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Description and interactions of informative text structure knowledge and skills of French-speaking Grade 6 students

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Abstract

This study was conducted in the province of Québec, Canada, among French-speaking Grade 6 students ($n = 175$) in the context of a school curriculum that does not clearly address text structure and main idea instruction. It aims to understand whether these students can identify informative text structures and main ideas in isolated paragraphs, comprehend main ideas and text structure in an informative text, and write a short structured informative text. It also describes relationships between these knowledge and skills coming from different reading and writing tasks. Three assessments relative to informative text structures were administered: a multiple-choice test on text structure knowledge and identification of main ideas, a reading comprehension test, and a short writing task. Results revealed that students performed better in the multiple-choice assessment compared to other assessments. Correlations between variables stemming from the three assessments were significant but their effect sizes were low to moderate. A hypothesized model was investigated via a path analysis suggesting that structure knowledge and main idea identification influence reading comprehension, which then influence writing.

Keywords Text structure · Reading · Writing · Informative texts · Main idea

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Introduction

Expository texts typically contain new or unfamiliar knowledge, and this knowledge is organized according to structures that are not limited to written expression. These structures reflect universal cognitive processes (Dickson, 1999; Williams, 2005) essential in understanding, analyzing, describing, and creating information, and upon which effective informative writing depends. According to Meyer (1985), five structures are predominantly used to describe, compare, sequence ideas, explain a causal relationship, and present a problem–solution situation. Around Grade 4, expository texts become more prevalent, and students are required to master these structures to convey their information (Wijekumar et al., 2017).

Hence, mastering the way in which ideas are articulated and supported within text structures to clearly express a phenomenon, an experience, or a fact is of great value, since access to information and knowledge gives access to academic and professional success, indeed to the power of self-improvement (Graham & Perin, 2007; Williams & Pao, 2013). In this sense, in school and professional settings, readers must integrate new information from texts, and to do so effectively they must understand how these texts are organized.

Learning how to use text structure of expository texts appears to be a difficult academic task for elementary and secondary school readers (Reynolds & Perin, 2009) since text organization is often complex and multiple (Mason & Hedin, 2011). Teaching structure awareness is, in this sense, considered essential in fostering text comprehension among students of various ages (Englert & Hiebert, 1984; Hebert, Bohaty, Nelson, & Brown, 2016; Pearson & Duke, 2002; Ray & Meyer, 2011; Sweet & Snow, 2003). A recent meta-analysis by Graham, McKeown, Kiuhara, and Harris (2012) revealed that such teaching also has a positive effect on the quality of student writing, which is an important predictor of academic success and a basic requirement for participation in civic life and the global economy (Graham & Perin, 2007). Consequently, teaching text structure to foster reading comprehension and writing skills is now recommended by many researchers conducting studies with English-speaking populations. However, while previous studies have shown that teaching text structures positively influences reading comprehension or writing production among elementary students (see also Armbruster, Anderson, & Ostertag, 1987; Englert & Thomas, 1987; Raphael & Kirschner, 1985; Taylor & Beach, 1984), it would be useful to better understand how students use these structure when instruction is unclear or informal. With these same students, it would also be interesting to understand the relationships between text structure knowledge, reading comprehension, and writing production. Hence, much remains unknown about how students connect their knowledge and skills related to text structure concurrently in reading and writing. While both reading comprehension and writing production have been topics of interest for researchers and practitioners for many years, research on the reading-writing connection has not received the same level of attention (Costa, Edwards, & Hooper, 2016; Fitzgerald & Shanahan, 2000; Parodi, 2007). This study is a step in these directions.

Reading and writing connections

The connection between reading and writing is complex since this relationship changes over time as students develop new skills and face more demanding tasks (Langer, 1986). Either can be more difficult than the other, depending on the reading or writing assignment. For example, writing may be more complex because it relies on the students' skills to select and structure information from a large repertoire of written resources and then coherently support these ideas in sentences and paragraphs (Grabe & Kaplan, 2014). On the other hand, Langer (1986) has argued that readers may be constrained by the text's lexicon, macrostructure, and themes, and writers may have fewer constraints by drawing from their own knowledge. In her study conducted among 67 students from Grades 3, 6, and 9, she analyzed their background knowledge and the monitoring and reasoning strategies they used when reading and writing stories and reports. Her results showed that reading comprehension and writing shared similar cognitive processes in terms of reasoning and meaning construction, but strong differences persisted in the frequency and nature of their use. For instance, there was stronger focus on surface-level text issues such as syntax and vocabulary when writing, compared to reading.

Abbott, Berninger, and Fayol (2010) went further by modeling the longitudinal development of reading and writing (considered separate fields) across different levels of language in a study involving over 240 students from Grades 1 to 7. Their results revealed that text comprehension had significant longitudinal paths to text composition over a longer developmental period (Grades 2–6) than did text composition to text comprehension (Grades 3–5). Reciprocal developmental paths for text levels across reading and writing from Grades 3 to 5 were small in magnitude but increased through the development period. The researchers also concluded that it was easier for developing writers to make connections (a) across levels of language within the same field and (b) across fields within the same level of language.

Results from another recent study (Ahmed, Wagner, & Lopez, 2014) used latent change models and found that reading-to-writing models were superior to writing-to-reading and bidirectional models, especially for word and text levels. The researchers also concluded that children apply their reading knowledge to their writing across all levels of language, but this developmental pattern is not reversible, except for sentences, where students seem to apply their written knowledge to improve their reading.

In sum, text reading and writing share common knowledge sources related to higher-level cognitive skills, but students may not automatically or easily use this share knowledge between different literacy activities. While learning what is mutual in reading and writing can have cross-modal benefits (see Graham & Hebert, 2011), how do primary grade students articulate knowledge and skills, in particular, at the macrostructural level, i.e., where text structures are central, across various reading and writing tasks?

Macrostructure in reading and writing

Reading and writing a text involve using its macrostructure, which consists in the organization of the most relevant propositions forming the gist of the text. Some models of reading (Irwin, 2006; Van Dijk & Kintsch, 1983) and writing (Bereiter & Scardamalia, 1987; Hayes & Flower, 1980) describe macrostructure as the level at which the main ideas are organized and ordered in a coherent sequence, making text structure and main ideas closely related (Reynolds & Perin, 2009).

Van Dijk and Kintsch (1983) thus describe macrostructures as hierarchies of propositions subsuming the different sections of a text. The logical sequence of propositions inside each paragraph is connected to a higher-level propositional sequence, creating unity between local meaning and global meaning in a text. According to Kintsch (2013), the sentence that is the most similar to all the other sentences in a paragraph, and most likely central it, is called the macroproposition. Readers cannot remember all the sentences in a text, but they can more easily remember the macroproposition, which is helpful for information recall and reuse. The macroproposition is sometimes not explicitly stated in a sentence, however, so understanding it relies on inference skills, the ability to extract the most important idea in a passage, and knowledge about the text subject, as well as text coherence and organization (Kintsch, 2013). While readers can develop strategies to predict content and organization in a text, understanding its structure and main ideas is nonetheless more likely to arise through and after reading.

In contrast, some models explain how writers efficiently use knowledge of text structure during the very first stages of writing, i.e., at the planning phase (Hayes & Flower, 1980), or more specifically during the subcomponent that refers to organizing ideas (Berninger, Abbott, Whitaker, Sylvester, & Nolen, 1995). However, beginning writers can sometimes generate ideas while having difficulties planning and organizing them in a coherent sequence at the micro or macro level. Their ideas are scattered, disconnected, and unsupported. As such, Bereiter and Scardamalia (1987) distinguish a knowledge-telling approach, in which content is generated through association by novice writers, from a knowledge-transforming approach, in which expert writers use sophisticated processes to express content while having rhetorical goals and fine organizational skills.

Similarly, Berninger and Swanson (1994) proposed a writing development model throughout the elementary grades in which word-level generation emerges first, followed by sentence-level and text-level generation. Hence, organizing ideas from the start does not seem to be natural among novice writers. Not surprisingly, strategies taught at the planning level of the text have a positive effect on students' writing achievement (Graham, 2006). In sum, readers and writers may use text structures at different moments, depending on the task, and these structures are essential in organizing ideas for text comprehension and production. Knowing how writers structure a text may give readers valuable information on how to approach the text (Hebert, Bohaty, Nelson, & Brown, 2016), in the same way that writers who know how to structure a text can clearly communicate their ideas and intentions to readers.

Although Meyer's (1985) five informative text structures share the same function of organizing ideas, they seem to differ in their level of complexity. Studies,

however, reveal mixed findings and do not converge on a single scale for structure complexity. Meyer and Freedle (1984) found that more organized structures such as comparison and causation were more easily recalled among adults compared to descriptive structures. A study by Richgels, McGee, Lomax, and Sheard (1987) indicated that Grade 6 students showed better reading skills with compare/contrast structures, while causal structures were the most challenging. However, a study by Smith and Hahn (1989) found that compare/contrast structures were more difficult than causal and sequence structures among elementary and middle school students. Are these differences between structure complexities in reading also reflected in writing? Favart and Passerault (1999) reported that, depending on their knowledge of discourse and their age, young French-speaking writers used various signal words to establish relationships between ideas, ranging from confusing to explicit. While less experienced writers consistently make use of the connector "and" to mark sequence, cause, addition, or opposition (Mouchon, Fayol, & Gombert, 1991), more experienced writers vary signal words as they develop knowledge about language and discourse. This may be consistent with their transforming-knowledge writing skills (Bereiter & Scardamalia, 1987), which provide clear relations between ideas instead of simply adding them. Nevertheless, it is not clear whether these experienced writers also understand text structure and main ideas better than novice readers do.

Our study was conducted in a French-language setting in Québec, Canada. While teaching different text genres is promoted in Québec's elementary school curriculum, there is no specification as to the typologies or teaching approaches to adopt, since this material is incorporated into broader reading and writing competencies to develop. As a result, the five informative text structures (Meyer, 1985) are not explicitly stated in the curriculum. In a study (Martel, Lévesque, & Aubin-Horth, 2012) conducted among 413 primary grade teachers across the province regarding their goals and teaching practices in reading, more than 50% of the participants declared that text analysis was not practiced frequently in their classrooms. Moreover, half of the surveyed teachers admitted to only moderately targeting reading skills and strategies for knowledge acquisition.

In this context, and before experimenting with new approaches to foster informative text comprehension and production, it is essential to study the knowledge and skills of these primary grade students regarding text structure. One could suppose that students who have not received specific teaching on informative text structures in reading and writing would have limited knowledge about these structures. One could also suppose that these students hardly rely on text structures to organize information while reading and writing. On the opposite, in Grade 6, these students have already experienced many opportunities to read and write in science, for example, and might have develop skills in organizing information. It is also unclear whether the declarative knowledge about structures that these students may nevertheless have contributes to their reading and writing performance. Before carefully selecting contents and instructional approaches adapted for these young readers and writers, our study therefore addresses the following questions:

1. Can students identify informative text structures and main ideas when reading isolated paragraphs?
2. Can they understand main ideas and text structure of an entire informative text?
3. Can they write a short, structured informative text?
4. Are the knowledge and skills from different reading and writing tasks correlated?
5. Does structure knowledge and main idea identification influence corresponding reading comprehension skills, which then influence writing skills?

By examining these questions, this study will bring a clearer understanding about these students' knowledge and skills, upon which it would be possible to build or consolidate learnings. In that sense, this study also has the potential to inform other population having either an unclear curriculum or insufficient instructional practices about text structures and informative text during the primary grades.

Method

Participants

The study included 175 participants in Grade 6. Among these, 71 were tested in September 2016 while 104 were tested in September 2017. All attended French-language public schools located in middle-class neighborhoods near Montréal, Canada. Before the participants were recruited, it was confirmed by three educational advisers who had worked for more than 10 years with these schools that no specific teaching of the five informative text structures had occurred in the classrooms. Students with disabilities and special needs participated in the study, but their data are not presented in this article since they will be examined in another publication. Grade 6 was selected since students are required to read more informative texts as of Grade 4 and because it is the last grade before secondary school, where understanding such texts is even more crucial in all disciplines.

Instruments and procedures

The study complied with all regulations regarding research involving human participants, as required by the university ethics committee and the participating school boards. Three assessments relative to informative text structures were administered between the second and fourth week of September 2016 and September 2017 to consenting participants: a multiple-choice (MC) test on text structure knowledge and identification of main ideas, a reading comprehension test (CT), and a short writing task (WT).

Text structure knowledge and identification of main ideas

The multiple-choice (MC) test asked students to identity text structures and main ideas in short paragraphs. It aimed to answer the first question of the study. The

group-administered assessment was adapted and translated from previous work on text structure in an English-speaking population (Bohaty, 2015). The test assessed the students' knowledge of Meyer's (1985) five expository text structures. Ten isolated short paragraphs were presented, two for each structure. Each paragraph was followed by a list of the five structures to choose from. In her study, Bohaty used this assessment as a proximal measure to evaluate the effects of a text structure instruction.

In the present study, four of these paragraphs were selected and required students to identify the main ideas among four choices: main idea, secondary idea, subject, and miscellaneous. These paragraphs were descriptive and cause–effect, which might have different levels of complexity (see Meyer & Freedle, 1984; Richgels et al., 1987). All items were scored as correct (1) or incorrect (0), for a total of 10 points for structure items and 4 points for main idea items. Cronbach's alpha coefficient revealed low internal consistency between structure items (0.58) and main idea items (0.31) for this instrument. This may recall how specific knowledge and cognitive load each structure demands. Appendix 1 presents a sample of this test.

Reading comprehension of an informative text

The purpose of the reading comprehension test (CT) was to answer Question 2. This test was also group-administered and demanded short written responses. It required students to read an entire text about "wild animal poaching" and answer open-ended questions about the main idea and text structure of certain paragraphs in order to assess these two interrelated macrostructure skills. It is similar to the type of tasks students encounter during the school year. The text had 700 words and a readability corresponding to Grade 6, as analyzed with the software LISI (Mesnager, 2002). Students were asked the following questions:

1. *Look for Paragraph X. What is the main idea of this paragraph?* The targeted paragraph had an explicit main idea clearly stated by the author in one sentence.
2. *Now, look for Paragraph Y. What is the main idea of this paragraph?* The targeted paragraph had an implicit main idea and therefore had to be extracted.
3. *Find the causes and effects of (the phenomena) using the information in the text*. This item required students to identify the causes and effects of phenomena described in various parts of the text. To do this correctly, students had to understand the organization of ideas within paragraphs. Questions 1 and 2 were marked 1 or 0. Question 3 was marked out of 6 since three causes and three effects had to be reported. Appendix 2 shows a translated sample of this task.

Since there is no such reading comprehension standardized test in French for these grades to evaluate text structure and main ideas (Elbro, Oakhill, Megherbi, & Seigneuric, 2017), this test was previously developed as a part of a larger research program. It originally contained 13 items, including assessments for literal comprehension and causal, anaphorical, and lexical inference generation. The test was created and validated with 223 French-Canadian students (Turcotte & Talbot, 2017)

using the Rasch model ([1980]/1960) to identify each item level of complexity and assess the probability of readers of different abilities to correctly answer these items. The internal consistency of the test was determined with a Cronbach's alpha of 0.74. The item characteristic curves and test information function showed that Question 1 had a moderate level of difficulty, while Questions 2 and 3 identified more skilled readers. In the original test, these items were more difficult to answer correctly compared to literal comprehension items. Analysis also showed that the overall test was useful in assessing students with average skills, but more specifically for those with skill levels between -2.5 and 1.

Informative writing task

The writing task (WT) was used to collect data to answer Question 3. It consisted in asking students to write two paragraphs about the Canadian lynx, a well-known animal for this population. This topic was also selected because, as early as Grade 2, students are required to learn about domestic and wild animals, more precisely about their diet, anatomy, and adaptation to their environment and climate. Nevertheless, to stimulate background knowledge, six pictures of the animal were first presented, and then an informative video from the Canadian Wildlife Federation was projected twice. The video was designed for elementary students and lasted 2 min and 40 s. Students were asked to take notes during the presentation of the pictures and video. They had 50 min to plan and write their paragraphs on a lined sheet of paper. The following instructions were given: "Write a two-paragraph text about the lynx for a children's science magazine. Focus on your ideas and sentences rather than on spelling because children's magazines usually have editors to correct spelling mistakes." Again, this task was similar to typical writing activities in Grade 6 classrooms.

Two graduate students with expertise in literacy learning and assessment scored the written texts. Forty percent of the texts were marked by both raters, with an inter-judge agreement of 93%. The texts were scored out of 3 points. Since structure and main idea are closely related in the macrostructure (Reynolds & Perin, 2009), a writing score combined structure and main idea of the written paragraphs.

A perfect score (3) was given when each paragraph had a clear main structure and clear main idea. Such paragraphs included details and examples without extraneous elements. For example, if one paragraph described the lynx's physical aspects, no details about its habitat would be inserted. Appendix 3 presents a sample student text (translated). A score of 2 was obtained when only one paragraph was well structured with a main idea, 1 when the paragraphs combined heterogeneous aspects without main ideas, and 0 when the main ideas and structures were absent or unclear.

Analysis

Data was entered using the statistical software SPSS to conduct analyses for each grade and to answer the first three questions of the study. To answer the fourth question, a Pearson correlation analysis was conducted to examine relationships between tasks regarding variables related to text structure. For the fifth question, a path

Table 1 Factorial structure of MC main idea

Item	Loading
MCitem1	.292
MCitem2	.299
MCitem3	.309
MCitem4	.656

All loadings were significant below .003

Table 2 Factorial structure of MC structure

Item	Loading
MCstruc1	.173
MCstruc3	.613
MCstruc4	.308
MCstruc5	.443
MCstruc6	.577
MCstruc7	.566
MCstruc8	.706
MCstruc9	.578
MCstruc10	.584

MCstruc2 was removed. All loadings were significant below .002

analysis was conducted to estimate the magnitude and significance of hypothesized causal connections among variables (Stage, Carter, & Nora, 2004). For this analysis, we used the structural equation-modeling program Mplus 6.12 (Muthén & Muthén, 1998–2011). All variables from the three assessments were treated as categorical variables.

Results

Prior to the means, correlation, and path analyses, a factor analysis was conducted to create latent variables relative to the multiple-choice assessment (MC). A first variable was created with the 10 text-structure items (MC structure), and a second variable was created with the 4 main-idea items (MC main idea). Analysis was conducted in Mplus using the WLSMW estimator. After a preliminary analysis, the second item inside the text-structure variable was removed, since it was not significantly related to its corresponding latent variable. No other modification was made. The factorial structures are presented in Table 1 for MC main idea and Table 2 for MC structure knowledge. In both cases, the latent variables are adequately described (see Tables 1, 2).

Table 3 presents mean scores for each variable derived from the three tasks. This data answer the first three questions of the study. In Table 3, mean scores indicate that students could identify main ideas in isolated paragraphs with a multiple-choice

Table 3 Mean scores of variables for Grade 6 students ($n=175$)

Variable	M	SD
A. Multiple choice (MC): main idea (/4)	2.3	1.1
B. Multiple choice (MC): text structure (/9)	5.8	2.0
C. Comprehension test (CT): main idea (/2)	0.7	0.7
D. Comprehension test (CT): text structure (/6)	3.0	2.0
E. Writing task (WT): text structure and main idea (/3)	1.5	0.7

task more easily than in the reading comprehension task involving a whole text and open-ended questions. Comprehension of text structure had similar results between tasks. Hence, understanding and stating the main idea and text structure of a complete text seemed complex for students, since mean scores for the comprehension test (CT) were rather low. As for writing, students obtained an average of 1.5 out of 3 points, which could mean that some students had difficulties. Indeed, descriptive data reveals that only 21 students (12%) had a perfect score of 3, 48 students (27%) had a score of 2 because they wrote only one well-structured paragraph, 103 students (59%) had a score of 1 because they wrote heterogeneous paragraphs, and 3 students (2%) had a score of 0 for their written production. While 8% of paragraph structures were marked as unclear, most of the paragraphs had a dominant descriptive structure (84%), followed by comparative (7%), sequence (3), cause–effect (1%) and problem–solution (1%) structures.

Table 4 shows correlations between variables related to the three tasks, which is relevant to answering the fourth question of the study. Table 4 shows significant correlations between all variables, although weak or moderate. The main idea identification variable (MC main idea) was weakly correlated with all other variables; however, it was moderately correlated with the variable derived from the same task, i.e., knowledge of these structures (MC structure). Writing (WT structure and main idea) and understanding text structure (CT structure) and main ideas (CT main idea) all moderately correlated with the structure knowledge variable derived from the multiple-choice task (MC structure).

In the light of these results and previous studies on the reading-writing connection (Abbott et al., 2010; Ahmed et al., 2014), a path analysis was conducted to analyze possible influences between variables. Two hypotheses were formulated. First,

Table 4 Correlations between variables from the multiple-choice test (MC), comprehension test (CT), and writing task (WT)

| Variable	A	B	C	D	E
A. MC main idea	1	0.424**	0.227**	0.181*	0.176*
B. MC structure		1	0.404**	0.362**	0.274**
C. CT main idea			1	0.251**	0.260**
D. CT structure				1	0.243**
E. WT structure and main idea					1

**Correlation is significant at $p<0.01$ (two-tailed); *correlation is significant at $p<0.05$ (two-tailed)

structure knowledge and main idea identification, as assessed by the multiple-choice task (MC), may affect reading comprehension (CT structure and CT main idea). In turn, these two variables may affect the writing score (WT).

Figure 1 presents the investigated model. The analysis shows that the data were well approximated by the model. The model fits were very good, $\chi^2(103) = 123.286$, $p = .084$, RMSEA $= 0.033$, CFI $= 0.949$, and TLI $= 0.941$, which is consistent with usual recommendations (Hu & Bentler, 1999). The results show each of the reading comprehension variables (CT) was related to its corresponding factor from the multiple-choice test, $\beta = .603$, $p < .001$ and $\beta = .460$, $p < .001$. Hence, structure knowledge assessed by the multiple-choice (MC structure) contributes to structure comprehension in the whole text task (CT structure). Writing score was significantly related to CT structure, $\beta = .244$, $p < .001$, and CT main idea, $\beta = .293$, $p < .001$, the two variables stemming from the reading comprehension task. The correlations between variables were moderate to strong between reading tasks (MC and CT) and weak to moderate between reading comprehension test and writing (CT and WT).

Discussion

Our study presents descriptive data regarding text structure knowledge and skills in reading and writing, as well as main idea identification, comprehension, and production among 175 Grade 6 students in a context where teachers have few indications on how to teach text structures and don't sufficiently foster texts feature analysis and learning from informative texts (Martel et al., 2012). Correlations and path analysis were carried out between variables from three different reading and writing tasks.
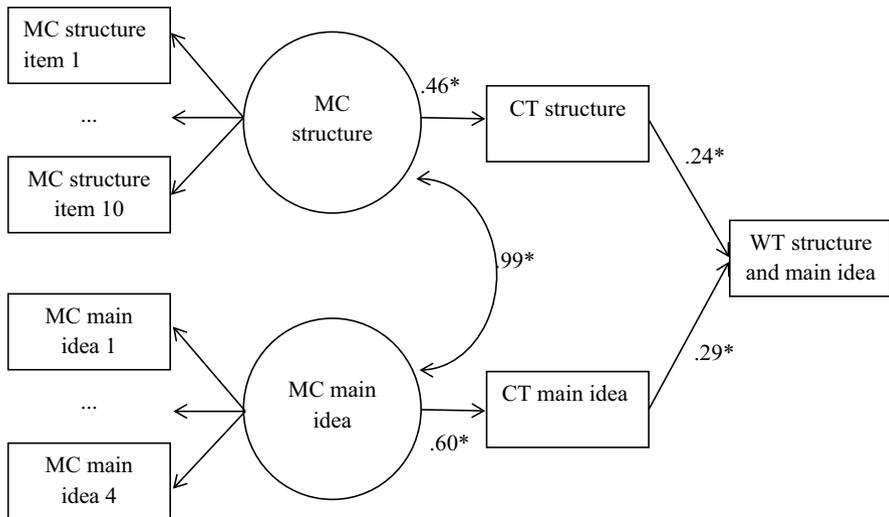
Fig. 1 Path analysis of the model. Circles represent latent variables, and rectangles represent measured variables. Mc structure item 2 was removed. Estimations are standardized coefficients. Loadings of latent variables are presented in Tables 1 and 2. *$p < .001$

Three questions were asked about students' text structure knowledge and skills in reading and writing.

The first question of the study aimed to examine whether participating students had knowledge about the five informative text structures. It also aimed to examine whether the students had abilities in identifying main ideas. Since the students correctly identified an average of 5–6 informative structures out of 9 in a reading assessment presenting isolated paragraphs and multiple answers, they may have had knowledge of these structures to a certain degree. Similarly, they could identify an average of 2.3 main ideas out of 4. The second question focused on the students' ability to understand main ideas and text structure when reading a complete informative text with open-ended questions. The students had difficulty identifying and reporting the main ideas of two paragraphs, as revealed by low mean scores (0.7 out of 2 points). As for reporting text information based on structure, the students were able to score an average of 3 out of 6 points. Their use of text structure to understand the gist of an informative text was therefore also questionable. The third question aimed to address their informative writing skills, more specifically in relation to text structure and main ideas. Few students (21/175) obtained a perfect score for this variable, indicating that most of the participants may have difficulty structuring ideas within two paragraphs when asked to write a short informative text on a well-known animal. Moreover, most of the written paragraphs (84%) had a descriptive structure, with a majority having heterogeneous and disconnected ideas, which is characteristic to novice writer (Bereiter & Scardamalia, 1987). These results show that without clear instruction being provided, students may have partially learned about text structures and main ideas. Hence, although they can identify some text structures and main ideas in a multiple-choice test, it seems much harder for them to use structures and main ideas in other tasks.

Thus, the fourth question aimed to explore correlations of text structure knowledge and skills between reading and writing tasks. Although there were correlations between all variables, their effect sizes were low to moderate. While students showed some knowledge and skills related to informative text structure, correlation between reading and writing tasks appeared weak. In light of this data, it would seem that text structure knowledge and skills implied in both reading and writing may develop at a different pace among these students depending on the task. Low to moderate correlations also suggest that for some students, knowledge and skills used in certain tasks are not automatically transferred to other tasks. As such, moderate correlations appeared only between variables from the reading assessments.

Could it be that some students can intuitively organize their own writing ideas effectively while having difficulty understanding main ideas and structures from the work of other writers? Langer (1986) found that writing could be less constraining than reading. Ahmed et al. (2014) also showed that children do not seem to apply their writing knowledge to their reading at the macrostructure level. Another explanation could be related to declarative knowledge regarding structures. The multiple-choice test was group-administered and students did not have the possibility of discussing or justifying their choices. If, for instance, a student was able to identify a sequence without knowing what the word "sequence" meant, he or she could simply have checked another answer.

Likewise, low effect correlations between measures in reading and writing could also indicate that some students who were able to discern main ideas and text structures when reading were not necessarily able to write well-structured paragraphs. Very few students showed the ability to structure information correctly in the writing task, even if they were asked to focus on ideas and sentences. This is consistent with the Berninger and Swanson (1994) model, in which structuring ideas would be the last stage of writing development. These students may be trapped in the knowledge-telling phase, in which content is generated through association (Bereiter & Scardamalia, 1987) rather than sophisticated processes to express content while having rhetorical goals and fine organizational skills. Overall, these correlations help in understanding that articulating knowledge and skills related to informative text structure in reading and writing appears to be difficult for this student population, like many other elementary and secondary school students (Reynolds & Perin, 2009).

A path analysis was conducted to examine the hypothesis of directional influences among these variables. The analysis shows that text structure and main idea, as assessed with the multiple-choice task, contributes to the prediction of corresponding reading comprehension skills (main idea and text structure). The path analysis also shows that reading comprehension variables contributed to the writing variable. These results are consistent with other studies interested in various levels of knowledge (e.g., word, sentence, text) in reading and writing. In a study by Abbott et al. (2010), comprehension had significant longitudinal paths to text composition over a long developmental period (Grades 2–6). Ahmed et al. (2014), who used latent change models, also found that reading-to-writing models were superior to writing-to-reading and bidirectional models. In sum, although correlations are weak to moderate between variables stemming from three different tasks in reading and writing, the path analysis suggests that knowledge and skills that students develop in some isolated tasks may contribute, to a certain degree, to performance in other reading tasks. The path analysis also indicates that skills relative to structures and main ideas in a reading comprehension task may help predicting the writing skills of structured paragraphs. Nevertheless, the way in which students master knowledge and skills in relation to text structures and main ideas, in order to use them adequately and concurrently in reading and writing, requires further investigation, especially within a developmental approach.

Limits and implications

The assessments used in this study were research-designed to target specific knowledge and skills. On the one hand, these results may not inform about students' general competence in writing or their performance relative to a norm. On the other hand, we avoided clouding the issue. A global comprehension score would have poorly informed about students' knowledge and skills regarding text structure. According to Fitzgerald (2013), "while measurement experts continue to strive toward improved and psychometrically valid assessments, it is possible for researchers to take first critical steps in measurement development by creating their own

measures that tap composing processes." The writing task used in this study went in this direction, but more studies employing similar procedures could give valuable information about their potential to screen writers having difficulties structuring information and ideas. Writing organized ideas demands high cognitive load, and although spelling and handwriting skills were not assessed, they could have interfered with written production (Puranik & AlOtaiba, 2012). Similarly, the reading comprehension test required short written answers, and although students with disabilities were not included in the analysis, variability between students' performance could be partly explained by other conditions that were not part of the study. In this sense, researchers interested in text structures should create measures that focus on text organization and thus save students from concentrating on spelling or other aspects of language.

It would also be worthwhile to explore why students showed better knowledge for some items in the multiple-choice test. Beside students' declarative knowledge about structures, some paragraphs might have been easier to understand due to more explicit signal words or greater background knowledge. The paragraphs consisted of a few short sentences, so readers could not rely on a larger written context to fully comprehend the paragraphs.

The path analysis must be carefully interpreted. In this study, the directional influences between variables from three different assessments followed results from previous studies. It was useful to test a specific hypothesis. However, it would be important to reexamine the investigated path through a longitudinal design. Also, studies including more participants of various SES neighborhoods would provide better generalizations of results among primary grade students in this population, which have unclear curriculum about text structures and informative text during the primary grades. Since this article intended to shed light on knowledge and skills students might have on text structure and main ideas in order to carefully select or develop instructional approaches suitable to them, this path remains helpful because its shows how knowledge and skills in a particular task can help predicting performance in a different task.

Hence, much work still remains to improve our understanding of how structure and main ideas develop across different reading and writing activities. While many theoretical models of reading or writing recognize the value and importance of text structure knowledge and skills (Bereiter & Scardamalia, 1987; Berninger & Swanson, 1994; Hayes & Flower, 1980; Irwin, 2006; Van Dijk & Kintsch, 1983), a better understanding of how students articulate such learning and abilities among various literacy activities deserves more attention.

In conclusion, our study suggests that these young readers and writers from Grade 6 may need more support in further developing awareness of text structure as a fundamental element of discourse required in oral and written expression and comprehension in all disciplines. Indeed, their knowledge and skills relative to text structure and main ideas, in reading and writing, are questionable. A revision of the school curriculum, as well as teachers' practices relative to text structure and informative text (see Martel et al., 2012), could be suitable. Therefore, while meaning from text may depend on the readers' interpretations, goals, disciplinary and language knowledge, opinions, and other personal and social aspects, effective oral

and written communication also relies on the shared knowledge between readers and writers—and text structure is precisely the type of essential shared knowledge required to build meaning from discourse (Van Dijk & Kintsch, 1983).

Appendix 1: Multiple-choice test (one paragraph)

Changes in the owl population are caused by changes in the rodent population. Owls feed on rodents. When the owl population increases, the rodent population decreases. A decrease in the rodent population limits the amount of food available for owls. Eventually, the owl population decreases.

Question A: What is the structure of this paragraph?

- Descriptive
- Cause–effect
- Sequence
- Problem–solution
- Comparison

Question B: What is the main idea of this paragraph?

- Changes in the owl population are caused by changes in the rodent population.
- The rodent population can decrease.
- The paragraph gives information about owls and rodents.
- Owls are birds.

Appendix 2: Sample passage (translated) from the comprehension test, in which students were required to identify the main idea

The value of death

Tiger skin is sometimes used to make luxurious bags, and the fur of unlucky pandas is used to make warm coats. In traditional Asian medicine, rhinoceros horns are believed to have healing properties and are used in powder form to cure fevers, maintain good health, and fight cancer. In China, shark fin soup is a popular dish among the wealthy despite the enormous harm done to the species. Every day, animals are killed for their feathers, skin, horns, fur and organs.

Appendix 3: Student composition that obtained a perfect score (translated)

Lynxes

Physical aspects

Lynxes might look like cats but they are wild and more dangerous. They have long and sharp teeth to hunt animals. Their big and agile paws also have sharp claws. They have pointed ears and good hearing to hunt at night.

Kittens

The female lynx usually has one or two young kittens in spring. The kittens will live with their mother for 10 months. The female lynx will prepare a den in an old tree trunk or under large rocks and moss. At birth, the kittens are totally blind. Their mother must feed and shelter them until they are stronger. They must then learn to hunt by imitating their mother, even if they would rather play with each other!

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