

## *The Effects of Manuscript, Cursive or Manuscript/Cursive Styles on Writing Development in Grade 2*

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### *Abstract*

In the research area of writing development, an increasing number of researchers suggest that graphomotor skills could be much more important than they appear to be (Christensen, 2009). Few researchers have studied the link between handwriting and teaching practices, despite the fact that some studies indicate its importance (Graham, 2010). The general objective of this study is to explore the relationship between different handwriting styles and the development of writing skills among 715 children in Grade 2. Generally, our results show that the three handwriting styles (manuscript/cursive, manuscript, and cursive) have different effects on writing development (speed, quality, word production, and text production).

### *Handwriting and Text Production*

Based on Hayes and Flower's model (1980), written production supposes three cognitive processes: planning (generating ideas and setting goals), translating (transcribing ideas into written text), and revising (rereading the text to improve clarity of idea expression). Further, Berninger and Swanson (1994) adapt this model to text production among younger writers. They describe two processes for translation: text generation, which occurs at different levels of language, and transcription, which includes handwriting (letter production) and spelling (word production).

The emergence of cognitive psychology studies in the area of writing learning has brought to light the fact that the development of handwriting skills brings into play several related abilities and that handwriting skills take a long time to acquire (Alamargot & Fayol, 2009). Indeed, an increasing number of studies are shedding light on the relationships between handwriting, spelling, and text production. Given the fact that text production requires the coordination of a large number of cognitive and metacognitive abilities, it could be argued that the graphomotor skills mobilized by children during handwriting have relatively little importance in the writing process as a whole. However, several studies have provided good reason to believe that this low-level aspect could be much more important than it might appear; to generate creative and well-structured

written texts, students must master the mechanical tools of getting letters, words, and sentences onto the page at a level of automaticity (Berninger, Vaughan, Abbott, Begay, Coleman, Curtin, et al., 2002; Bourdin, Cogis, & Foulon, 2010; Christensen, 2005; Medwell & Wray, 2008).

Children entering primary school spend most of their cognitive energy managing the spelling and graphomotor aspects of writing. More advanced writers are not only able to manage the spelling and graphomotor aspects of writing, but they can also focus on planning and editing activities. Indeed, to the extent that young students deploy a significant portion of their cognitive energy controlling low-level processes (such as handwriting or spelling), few attentional resources are available for more complex tasks (such as idea generation, word choice, management of cognitive activities, and text editing) (Medwell & Wray, 2008). In other words, for learners, the high demands and difficulties of handwriting not only stop concurrent activation of other processes, but can explain why it's difficult for them to engage in high-level processes (McCutchen, 2011). Based on Christensen (2005), "unless handwriting is automated, the cognitive load required for the physical act of writing can overwhelm the system and interfere with more complex processes that require conscious thought for ideation, sequencing ideas, and monitoring of accuracy and communicative clarity" (p. 442).

Basing themselves on the well-known cognitive constraint phenomenon encountered in writing (Bourdin, 2002; McCutchen, 2008, 2011), studies have drawn attention to the importance of automating certain activities in the act of writing (such as recalling word spelling or handwriting) to enable young students to devote attentional resources to managing more complex aspects of text production. Indeed, many researchers (in particular, Bourdin, 2002; Graham, Berninger, Abbott, Abbott & Whitaker, 1997; Jones & Christensen, 1999) note the need for automating letter and word writing in order to free up attentional resources so they can be devoted primarily to the many cognitive tasks involved in text production. As Graham and Bereiter (1996) note, if children write slowly, they will be unable to remember all of their ideas, forgetting them before they are able to write them. With regard to the impact of concurrent activities on attentional resources, Scardamalia and Bereiter (1987) note that when 6- to 7-year olds simply dictate a text rather than writing it out themselves, the text is more coherent, more elaborate and much longer. De La Paz and Graham (1995) also note that writing under dictation reduces the attentional demand on children, a condition which enhances handwriting quality at the beginning of kindergarten.

This relationship between graphomotor skills in writing and spelling mastery is also noted by Berninger and Swanson (1994). They show that the younger children are, the more graphomotor skills and spelling are important, even though those skills still influence the quality of texts produced by older children. Another study in Grade 2 (Jones & Christensen, 1999) reveals that 53% of the variance in text production quality can be attributed to the automation of letter production. Similarly, Fayol and Miret (2005) note a link between the extent of graphomotor mastery and the spelling performances of third graders (N=77). In this study, the French researchers find that the low performances in handwriting were significantly correlated with low scores in word production.

A vast study of 600 first to sixth graders in the USA (Graham et al, 1997) clarifies our understanding of the relationships between the graphomotor components of writing, spelling, and the quality and fluidity of writing activities. This is achieved by an analysis that relies on structural equation modeling (SEM). This model has the advantage of being able to validate developmental hypotheses. The authors were able to show that transcription skills (graphomotor skills and spelling) are important determinants in the variance in fluidity and composition quality in writing (number of words), both at the beginning and the end of primary school. However, this analysis reveals that handwriting directly predicts the quality of written productions by all primary school students. Graham and Harris (2000) note that mastery of graphomotor skills in writing does not only facilitate the initial writing learning process, but also supports the overall development of writing for a period of at least six months. In another study conducted by Berninger, Abbott, et al. (2002) to explore writing and reading connections in elementary school, one of the results shows that the covariance was significant between handwriting and spelling only in Grade 1---when manuscript style is introduced---and in Grade 3---when cursive style is introduced. As Berninger et al. (2002) claim, “handwriting may constrain spelling, and spelling may constrain handwriting in typically developing writers” (p.44). The precision of the above results (Graham et al, 1997; Graham & Harris, 2000) supports earlier hypotheses arguing for an important determining role for transcription skills in writing. Above all, they draw attention to the often-underestimated contribution of graphomotor components to writing skills (quality and fluidity) of primary school students, which are more important than the contribution of spelling abilities.

In the same way, two studies conducted by Medwell and her colleagues in England (Medwell, Stand, & Wrap, 2007, 2009) show that a high proportion of the variance in composition was related to handwriting (automatic letter production). This is not only true in a study with 179 children in Grade 2 (Medwell et al., 2007), but also in Grade 6 (N=198) at the end of elementary school (Medwell et al., 2009). This finding supports the idea that handwriting requires cognitive efforts not only for children at the beginning of elementary school but also at the end. This finding also shows that cognitive processes might be unavailable for higher level tasks in text production throughout the entire elementary school period.

Graphomotor activity thus appears to be an important component of the writing act because it has an impact on student performances in spelling and written composition and because handwriting problems influence the quality of text production. Moreover, various studies have clearly shown the contribution of this component by demonstrating that good spelling and text production abilities are dependent upon the automation of graphomotor skills during elementary school.

In a modern view of writing, it appears important to consider the role of technology in the writing process (Salomon, Kozminsky, & Asaf, 2004). However, Christensen (2009) upholds the importance of handwriting in the development of writing in school, especially for beginner writers. She states two reasons: 1) the ability to produce written texts is necessary to complete different written tasks in school (for example, class work or assessment tasks); 2) the phenomenon of cognitive overload that occurs during

handwriting and interferes with text production in young writers is also observed during keyboarding; in other words, if a young typist allocates a large part of his attention to typing, he doesn't have sufficient attention for dealing with more complex activities of text production (Christensen, 2004; Connelly, Gee & Walsh, 2007). Moreover, Longcamp, Zerbato-Poudou, and Velay (2005) conducted a study to examine letter recognition in two groups of kindergarten writers (one using handwriting and one using typing). They found that letter recognition was better in the handwriting group. This finding shows that whether a child learns to write letters through handwriting or through typing may influence visual recognition of letters, which is important in reading and writing. So, even if more research is needed in the future to explore the link between the digital environment and literacy (Burnett, 2009; Christensen, 2009), recent research argues for the justified place of "writing by hand" within the current context of writing in school.

### *Handwriting Styles*

Previous research leads us to see the importance of handwriting in the development of writing abilities in primary school children and raises pedagogical issues as well as a number of questions. For example, how can we create a pedagogical setting that contributes to this automation? Do the different writing styles taught in primary school have an impact on the development of handwriting and writing in general? Both pedagogical practices and opinions vary on this issue. Indeed, this issue is at the heart of a large controversy in the various countries using the Latin alphabet (Ediger, 2002). Different choices have been made in different settings. For example, in the United States and Canada, manuscript style is introduced initially in Grade 1, followed by cursive style in Grade 2. France favours teaching only cursive handwriting from kindergarten. And in Mexico, manuscript style is generally the only style taught.

To better understand the official orientation for handwriting teaching in primary school in Canada, LeBlanc (2010) studied the official programs of all Canadian provinces. Manuscript style is the first writing style for the majority of official programs (Alberta, North Western Territories, Nunavut, Prince Edward Island, Manitoba, New Brunswick, Nova Scotia, Saskatchewan, and Newfoundland). Cursive style is prescribed as the second style. In Quebec, these two styles are also recommended; but there is no indication on when to change from manuscript to cursive style. For two others provinces (British Columbia and Ontario), no recommendation is made as to official style. In summary, most official programs in Canada prescribe first teaching manuscript style followed by cursive style. Even in the provinces where official recommendations are vague, the above-mentioned practice is still prevalent in most schools.

A recent study (Bara, Morin, Montésinos-Gelet, & Lavoie, in press) explores the declared practices and conceptions about teaching handwriting among 45 teachers (Grade 2) in France and in Quebec (Canada). This study shows that teachers in France and Quebec do not agree on which writing style should be taught in primary school. In the Bara and al. (in press) study, individual interviews with 45 teachers reveal that in-class writing practices did not differ between teachers who taught cursive style and those who taught manuscript style. The majority of teachers (77.8% in Quebec and 94.7% in France)

claimed to propose activities in class about letter formation three times a week (copying letter forms or working alone with exercise books). However, only teachers of cursive style reported giving explicit teaching with verbal instructions.

Some researchers have opted to study handwriting styles and their relationship to certain aspects of writing skills. For example, Graham, Berninger and Weintraub (1998) studied primary school children's writing speed and the legibility of their handwriting in function of the handwriting style used. They met with 600 fourth, fifth and sixth graders and concluded that the writing speed of children who combined manuscript and cursive styles was faster than that of children who only used one style. Children who combine manuscript and cursive handwriting generally do so because they initially adopted the manuscript style and subsequently learned cursive handwriting, which is faster (however, this finding is contradicted by research by Graham et al, 1998).

The successive teaching of two handwriting styles (manuscript followed by cursive) appears to prevail in Quebec, Canada, although the teaching program offers no recommendation to this effect. From a purely motor activity perspective, this approach appears to be reasonable since it involves first adopting a handwriting style reputed to be simpler and then turning to a handwriting style that is acknowledged as being faster. However, questions can be asked about the relevance of submitting children to a dual learning process, especially in the case of children with learning disabilities (Gregg, Coleman, Davis, & Chalk, 2007). Whatever handwriting style is used, there is no doubt that the ability to recognize various forms of the same letter in the Latin alphabet is necessary for children to be able to read in their language. On the other hand, the ability to write using different handwriting styles is not a prerequisite for being understood. Is this dual teaching necessary or does it hinder writers? To answer this question, more studies are needed to examine the relationship between different handwriting styles and handwriting efficacy (Christensen, 2009).

### *Research Objectives*

This study seeks to provide a better understanding of writing development. More precisely, it seeks to document the possible effects of different handwriting styles (Manuscript/cursive, Manuscript or Cursive) on various components of writing. Firstly, and with a view to shedding light on the role of handwriting skills at the beginning of primary school, the present study examines the relationship between graphomotor skills (speed and quality) and writing mastery. Secondly, this research investigates the impacts of three handwriting styles on graphomotor, spelling, and writing skills of children at the beginning of primary school.

### *Methodology*

#### *Population*

715 seven- to eight-year-old French-speaking children (Québec, Canada) participated in this study (average age=7.7; 342 girls and 373 boys). Our sample was divided into three groups according to teaching practices: Manuscript/cursive group (the most common profile in Quebec schools): children who learned manuscript handwriting in Grade 1 and cursive handwriting in Grade 2 (n=288); Manuscript group: children who

have only learned manuscript handwriting since the beginning of primary school (n=163); Cursive group: children who have only learned cursive handwriting since the beginning of primary school (n=264).

### *Tasks*

These children performed three collective tasks at the beginning and the end of Grade 2: writing letters of the alphabet, writing words and writing a text (adapted from Berninger et al., 1997). The three tasks were successively performed in a period of 45 minutes. Specifically, in the first task, the students had to write, in order, as many letters of the alphabet as they could in one minute (Berninger & Rutberg, 1992). The number of properly produced letters gave a score for writing speed (SA). In addition, there was an evaluation of the quality of letter formation based on a variety of criteria (e.g., linearity, spacing between letters, and letter size and form).

The second task, writing words, involved writing a certain number of words in a given amount of time to evaluate the level of automatization for these written words (orthographic-motor integration). Specifically, the children were asked to write 20 one- or two-syllable words presented orally and visually (illustrations and word spelling). Following the 20-word presentation, a sheet with the illustrations of the words was given to the children and they were asked to write as many words as they could in five minutes (the illustrations were provided to help recall). This task allowed us to determine a writing speed score based on the number of words produced within the time limit (SW).

The third task involved producing a text in a given amount of time. After reading a short narrative, the children were asked to produce a written summary. They were given three minutes to think about what they would write and 10 minutes to write the text. An overall score for the quality of the text (OQ) was determined based on presence of events (0 to 6) and presence of characters (0 to 4). The length of production was also evaluated based on the number of words written. A syntax score was also attributed based on sentence structure with respect to meaning and word order. For example, a sentence was judged agrammatical when we observed perturbation in meaning or in word order, or when we observed word omission (for example, a sentence without verb or subject) or presence of pseudowords.

### *Results*

To answer our first research question, we begin by presenting our results with regard to the relationship between graphomotor skills (speed and quality) and mastery of writing. We then look at whether we can observe a differentiated impact of handwriting styles on graphomotor skill (handwriting development), word production and text production.

#### *Relationship Between Graphomotor Skills and Written Production*

Table 1

*Relationship Between Graphomotor Skills (Speed and Quality) and Writing at the End of Grade2 (N=718)*

|         |       | Quality (alphabet task) | Word production | Syntax (text production) | Length of summary | Quality of summary's content |
|---------|-------|-------------------------|-----------------|--------------------------|-------------------|------------------------------|
| Speed   | Corr. | -.114                   | .340***         | .075*                    | .278***           | .300***                      |
|         | sig.  | .002                    | .000            | .045                     | .000              | .000                         |
|         | N     | 718                     | 718             | 709                      | 710               | 709                          |
| Quality | Corr. |                         | .169***         | .124**                   | .056              | .044                         |
|         | sig.  |                         | .000            | .001                     | .133              | .245                         |
|         | N     |                         | 718             | 709                      | 710               | 709                          |

Correlation analysis (Spearman) suggests that writing speed is significantly related to word-writing performance (word production: .340) and the ability to produce a text (syntax: .075, length: .278, and quality of the summary's content: .300). On the other hand, letter quality is only significantly correlated with word production (.169) and syntax (.124). As such, we can say that the greater the writing speed, the better the performances in word and text production.

#### *Graphomotor skills*

This section presents student performances for each of the three handwriting styles with regard to their graphomotor skills (writing speed and quality)

Table 2

*Performances (Mean, Standard Deviation) for Graphomotor Skills (Speed and Quality) for All Subjects (N=718) by Handwriting Style (Manuscript/Cursive, Manuscript, Cursive)*

|                                      | Beginning of the year<br>Mean ( <i>standard deviation</i> ) | End of the year<br>Mean ( <i>standard deviation</i> ) |
|--------------------------------------|---|---|
| Speed<br><b>Manuscript-cursive</b>   | 22.91 (9.11)  | 30.38 (11.78)   |
|                                      | 18.31 (7.33)  | 30.07 (11.17)   |
|                                      | 19.28 (7.56)  | 25.42 (9.24)  |
| Quality<br><b>Manuscript-cursive</b> | 6.96 (1.30)   | 7.12 (1.37)   |
|                                      | 6.86 (1.51)   | 6.95 (1.41)   |
|                                      | 7.12 (1.42)   | 7.19(1.50)  |

#### *1.1 Speed.*

ANCOVA results show that handwriting styles have an effect on speed ( $F(2,711) = 15.634, p < 0.001$ ). Multiple comparison analysis (Bonferroni method) shows that the results differ at the end of the year when beginning of year scores ( $30.38 > 30.07 > 25.42$ ) are taken into account.

For all the handwriting styles, the increase between the beginning and the end of the year is significant ( $p < 0.001$ ). Moreover, the increase is sharper for certain styles ( $F$

(2.712) = 16.191,  $p < 0.001$ ). In this regard, multiple comparison tests show that the difference between the beginning and the end of the year is greater ( $p < 0.05$ ) for the Manuscript style (11.77) than for the Manuscript/cursive and Cursive styles (respectively 7.47 and 6.14).

Despite the progress displayed in all the handwriting styles, our results indicate that by the end of Grade 2, Cursive style displays the weakest scores (25.42). The difference is significant ( $p < 0.001$ ) in comparison to the other styles.

### 1.2 Quality.

ANCOVA results show that handwriting style has no effect on quality ( $F(2, 709) = 0.714$ ,  $p = .490$ ). The increase between the beginning and the end of the year is not significant ( $p < 0.05$ ) for any of the styles and the absence of an increase is similar in all handwriting styles ( $F(2, 710) = 0.234$ ,  $p = .792$ ).

### Word Production

This section presents student performances for each of the three handwriting styles with regard to word production. These performances were measured based on the number of words having the correct spelling in the isolated word task.

Table 3

*Performances (Mean, Standard Deviation) for Word Production for All Subjects (N=718) by Handwriting Style (Manuscript-Cursive, Manuscript or Cursive)*

|                           | Beginning of the year<br>Mean (standard deviation) | End of the year<br>Mean (standard deviation) |
|---------------------------|--|--|
| <b>Manuscript-cursive</b> | 13.51 (5.14)                                       | 15.34 (4.06)                                 |
| <b>Manuscript</b>         | 11.89 (5.42)                                       | 14.73 (4.00)                                 |
| <b>Cursive</b>            | 13.37 (4.98)                                       | 16.25 (3.41)                                 |

For all the styles, the increase between the beginning and the end of the year is significant ( $p < 0.001$ ). Moreover, the increase is sharper for certain handwriting styles ( $F(2, 712) = 7.207$ ,  $p < 0.001$ ). Multiple comparison tests show that the difference between the two points in time is weaker ( $p < 0.05$ ) for the Manuscript/cursive approach (1.83) than for the Manuscript and Cursive styles (respectively 2.85 and 2.89). We can, therefore, see that Manuscript/cursive style subjects display less improvement in word production than Manuscript and Cursive subjects.

We can observe that by the end of the year, Cursive style displays higher scores than Manuscript/cursive and Manuscript styles (respectively  $p < 0.001$  and  $p < 0.05$ ). It should be noted that the difference between Cursive and Manuscript styles could be due to a difference favouring Cursive style at the beginning of the year. In addition, the difference between Cursive and Manuscript/cursive styles at the end of the year is worth noting since these two groups had very similar performances.

### Composition Skills

This section presents student performances for each of the three handwriting styles with regard to composition skills (syntax, length, and content quality). These performances were measured based on recall of a story.

Table 4  
*Performances (Mean, Standard Deviation) for Composition Skills (Syntax, Length, Summary Content) for All Subjects (N=718) by Teaching Approach (Manuscript/Cursive, Manuscript, Cursive)*

|                              | Beginning of the year<br>Mean ( <i>standard deviation</i> ) | End of the year<br>Mean ( <i>standard deviation</i> ) |
|------------------------------|---|---|
| Syntax                       |   |   |
| <b>Manuscript-cursive</b>    | 3.29 (1.43)   | 3.24 (1.22)   |
| <b>Manuscript</b>            | 3.02 (1.41)   | 2.94 (1.37)   |
| <b>Cursive</b>               | 3.32 (1.40)   | 3.59 (1.06)   |
| Length                       |   |   |
| <b>Manuscript-cursive</b>    | 41.49 (24.29)   | 55.78 (31.47)   |
| <b>Manuscript</b>            | 35.17 (22.30)   | 48.91 (29.00)   |
| <b>Cursive</b>               | 37.89 (22.57)   | 51.43 (27.56)   |
| Quality of summary's content |   |   |
| <b>Manuscript-cursive</b>    | 4.39 (1.74)   | 4.85 (2.01)   |
| <b>Manuscript</b>            | 3.89 (1.71)   | 4.65 (1.78)   |
| <b>Cursive</b>               | 4.14 (1.48)   | 4.73 (1.85)   |

### *1.1 Syntax.*

Our results indicate a progression only for Cursive style and this progression is significant ( $p < 0.01$ ). The performances displayed by the subjects in Manuscript/cursive and Manuscript styles did not improve between the beginning and the end of Grade two.

Moreover, at the end of the year, Cursive style subjects displayed significantly higher scores than those of Manuscript style ( $p < 0.001$ ) and Manuscript/cursive style ( $p < 0.01$ ).

### *1.2 Length.*

For all approaches, the increase between the beginning and the end of the year is significant ( $p < 0.001$ ). However, the increase is not greater from one style to the next ( $F(2,703) = 0.062$ ,  $p = .940$ ). ANCOVA results show that the style has no effect on the number of words produced ( $F(2,702) = 0.484$ ,  $p = .617$ ). The texts get longer over the school year regardless of handwriting style.

### *1.3 Quality of summary's content.*

For all handwriting styles, the increase over the school year is significant ( $p < 0.001$ ). However, the increase is not greater from one style to the next ( $F(2,701) = 1.168$ ,  $p = .312$ ). ANCOVA results show that the handwriting style has no effect on the quality of the summary ( $F(2,700) = 0.023$ ,  $p = .978$ ).

## *Discussion*

### *Graphomotor Skills and Written Production*

In line with other studies, we looked at writing speed and the quality of letter formation to examine students' graphomotor skills. Our results lead us first to note a link between graphomotor skills and writing skills. This observed relationship supports the

findings of other studies (Berninger et al., 2002; Fayol & Miret, 2005; Graham et al., 1997; Medwell et al., 2007) that show the contribution of these skills to writing skills. Our results add to previous research by showing that writing speed has more of an impact on word production and composition performance than the quality of letter formation. As such, the faster the writing speed, the better the spelling and text performance. This observation concurs with Graham and Weintraub (1996) who note that when writing speed is not fast enough, children forget their ideas before they can write them, which, in turn, has a negative impact on text production. By writing faster, children thus appear to automate the graphomotor aspect of spelling information, which is a crucial element in the development of writing skills (Berninger & Swanson, 1994). Overall, our results confirm the cognitive view that “writing quality depends, at least partially, on the writer’s skill in managing the writing processes” (Beauvais, Olive, & Passerault<sup>1</sup>, 2011, p.425)

We also note the students’ ability to develop their writing speed because of the significant differences observed between the beginning and the end of the year. These results are not particularly surprising since they show that, with writing practice over the course of the year, the students gain experience and increase their writing speed. Improved writing speed enables them to spell better and to write better texts. This observation concurs with studies showing the link between handwriting, word spelling, and text quality (Fayol & Miret, 2005; Graham et al. 1997; Jones & Christensen, 1999).

We did not observe a significant increase in the quality of letter formation over the course of the year; it remained stable. This result might seem surprising. Since young writers have generally not automated letter formation, one could assume that the various writing experiences throughout the year would lead to an improvement in the quality of letter formation. However, it was not the case in our study. We could hypothesize that this aspect of writing does not receive much attention in class and as such, pedagogical factors had an impact on our results, particularly with regard to certain elements of teaching handwriting (frequency, direct and explicit nature). When we return to the declared practices of the teachers in this study, in the interview before the experimentation, half of the teachers in all groups (Manuscript/cursive, Manuscript or Cursive) did not declare teaching handwriting in an explicit context in class. Yet recent work in this area indicates that writing can only improve with at least a minimum of teaching (direct and explicit) and frequent practice (Chartrel & Vinter, 2004; Graham, 2010; Schlagal, 2007), especially in the early moments of schooling. However, if quality is not worked on, practice will ensure a certain degree of legibility though it will not guarantee progress. For this pedagogical point, other research will be needed to study the link between the nature of teaching practices in handwriting and the development of writing skills in primary school.

Our results with regard to graphomotor skills show that while writing speed improves, quality remains the same. These results strike us as interesting, in as much as they reveal that speed does not increase to the detriment of writing quality. Even though the children write faster, this does not have a negative impact on legibility. This observation does not concur with the results of studies with students in higher grades

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<sup>1</sup> This research led by Beauvais & al. (2011) shows the link between how writers (students at university) manage the cognitive activities during production and the quality of text.

(e.g., Hamstra-Bletz & Blöte, 1993). Indeed, they note that from mid-primary school on, students pay less attention to handwriting and that their letter formation is not as good and their writing is less legible.

### *Graphomotor Skills and Writing Styles*

Students who learned cursive style wrote less rapidly than students in the other styles. This observation concurs with other studies and suggests that cursive style weakens writing speed. However, we observed that Cursive students displayed more progress in word production than Manuscript/Cursive and Manuscript students and that the word production performances of Manuscript/Cursive students were significantly weaker than those observed in the other groups. As other studies have shown (e.g., Berninger, Abbott et al., 2002), it would appear that the graphomotor component influences word production management, especially for learning writers faced with learning another handwriting style (cursive following manuscript).

We observed that the Cursive style children also progress or progress more than the other groups (especially in comparison to the Manuscript/Cursive group) in the areas of word production and syntax, two important components of writing. The difference between the Cursive style and the two other styles could be due to a variety of factors. However, when we examined the nature of handwriting practices in the Cursive group (Bara et al., in press), we did not find marked difference between the groups. The only point of difference for the Cursive group was to integrate verbal information in handwriting teaching. It may be the explicit character of this practice that explains this difference; but this hypothesis will be confirmed with future research (Chartrel & Vinter, 2004; Graham, 2010). As mentioned by Christensen (2009), the results of previous research is not clear on the role of verbal mediation, even if teachers' verbal instructions seem to be useful for young writers (Graham & Weintraud, 1996). A linguistic factor may also explain this difference for the Cursive group. When students write in cursive, the very nature of this style allows them to memorize and recall the word unit more easily, as opposed to manuscript style---all letters of one word are tied together. According to Abbott, Berninger, and Fayol (2010) who find a strong relationship between word performance and text production, new research should explore the impact of integrated instructional programs on writing abilities (integrating word instruction with composition instruction or integrating word instruction with handwriting instruction). Based on our study, we agree with Abbott et al. (2010) that "cross-cultural studies should compare handwriting's development and its longitudinal relationships to those of other writing skills in countries that systematically vary in the consistency of handwriting instruction provided across the grades" (p. 294).

In this discussion, it is important to note the fact that the standard-deviations are important in size for both speed and quality, regardless of handwriting styles (Manuscript/cursive, Manuscript or Cursive). This observation indicates that there is a very broad heterogeneity among students with regard to this aspect of writing. In pedagogical terms, this heterogeneity calls for teaching styles that are likely to offer a better differentiation. This proposal remains to be explored in subsequent research.

### Conclusion

In line with other studies, generally, our data tend to show that writing skills improve in terms of speed (the students write faster), spelling (words are written better), and text production (they produce longer texts, the syntax is better, and the summary content is of better quality). However, writing quality remains the same over the course of the year. When we take the handwriting style into account, we can observe that Manuscript/cursive style children do not perform as well in spelling as the children in the other groups. This finding lends support to the idea that the development of writing skills in primary school is better served by teaching a single handwriting style (cursive or manuscript) to avoid dual learning. In this regard, a trend emerged for Cursive style students who were the only ones who showed an improvement in syntax. Moreover, the advantage of this style can also be seen in improved word production by the end of the year.

Our study raises a certain number of pedagogical issues. Firstly, there is a need to think about the role of graphomotor skills in the development of writing skills and to assign more importance to them in the classroom. Secondly, it is important to support the educational community to ensure that decisions are made to encourage the automation of handwriting at the beginning of schooling (Tucha, Tucha, & Lange, 2008). To this end, direct and explicit teaching of letter formation and frequent practice opportunities are essential components (Graham, 2010). Lastly, further thinking is needed about the pertinence of learning two handwriting styles. In a larger context of technological advances within education, this reflection needs to consider not only the role of primary school in the development of fluency in writing, but also its essential role in the introduction of various technological tools in different contexts of communication. This consideration is important in the teaching of writing. We must ask ourselves: Is it more important to teach two styles of handwriting or to teach one style of handwriting and a “digital style” of communication? To answer these questions, more research is needed.

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### *Acknowledgements*

This research was supported by a grant from the Social Sciences and Humanities Research Council (Canada).