading comprehension sub-test (percentiles equal to or below the twenty-fifth), also completed the sub-tests for reading words and pseudo-words, with the aim of specifying their problems at a phonological level (Suárez & Cuetos, 2012). On the basis of this, 54 pupils were selected, mean age 12 years and 2 months, with reading difficulties at the decoding level (all with a percentile < 25: 8 with speed problems for reading words, 23 for reading pseudo-words and 23 for both), with a normal level of intelligence, equal to or greater than 80, and without any form of diagnosis of language development, Attention Deficit Hyperactivity Disorder, or other disorders, and a further 548 students, with a mean age of 11 years and 10 months, not presenting any kind of reading difficulty, either in comprehension or decoding. Their distribution by years and gender is shown in Table 1. All of these subjects undertook a task of reading and summarizing a text, using the triple task technique and a reading comprehension questionnaire on the text they had read.

Instruments

A hybrid task was used that consisted of reading and summarizing a text. For this purpose use was made of two texts taken from the standardized test for strategies of comprehension (Vidal-Abarca, Gilabert, Martínez, & Sellés, 2007), suited to the age range, and were counterbalanced for gender, grade, and status as having or not having difficulties. These were applied in accordance with the triple task technique (Olive, Kellogg, & Piolat, 2002). During the exercise, at random intervals averaging thirty seconds the subjects heard a sound signal through the earphones of a headset with a microphone connected to a laptop computer, and had to respond as quickly as they could by saying "ta", allowing their reaction time to be recorded. Thereafter, they had to indicate what type of activity they were undertaking at the moment they heard the signal by pressing the key on the computer that corresponded to this action. For this purpose different keys were associated with a list of categories: *reading text*, differentiated by colours according to which paragraph of the text they were reading or glancing at, *thinking* if they were thinking about the text, about something that they did not understand or about the summary, *taking notes* if they were underlining or making notes on the text, *writing summary* if they were writing or changing anything in the summary, *reading summary* if they were reading or looking at what they had written in the summary, and *other* if they were doing something not related to the task. When the exercise was completed, pupils used their computers to answer the reading comprehension questions of the test of strategies for comprehension (Vidal-Abarca et al., 2007) corresponding to the text they had read.

Table 1
Sample details

	Primary 5		Primary 6		Secondary 1		Secondary 2	
	Female	Male	Female	Male	Female	Male	Female	Male
Typically developing	63	53	67	65	65	75	79	81
Reading deficit	6	10	4	5	7	8	7	7

Measurements of process in the reading and summarizing task

The triple task technique yielded a number of measurements of the process followed by students in the reading and summarizing task. First, there was an estimate of the *cognitive cost* involved for each student in each of the actions carried out during the task (reading, writing, taking notes, and so forth). It was assumed for this purpose that the increase in reaction times during the activities undertaken in the task, as against the baseline, was due to the quantity of resources or processing capacity demanded of the person involved in the activities of the reading and summarizing task. To this end, the cognitive cost of each category for each student was calculated by deducting from the average reaction time in each of the action categories used, the average reaction times of the baseline for each student. Second, a *general estimate of the types of activities carried out during the task and the time dedicated to each of them* was obtained. Third, a general estimate of the *organization* of the different reading and writing processes in the task was obtained from the following indicators: *read-compose swapping*, that is, transitions between reading the passage and composing the summary, with composing taken to be writing the summary, but also reading the summary, thinking, and making notes, and *read-back measure*, that is, whether students went back to re-read earlier paragraphs in the passage or read linearly.

Measurements of performance in the task

Two measurements were used, one derived from the summary and the other from the score achieved by students on the reading comprehension questionnaire (Vidal-Abarca et al., 2007). This comprised ten multiple-choice questions with four answer options, evaluating anaphoric inferences, building up macro-ideas, inferences based on knowledge and grasping ideas explicit in the text.

On the other hand, to obtain a measurement of reading comprehension from the summary, first, three independent experts established a segmentation of the ideas in the original texts. For this, they divided each text in the minimum discourse units, that is, the smallest units of the text with a complete sense, which were labelled as ideas. Thereafter, each expert categorized independently these ideas according to the importance of their role in the text. They reached that four levels of importance should be distinguished in the ideas of the text: main ideas, secondary ideas, third and fourth level ideas. They solved disagreements in the categorization of ideas by consensus. Once the analysis of the original texts had been carried out, evaluation of the students' summaries was achieved by having two independent correctors identify what types of idea from the original text were included in each summary, regardless of how they were expressed. Both raters showed a suitable index of agreement.

Good performance on the summary writing task would require that students include most or all of the level-1 idea units, and decreasing numbers of ideas at levels 2, 3 and 4. A strategy for determining an overall summary writing score that captured this understanding of performance would be, therefore, to calculate a total number of ideas, weighted by level. Rather than giving a priori weights we used confirmatory factor analysis to predict a Summary Performance latent from idea unit counts at each level. This served both to confirm that the underlying structure

of the performance measure was weighted more towards higher level ideas, and to provide empirical weights which could then be used to calculate a performance measure for use in further analyses.

Inspection of the modification indices from an initial model in which all four observed variables were treated as orthogonal, suggested better fit from a model in which counts of ideas at Level 1 and at Level 4 were allowed to co-vary. This gave a final model with good fit (CFI = 1.0, TLI = .99, RMSEA = .050). Correlation between Level 1 and Level 4 idea counts was -.13 and unstandardized parameter estimates for idea counts at Levels 1, 2, 3 and 4 were, respectively, 1, .57, .35, .05. This confirmed our hypothesis that underlying the four separate measures was a single latent variable with emphasized higher level ideas and deemphasized lower level ideas. We used these estimates to create a weighted sum of idea counts and used this as a measure of summary-writing performance.

Summary task performance was significantly but quite weakly related to scores for the reading comprehension questionnaire (Vidal-Abarca et al., 2007) (i.e., to questions based on the same passage as the summary task; $r = .39, p < .001$).

Procedure

The students selected as the sample were trained in categorizing actions through direct introspection and the reliability of their responses was assessed, obtaining a Kappa index greater than .98. Performance of the hybrid exercise in triple task format took place in small groups of five to eight pupils, always during the normal school timetable, in classrooms set aside for the purpose.

Data analysis

Statistical analysis was by traditional between-subjects analysis of variance, for analysis of effects of age group and of reading deficit on performance and on reading and writing process. We used linear mixed effects models to examine effects of reading and writing processes on cognitive load, and incremental multiple regression to examine relationship between process and performance. The detail of each of these analyses is given at the start of the relevant section.

Results

Reading comprehension performance

As might be expected, scores on both the comprehension questions associated with texts and the summary scores showed an effect of school year: Summary, $F(3, 435) = 6.14, p < .001$; Comprehension questions, $F(3, 425) = 12.8, p < .001$. For the two measures, however, differences were only statistically reliable between Grade 5 and Grade 6 (Effect sizes: Task Questions $d = .69$; Task Summary, $d = .68$) with no statistically significant differences among the other grades (t-tests with Bonferroni correction, familywise $\alpha = .05$).

Students with reading deficits performed substantially less well on all the comprehension measures $t(599) > 4.2, p < .001, d > 2.5$, with scores that were lower than the youngest (5th grade) students in the typically developing sample (see Table 2).

Table 2
Mean comprehension scores by school grade

	Primary 5	Primary 6	Secondary 1	Secondary 2	Reading deficit (all grades)
Summary	17.4 (7.30)	20.4 (8.26)	22.0 (8.19)	20.9 (7.49)	15.3 (7.14)
Comprehension questions	4.85 (1.94)	6.31 (2.36)	6.59 (2.23)	6.36 (2.04)	3.81 (2.36)

Table 3
Summary writing processes: Estimated times in specific activities (minutes)

	Primary 5	Primary 6	Secondary 1	Secondary 2	Reading deficit (all grades)
Read passage	7.36 (3.32)	6.89 (3.46)	5.75 (2.65)	5.48 (2.38)	6.67 (3.40)
Write summary	13.51 (4.91)	13.07 (3.91)	11.50 (4.10)	11.74 (3.93)	12.37 (6.48)
Think	2.26 (2.47)	1.66 (1.84)	1.41 (1.34)	1.51 (1.47)	1.97 (2.33)
Write notes	2.36 (2.66)	2.42 (2.93)	1.89 (2.04)	2.14 (2.34)	2.86 (3.76)
Read summary	1.29 (1.47)	1.60 (1.73)	1.68 (1.65)	1.27 (1.41)	1.85 (2.10)

Table 4
Summary writing processes: Frequency of read-write swapping, and reading back to earlier paragraphs

	Primary 5	Primary 6	Secondary 1	Secondary 2	Reading deficit (all grades)
Read-Compose Swapping	9.34 (7.75)	9.97 (7.82)	8.30 (5.67)	7.27 (5.89)	6.44 (5.89)
Readback	1.12 (.94)	1.36 (1.25)	1.16 (1.06)	.89 (.97)	.96 (1.41)

Patterns in reading-writing process

Table 3 gives estimated time in the various activities reported by participants while completing the hybrid task. Statistical analysis was by ANOVA followed by pairwise contrasts between adjacent grades (t-tests with Bonferroni correction, familywise $\alpha = .05$). Younger students tended to spend more time both reading the target passage and writing the summary: reading passage, $F(3, 435) = 10.1, p < .001$; writing summary, $F(3, 435) = 5.8, p = .001$, with statistically significant differences only between Grade 6 (primary) and Grade 1 (secondary) (effect sizes: reading the passage, $d = .42$; writing summary, $d = .38$). There were no statistically significant differences in time-in-activity between students with and without reading deficits.

As for the distribution of reading and writing processes during the task, in relation to the Read-Compose Swapping variable (Table 4), there was a weak, but statistically significant effect of grade of Read-Compose Swapping, $F(3, 354) = 3.54, p = .015$, with primary students swapping more frequently than secondary students, $t(437) = 2.95, p = .003, d = .28$. Students with reading difficulties were less likely to switch between reading and composing than typically developing students, $t(491) = 2.19, p = .029, d = .33$.

Students also varied in the extent to which they returned to earlier paragraphs in the passage. Most students read very linearly, rarely looking back at paragraphs that they had finished reading. However some students did read back. The Readback measure (Table 4) therefore represents a count of each time the paragraph that the student reports reading on the current probe is earlier than the paragraph that they reported reading at the previous probe. Again, there was an effect of grade, $F(3, 354) = 3.84, p = .010$, with primary students reading back more frequently than secondary students, $t(437) = 2.95, p = .027, d = .21$. There was no evidence of a greater tendency to read back in students with reading difficulties.

Cognitive cost in reading-writing process

We used linear mixed effects models to explore these data, with random intercepts at the participant and probe levels. These serve the same function as more traditional repeated-measures ANOVA but capture the multi-level nature of the response-time data, with varying numbers of probes nested within participants. Models were evaluated by chi-square difference tests, relative to the zero (constant-only) model.

As can be seen from Figure 1, response time was slower when students were writing than when they were reading the passage, suggesting that writing has greater attentional demands, $\chi^2(1) = 82, p < .001$. There was some evidence of an effect of grade, with older students finding both reading and writing less cognitively

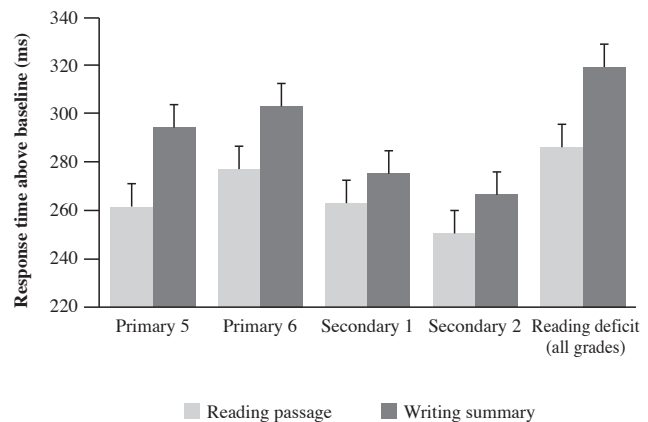


Figure 1. Attentional demands of reading and writing during the summary task (mean for probe response time minus mean baseline response time; error bars represent standard error)

demanding, $\chi^2(3) = 8.0, p = .047$. Students with specific reading deficits found both reading and writing more cognitively demanding than did the other students, $\chi^2(1) = 5.5, p = .019$.

Process / product relationships

We explored the relationship between summary writing performance – measured in terms of the idea-unit based variable discussed above – and the various process variables detailed in the previous section. We evaluated a hierarchical series of regression models, comparing between them with an R^2 -change test. Model 1 included just grade and whether or not the child had a reading deficit as predictors. Model 2 added all of the time-in-activity variables. Model 3 added frequency of read-compose swapping and of readback. Finally, Model 4 added the probe response time variable for writing the summary and for reading the passage, as measures of attentional demand. Model 1 confirmed a small but statistically significant effect of grade and of reading deficit on summary writing performance, $R^2 = .06, F(2, 490) = 16.1, p < .001$. Measures of time in various different activities during summary production (Model 2) explained an additional 21% of variance, R^2 change = .21, $F(5, 485) = 27.3, p < .001$. Read-Compose Swapping, and Readback explained a further 2% of variance: Model 3, R^2 change = .02, $F(2, 483) = 8.18, p < .001$. We found no evidence of an effect of attentional demand (Model 4). The final model indicated significant effects ($p < .001$ in all cases) for grade and reading deficit, as indicated by previous analyses, and also for time spent writing ($\beta = .39$), time spent making notes ($\beta = .16$), and tendency to swap between reading and composing ($\beta = .19$). We found no significant effects for time spent reading or any of the other time-in-activity measures, or for measures of the attentional demands of reading and writing. It is possible the effects of time spent writing and, particularly, time spent taking notes result just from the fact that more competent or more motivated students both spend longer in these activities and produce better summaries, with no causal link between activity and product. To help discount this possibility we performed the same analysis with scores from the comprehension questions as the dependent variable. This model showed effects for grade and for reading deficit, but did not show effects for any of the process variables.

Discussion

With regard to differences as a function of age in performance and in the processes followed for the hybrid task, there was a tendency for the quality of the summary and reading comprehension answers to increase as age rose, this was statistically significant only between students in the fifth and sixth grades, with no differences from the students in secondary education. These data are consistent with those put forward consecutively in Programme for International Student Assessment reports (Elosua & Mújica, 2013; Navas & Urdaneta, 2011), which pointed to poor performance in reading comprehension as characterizing secondary students in Spain in comparison with those from other countries in an international context.

As for the processes used in the task, in relation to the activities carried out, there were statistically significant differences only in the activities of reading the text and writing the summary. In both cases, younger students took significantly more time for these tasks, perhaps because of the greater cognitive demand that such

work implies for them, as corroborated by the results obtained in this study relating to cognitive load, estimated through reaction times. Unexpectedly, there was not a greater presence as a function of age of mediation activities in the summarizing task, such as taking notes, revising the summary and the like. In the early years of secondary education, students have not reached a strategic domain of this sort of task such as to differ significantly from the process followed by primary students, which could improve their reading comprehension achievement. This result is in accord with previous research undertaken in Spain with secondary students, in which students from earlier years (first and third grade) showed scarcely any mediation activities, being characterized principally by a direct reading-writing process (Mateos & Solé, 2009). Another study carried out with pupils from the second year of secondary education, also found no presence of cognitive and meta-cognitive processes that might be related to mediation activities like those considered in the present paper (Mateos et al., 2008).

Finally, with regard to the distribution and organization of processes in the task, secondary students also showed less recursion between reading and writing relative to primary students, a feature that will be discussed below, and a smaller number of regressions or loop-backs in reading. These latter can be interpreted as a process of monitoring reading comprehension, where the subject goes back to resolve some incongruity in understanding, to solve a problem that has arisen, or to aid the integration of new ideas from the text with prior items. This would be ideal for effective reading, and characteristic of expert readers. Nonetheless, this monitoring might be undertaken with reference to searching for the sense of unknown words, which would mean less effective use of time and less repercussion on the final understanding of the text achieved, and this might be what was happening with primary education students. Moreover, it is also possible to interpret such actions in younger pupils, that is, those in primary education, as lapses in attention and concentration, or anxiety caused by needing to evaluate (Gutiérrez & Avero, 1995), or even as an outcome of cognitive overload of the demands imposed at the level of lexical and syntactic processing. This would require the students to loop back in order to retrieve information previously read, but subsequently forgotten.

With regard to the second objective, relating to differences between students with and without reading difficulties, students with learning difficulties showed significantly weaker performance both in the quality of summaries and in understanding of the text. In turn, the cognitive cost implied for students with difficulties in reading and writing activities was significantly greater, as might be expected because of their problems with automation of decoding processes.

Nevertheless, despite the greater cognitive demands that the task implied for them, they did not vary in the way in which they performed it, either regarding the mediation activities used in carrying out the work, or in the time given over to the direct activities of reading and writing, or greater regression or re-reading of the text. This might explain their lower performance in the task. This is to say that, in spite of their difficulties with reading, these students do not seem to adopt any specific strategy to help them compensate for these problems, either the most basic, such as spending more time on reading and writing, or more complex ones, linked to the use of mediation activities as a “scaffolding” for reading (underlining, taking notes, re-reading and so on) or in writing (making notes, re-reading and revising what they have

written, and the like). The only indicator of processes in which significant differences were found was recursion between reading and writing, with the students with reading difficulties showing less reading and writing cycles.

The results obtained regarding the interweaving of the processes of reading and writing during the task, either from the viewpoint of change with age, or comparing pupils with and without learning difficulties, can be interpreted from different angles. This is because the same organizational pattern or strategy can be used in more than one way, as has been demonstrated by previous research that compared the reading process in students with and without learning difficulties (Wigent, 2013). Thus, in the case of expert readers, recursion between reading and writing can be seen as an action to transfer and integrate specific information from the original text into the written product that they are composing, to monitor that their written output does reflect the main idea in this original text, to seek out key words identified when reading the original which they specifically wish to include in their writing, and so forth. In brief, these reading-writing cycles in expert readers may be interpreted as a complex interaction between the knowledge that the reader-writer-learner has already stored and details provided by the characteristics and data included in external sources of information, either the original text or the summary (O'Hara, Taylor, Newman, & Sellen, 2002). This usage would have a positive influence on the performance achieved in the task and hence seems unlikely among the sort of students involved in the present study. Here, these recursive reading-writing cycles might be indicating a basic and inefficient strategy for performing the task, termed a copy-delete strategy by Brown and others (Brown & Day, 1983; Brown et al.,

1983), and characterized by sequential reading of segments of the text, which are then either discarded or copied over more or less literally. This would seem to be applied in an even less effective manner by students with learning difficulties. Unfortunately, the nature of the measurements recorded in this study does not permit more direct conclusions to be drawn in relation to possible uses individual students may have made of the organization and distribution of the reading-writing cycles that they performed during the task. This is an objective envisaged for future studies.

In the light of the above, the use of summarizing, despite its pedagogical value, might not be particularly appropriate in the case of students who are in the elementary stages of education, or who present learning difficulties. From an educational viewpoint, it would be necessary to give such students, including those in the earlier years of secondary education, specific training in the use of optimum strategies, following instructional approaches that have been validated for developing complex cognitive abilities (see, for instance, Fidalgo, Torrance, & Robledo, 2011; García & Arias, 2004; Soriano, Cheebani, Soriano, & Descals, 2011). This would permit an effective use of summarizing as a learning tool.

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References

- Delaney, Y. (2008). Investigating the reading-to-write construct. *Journal of English for Academic Purposes*, 7, 140-150.
- Brown, A.L., Day, J.D., & Jones, R.S. (1983). The development of plans for summarizing texts. *Child Development*, 49, 1076-1088.
- Brown, A.L., & Day, J.D. (1983). Macrorules for summarizing texts: The development of expertise. *Journal of Verbal Learning and Verbal Behaviour*, 22, 1-14.
- Cattell, R.B., & Cattell, A.K.S. (2001). *Factor "g" Escala 2 [g Factor scale 2]*. Madrid: TEA (10ª edición; 1ª edición de 1977).
- Elosua, P., & Mújica, J. (2013). Invariance levels across language versions of the PISA 2009 reading comprehension test in Spain. *Psicothema*, 25(3), 390-395.
- Fidalgo, R., Torrance, M., & Robledo, P. (2011). Comparación de dos programas de instrucción estratégica y autorregulada para la mejora de la composición escrita [Comparison of two strategic and self-regulated instructional programs for improving writing]. *Psicothema*, 23(4), 672-680.
- García, J.N., & Arias, O. (2004). Intervención en estrategias de revisión del mensaje escrito [Intervention in revising composition strategies]. *Psicothema*, 16(2), 194-202.
- Gutiérrez, M., & Avero, P. (1995). Ansiedad, estrategias auxiliares y comprensión lectora: déficit de procesamiento vs falta de confianza [Anxiety, compensatory strategies and reading comprehension: Processing deficit vs. lack of confidence]. *Psicothema*, 7(3), 569-578.
- Hayes, J.R. (1996). A new framework for understanding cognition and affect in writing. In C.M. Levy & S. Ransdell (Eds.), *The science of writing: Theories, methods, individual differences and applications* (pp. 1-27). Mahwah, N.J.: Lawrence Erlbaum Associates.
- Kellogg, R.T. (1996). A model of Working Memory in Writing. In C.M. Levy & S. Ransdell (Eds.), *The science of writing: Theories, methods, individual differences and applications* (pp. 57-72). Mahwah, N.J.: Lawrence Erlbaum Associates.
- Kintsch, W., & Rawson, K.A. (2005). Comprehension. In M.J. Snowling & C. Hulme (Eds.), *The Science of Reading* (pp. 209-226). Oxford: Blackwell Publishing.
- Lenski, S.D., & Johns, J. (1997). Patterns of reading-to-write. *Reading Research and Instruction*, 37, 15-38.
- Mateos, M., Martín, E., Villalón, R., & Luna, M. (2008). Reading and writing to learn in secondary education: Online processing activity and written products in summarizing and synthesizing tasks. *Reading and Writing*, 21, 675-697.
- Mateos, M., & Solé, I. (2009). Synthesizing information from various texts: A study of procedures and products at different educational levels. *European Journal of Psychology of Education*, 4, 435-451.
- McCutchen, D. (1996). A capacity theory of writing: Working memory in composition. *Educational Psychology Review*, 8(3), 299-325.
- McGinley, W. (1992). The role of reading and writing while composing from multiple sources. *Reading Research Quarterly*, 27, 227-248.
- Navas, M.J., & Urdaneta, E.J. (2011). PISA y el triángulo de la evaluación [PISA and the assessment triangle]. *Psicothema*, 23(4), 701-706.
- O'Hara, K.P., Taylor, A., Newman, W., & Sellen, A. (2002). Understanding the Materiality of Writing from Multiple Sources. *International Journal of Human-Computer Studies*, 56(3), 269-305.
- Olive, T., Kellogg, R.T., & Piolat, A. (2002). The triple task technique for studying the process of writing. In T. Olive & C.M. Levy (Eds.), *Contemporary tools and techniques for studying writing* (pp. 31-60). Dordrecht: Kluwer Academic Publishers.
- Ramos, J.L., & Cuetos, F. (2009). *Evaluación de los procesos lectores en alumnos del tercer ciclo de Educación Primaria y Educación Secundaria Obligatoria-PROLEC-SE* [Assessment of reading processes in third

- cycle of Primary Education and Compulsory Secondary Education-PROLEC-SE]. Madrid: TEA.
- Solé, I., Mateos, M., Miras, M., Martín, E., Castells, N., Cuevas, I., et al. (2005). Lectura, escritura y adquisición de conocimientos en Educación Secundaria y Educación Universitaria [Reading, writing and knowledges acquisition in Secondary Education and University]. *Infancia y Aprendizaje*, 28(3), 329-347.
- Soriano, M., Chebaani, F., Soriano, E., & Descals, A. (2011). Enseñanza recíproca y autoobservación del uso de estrategias: efectos sobre la comprensión de textos [Reciprocal teaching and self-monitoring of strategy use: Effects on reading comprehension]. *Psicothema*, 23(1), 38-43.
- Spivey, N.N. (1997). *The constructivist metaphor. Reading, writing and the making of meaning*. San Diego: Academic Press.
- Spivey, N.N., & King, J.R. (1989). Readers as writers composing from sources. *Reading Research Quarterly*, 24, 7-26.
- Suárez, P., & Cuetos, F. (2012). ¿Es la dislexia un trastorno perceptivo-visual? Nuevos datos empíricos [Is dyslexia a visual perceptive disorder? New empirical data]. *Psicothema*, 24(2), 188-192.
- Tierney, R.J., & Shanahan, T. (1996). Research on the reading-writing relationship: Interactions, transactions and outcomes. In R. Barr, M.L. Kamil, P.B. Mosenthal, & P.D. Pearson (Eds.), *Handbook of Reading Research* (pp. 246-280). New York: Longman.
- Vidal-Abarca, E., Gilabert, R., Martínez, T., & Sellés, M.P. (2007). *Test de estrategias de comprensión* [Test of comprehension strategies]. Madrid: Instituto Calasanz de Ciencias de la Educación.
- Wigent, C.A. (2013). High school readers: A profile of above average readers and readers with learning disabilities reading expository text. *Learning and Individual Differences*, 25, 134-140.