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ORIGINAL RESEARCH

Teaching Reading Comprehension in Portuguese Primary and Middle Schools

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Abstract
Reading comprehension is an important skill throughout all stages of education. However, Portuguese pupils still demonstrate difficulties in understanding what they read. In addition to cognitive and psychological factors, it is important to understand how this skill is addressed in textbooks. Here, we examined how reading comprehension is targeted in Portuguese and Science textbooks in Grades 4 and 6. Regarding Portuguese textbooks, we found a higher focus on orality than on reading comprehension in Grade 4 and a more distributed focus regarding literacy-related skills in Grade 6. In both grades, most of the questions related to reading comprehension involved retrieval of factual information using open questions. This pattern was also observed for Science textbooks. These findings seem crucial to shed light on the articulation between the educational system, subjects' curriculum and educational actors, which is critical to effectively develop pupils' reading comprehension skills.

Keywords Mother tongue language · Primary and middle grades · Portuguese · Reading comprehension · Science

1 Teaching Reading Comprehension in Portuguese Primary and Middle Schools

Reading is an important activity that allows communication, knowledge production and dissemination. To read well and understand what is read is a pre-requisite to achieve success in school and perform daily tasks, as well as to participate actively and successfully in adult life (Beerwinkle et al. 2018). According to the Simple View of Reading (Hoover et al. 1990), the activity of reading involves two components: decoding and linguistic comprehension. Both of them have an important contribution to reading comprehension, especially in primary grades. However, to decode the printed symbols and access their meanings and

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interpretations is not enough to comprehend what is read. Readers also need to understand written messages in interpretative, critical and creative ways (Roe et al. 2012). Thus, reading comprehension involves figuring out stated and implied ideas, making inferences and assessing information, as well as producing new products based on what was read (Ghaith 2018). Aaron et al. (2008) suggested that the acquisition of these skills depends not only on cognitive and psychological factors, but also on ecological aspects, such as teacher knowledge, instructional practices and textbook contents. The current study examines how Portuguese textbooks address reading comprehension in the subjects of Portuguese and Science at two key points of the Portuguese educational system, namely, at the end of the first and second basic education cycles.

2 Overview of the Educational System

The Portuguese educational system comprises four stages: preschool, basic, secondary and higher education (Ministério da Educação 2007). Whereas preschool and higher education are facultative, basic and secondary stages are mandatory. Basic education is composed of three cycles: Grades 1–4, Grades 5–6 and Grades 7–9. Secondary education (Grades 10–12) offers three study programmes: Scientific-Humanistic, Technologic and Professional and Specialized Art. Table 1 provides an overview and main characteristics of Portuguese compulsory education, including number of schools and students in 2019.

In order to succeed throughout these cycles, students need to master several skills. One of these skills is reading comprehension, which is a transversal competence required across school subjects and grades.

3 Reading Comprehension Instruction

3.1 Portuguese Language System

In order to master reading and writing on alphabetic languages, pupils must understand the alphabetic principle, which postulates that each written symbol (i.e., grapheme) is associated with a spoken unit (i.e., phoneme; Liberman et al. 1989). Alphabetic orthographies can be classified according to two dimensions: syllabic structure and orthographic depth. The Portuguese orthography is characterized as having a simple syllabic structure, with a predominance of open CV syllables and intermediate depth, with several inconsistencies (Seymour et al. 2003; Sucena et al. 2009). In addition to being influenced by these characteristics, learning to read in Portuguese is also influenced by ecological aspects, such as curricula, teaching methods and materials (Ribeiro et al. 2016).

3.2 Reading Comprehension In Portuguese Curricula

The main goal of the curriculum of the Portuguese subject is to provide students with skills that enable them to be autonomous in the multifunctional and cultural use of the Portuguese language (Buescu et al. 2015). To that end, the curriculum is organized in a coherent and hierarchical way throughout the three cycles of basic education. The program and curricular goals in the first and second cycles was organized in four domains, Orality, Reading

Table 1 Summary of the Subjects and Weekly Workload in Portuguese Compulsory Education

Education	Grades	Ages	2019 Statistics	Subjects
Basic	1st Cycle. Grades 1–4	6–9	4140 schools. 393,793 students	Portuguese (7 h)
				Mathematics (7 h)
				Science (3 h)
				Artistic and Physical Expression (3 h)
				Study support (1.5 h)
				Complementary subject (1 h)[a]
	2nd Cycle. Grades 5–6	10–11	1184 schools. 218,907 students	Portuguese (250 min)
				English and History and Geography (250 min divided)
				Mathematics (250 min)
				Science (100 min)
				Visual Education (90 min)
				Technological Education and Musical Education (180 min divided)
				Physical Education (135 min)
	3rd Cycle. Grades 7–9	12–14	1462 schools. 357,529 students	Portuguese (200 min)
				English and another foreign language (270 min divided)
				History and Geography (200 min divided)
				Mathematics (200 min)
				Natural Science and Physicochemical (270 min divided)
				Visual Education, Information and Communication Technologies and Physical Education (300 min divided)

Table 1 (continued)

Education	Grades	Ages	2019 Statistics	Subjects
Secondary[b]	Grades 10–11	15–16	959 schools. 399,386 students	Portuguese (180 min)
				Foreign language (150 min)
				Philosophy (150 min)
				Physical Education (150 min)
				Triennial subject (250 min)
				Biennial subject 1 (270 or 315 min)
				Biennial subject 2 (270 or 315 min)
	Grade 12	17		Portuguese (200 min)
				Physical Education (150 min)
				Triennial subject (270 min)
				Annual subject 1 (150 min)
				Annual subject 2 (150 min)

[a]In Grades 3 and 4, English is a mandatory subject with a weekly workload of 2 h

[b]Subjects and workload corresponds to the Scientific-Humanistic programme

and Writing, Literary Education and Grammar, whereas that in the third cycle was organized in five domains, Orality, Reading, Writing, Literary Education and Grammar.

In Grades 1–4, children are expected to read texts of different genres and to improve their vocabulary. Reading comprehension is expected to be promoted by teaching children how to reformulate a text and how to identify and analyze text elements (e.g., sequence of events, main theme, characters' intentions and emotions). In Grades 5–6, reading comprehension instruction aims to reinforce previous skills by targeting more complex texts of different genres. Students should be able to write partial syntheses and differentiate between essential and accessory information. Students learn how to make inferences and relate information as well as how to critically evaluate a text. Students' success in achieving these learnings is crucial for the upcoming years (Grades 7–9), which pose higher demands on their reading comprehension skills. After the two first cycles of basic education, Portuguese students are expected to interpret texts from different categories, genres and complexity levels. They are taught how to identify cause and effect, differentiate between facts and opinions and elaborate deductions and inferences. They are also expected to express their viewpoints and elaborate critical appreciations about the texts they read.

Reading comprehension skills are not limited to language-related subjects. Across all subjects, pupils are asked to locate and extract relevant information from what they read and filter out relevant information (Clarke 2014). However, the explicit teaching of these skills seems limited to native-language subjects. An examination of the curricula of other subjects besides Portuguese, such as Science, reveals that reading comprehension instruction is barely targeted. For example, in the first cycle, there is only a brief reference to reading comprehension: Students should be able to select several sources of information, to use different ways to collect and treat information and to communicate that information (Ministério da Educação 2018). Nonetheless, there is no reference to how teachers are supposed to teach these skills, how students should accomplish these goals and, critically, how this instruction can be articulated with the first language curriculum. In the second and third cycles, there is no reference to reading comprehension instruction in science-related subjects. Still, reading comprehension is a fundamental learning skill that should be reinforced across all subjects.

3.3 Portuguese Students' Reading Comprehension Skills

In addition to teacher-developed instruments to assess students' progress, there are external evaluation instruments developed by governmental institutions. National exams were implemented for the last time in 2010–2015 and 2010–2014 at the end of Grades 4 and 6, respectively. Results showed students' strengths and weaknesses in reading comprehension in different types of texts (Gabinete de Avaliação Educacional, 2010a, b, c, 2011a, b, 2012; Instituto de Avaliação Educativa 2017a). Regarding informative texts, both fourth and sixth graders revealed high proficiency in items required them to locate, paraphrase, or interpret explicit information. Regarding literary texts, fourth graders showed some difficulties in producing a correct and organized discourse when they were asked to explain their reasoning and justify their ideas. These difficulties were particularly evident when students had to complete several sub-tasks, such as reread the text, elaborate a reasoning based on implicit information and produce coherent and clear arguments. Despite showing reduced difficulties in locating, paraphrasing, or interpreting explicit information, sixth graders struggled in items that required more demanding cognitive operations, such as complex inferences.

Portugal also participates in international initiatives, such as the progress in international reading literacy study (PIRLS), which assesses literacy performance in Grade 4. In this reading comprehension test, students are asked to answer a set of questions about given texts. Each question targets one of the following reading comprehension main processes: locate and extract explicit information from the text; make indirect inferences; interpret and relate ideas and information; and analyze and evaluate content and text elements. The test final score, whose maximum is 1000 points, is classified in one of four performance levels: low (400–474 points), medium (475–549 points), high (550–624 points) and advanced (625–1000 points). In the latest edition (2016), Portugal had a score of 528 points (Instituto de Avaliação Educativa 2017b, 2018). Although this result placed Portugal in the group of participants with scores significantly higher than the PRILS mean score, since 2011 Portugal dropped from the 19th to the 30th ranking position. In 2016, only 7% of the Portuguese students achieved the advanced level of performance, whereas 18% remained at the low level of performance. With exception of students in the low level of performance, the results in all the other performance levels were below the international median. In 2016, Portugal also participated in ePIRLS, a reading literacy program in digital format. Portugal achieved the 12th ranking place and, contrary to the international trend, the scores were lower than those achieved in PIRLS.

4 Present Study

A central assumption of the current study is that textbooks are a fundamental tool in the teaching and learning of reading comprehension and thus worthy of research attention. This study explores how textbooks approach reading comprehension instruction in Grades 4 and 6. Since reading comprehension is a transversal competence required across all subjects, we examined textbooks from two subjects: Portuguese (i.e., native language) and Science. As noted earlier, subjects' textbooks are included as part of the ecological component that contributes to the acquisition of literacy. Thus, to deepen knowledge on the acquisition of reading comprehension skills, it is crucial to understand how the teaching of these skills is addressed in the materials that teachers and students use every day. This information can contribute to improve their performance on national and international assessments and ultimately promote its effective use in life.

5 Method

5.1 Textbooks' Selection and Analysis

Eight textbooks from different publishers were randomly selected from the list provided by the Ministry of Education. This list contains all the textbooks that are in line with curricular goals and, thus, can be chosen by schools for each grade and subject. We selected four Portuguese textbooks (two from each grade) and four Science textbooks (two from each grade) (cf. Appendix for complete references). For each textbook, we examined the table of contents (—) to identify how they were structured in terms of number of units (—) and analyzed the content of the textbook concerning specific skills targeted in each rubric (i.e., set of exercises) as well as text types addressed. Additionally, for each rubric

targeting reading comprehension skills, we examined the type of questions and response formats used.

5.1.1 Targeted Skills

All textbooks were coded for the specific skills targeted in each rubric, which were defined in line with the curriculum. For Portuguese textbooks, we counted the number of rubrics targeting orality (i.e., exercises involving oral expression and text content anticipation), grammar (i.e., explication, systematization and application of rules and grammatical processes), reading comprehension (i.e., activities involving text reading, question answering and diagrams elaboration) and text production (i.e., exercises involving planning, producing and revising texts). For Science textbooks, we counted the number of rubrics tapping expansion of knowledge (i.e., activities promoting search, debate and knowledge sharing), experiment execution (i.e., activities promoting observation and investigation, as well as deduction of conclusions), review of knowledge (i.e., concept maps to review previous knowledge or contents discussed in the unit), long-term project (i.e., activities promoting knowledge, know-how and work capacity) and knowledge evaluation (i.e., exercises to assess knowledge covered throughout the unit).

5.1.2 Text Types

In the eight textbooks we counted the number of texts presented and identified the text type. For Portuguese and Science textbooks, we considered the following text types: narrative (i.e., text about events that occur in a certain place and over a given period of time, with real or imaginary characters), poems (i.e., text presented in the form of verse, stanza or prose, with the purpose of expressing emotion), informative (i.e., information on a given subject, which aims to clarify a person or a group of people on that matter), biography (i.e., text about a person's life trajectory with factual data), descriptive (i.e., text that involves the description of something, such as an object, person or place), dramatic (i.e., text that represents some conflict of life from the dialogue between the characters), argumentative (i.e., text that intends to defend an idea, hypothesis, theory or opinion in order to convince the reader) and expositive (i.e., text whose purpose is to inform the reader or spread knowledge about a topic). For Science textbooks only, we additionally examined whether the texts were complemented by charts or demonstrative images of the concepts.

5.1.3 Reading Comprehension Questions

Given the purpose of the present study, we narrowed the focus of our analysis to reading comprehension rubrics. Specifically, the focus and response format of each reading comprehension question was examined. The focus of the questions was categorized into the following categories: factual (i.e., retrieval of information explicitly presented in the text), summary (i.e., synthesis of information), inference (i.e., deduction made on the basis of the presented information), vocabulary (i.e., meaning of words or expressions), application of knowledge (i.e., transposition of knowledge into other contexts), reflection (i.e., thinking about a topic), search (i.e., seeking information beyond the contents addressed) and text production (i.e., writing a text). The response format was categorized into the following categories: fill in the gaps (i.e., completion of blank spaces within sentences or small texts), multiple choice (i.e., selection of the correct answer among several options), open

questions (i.e., writing of short or long answers), diagrams (i.e., graphic representation of the concepts), text search (i.e., response given by underlining or circling information in text), generate inferences (i.e., presentation of deductions made), association (i.e., establishment of correspondences between information presented in two columns), transcription (i.e., copying information from text), true and false (i.e., classification of sentences as true or false), search of information (i.e., response based on other sources, such as books or internet) and class discussion (i.e., collaborative discussion of contents).

5.1.4 Coding Reliability

The first author, who coded all the data, trained a second coder, who rescored one textbook from each grade and subject. Inter-rater agreement was computed separately for targeted skills, text type, focus of the reading comprehension questions and response formats. Respectively, percentage of agreement was 100%/100%, 100%/95%, 92%/95% and 96%/99% for the Portuguese textbooks in Grade 4/6 and percentage of agreement was 97%/100%, 100%100%, 95%/98% and 100%100% for the Science textbooks in Grade 4/6. Coding disagreements were discussed between both coders and, under the advice of the last author, the coding of the first judge was kept.

6 Results

Tables 2 and 3 display frequencies and percentages for the observed categories for Portuguese and Science textbooks, respectively.

6.1 Portuguese Textbooks

6.1.1 Grade 4

The two textbooks constituted ten units each. When comparing the skills targeted in the textbooks, we observed that both textbooks had a major focus on orality (50.84% and 37.99%). Additionally, one textbook had a minor focus on grammar (13.04%) whereas the other one had a minor focus on text production (11.17%). The majority of texts presented on both textbooks were narratives (42.86% and 54.55%). Concerning reading comprehension questions, these were mainly focused on retrieval of factual information in one textbook (37.74%) and on generating inferences in the other textbook (39.77%). We also found that in both textbooks, there was a large use of open questions (62.31% and 59.65%).

6.1.2 Grade 6

One textbook had six units and the other one had five units. When comparing the skills targeted in the textbooks, we observed that one textbook presented a major focus on orality (30.34%) and a minor focus on text production (16.29%), whereas the other textbook presented a major focus on reading comprehension (41.33%) and a minor focus on orality (10.67%). As in Grade 4, the majority of texts presented in both textbooks were narratives (32.89% and 38.33%). In both textbooks, reading comprehension questions tended to require the retrieval of factual information (36.55% and 42.42%), along with the use of a short/long written answers (63.97% and 55.61%).

Table 2 Analysis of Portuguese Textbooks

	Grade 4				Grade 6			
	A		B		C		D	
	N	%	*N*	%	*N*	%	*N*	%
Skills targeted								
Orality	152	50.84	68	37.99	54	30.34	16	10.67
Text production	51	17.06	20	11.17	29	16.29	26	17.33
Grammar	39	13.04	29	16.20	36	20.22	26	17.33
Reading comprehension	57	19.06	41	22.91	36	20.26	62	41.33
Other	0	0	21	11.73	23	12.92	20	13.33
Total	299	100	179	100	178	100	150	100
Text types								
Narrative	24	42.86	24	54.55	25	32.89	23	38.33
Poems	13	23.21	8	18.18	16	21.05	10	16.67
Informative	6	10.71	5	11.36	13	17.11	9	15.00
Biography	1	1.79	0	0	0	0	0	0
Descriptive	2	3.57	1	2.27	1	1.32	1	1.67
Dramatic	3	5.36	2	4.55	3	3.95	5	8.33
Argumentative	1	1.79	0	0	2	2.63	0	0
Expositive	0	0	0	0	4	5.26	0	0
Other	6	10.71	4	9.09	12	15.79	12	20.00
Total	56	100	44	100	76	100	60	100
Focus of RC questions								
Factual	120	37.74	45	26.32	90	36.44	84	42.42
Summary	21	6.60	9	5.26	38	15.38	10	5.05
Inference	94	29.56	68	39.77	75	30.36	64	32.32
Vocabulary	34	10.69	10	5.85	14	5.67	1	0.51
Application of knowledge	18	5.66	11	6.43	18	7.29	32	16.16
Reflection	6	1.89	2	1.17	1	0.40	2	1.01
Text production	2	0.63	2	1.17	0	0	0	0
Search	1	0.31	3	1.75	0	0	0	0
Other	22	6.92	21	12.28	11	4.45	5	2.53
Total	318	100	171	100	247	100	198	100
RC Response Format								
Fill in the gaps	6	1.87	13	7.60	1	0.40	3	1.53
Multiple choice	31	9.66	20	11.70	23	9.31	13	6.63
Open questions	200	62.31	102	59.65	158	63.97	109	55.61
Diagrams	24	7.48	18	10.53	8	3.24	17	8.67
Text search	14	4.36	4	2.34	2	0.81	0	0
Generate inferences	8	2.49	1	0.58	14	5.67	22	11.22
Association	12	3.74	0	0	5	2.02	6	3.06
Transcription	15	4.67	6	3.51	34	13.77	22	11.22
True and false	4	1.25	0	0	2	0.81	4	2.04
Search	1	0.31	0	0	0	0	0	0
Class discussion	5	1.56	5	2.92	0	0	0	0
Other	1	0.31	2	1.17	0	0	0	0
Total	318	100	171	100	247	100	198	100

Table 2 (continued)

RC = reading comprehension

6.2 Science Textbooks

6.2.1 Grade 4

One textbook had nine units, whereas the other one had ten units. Both textbooks tended to focus on activities for expanding knowledge (36.84% and 38.36%) and the majority of texts were informative, including charts or demonstrative images of the concepts (87.72% and 61.04%). Concerning reading comprehension questions, these were mainly focused on retrieval of factual information (39.06% and 61.29%), with open questions being again the preferred response format across both textbooks (62.13% and 74.73%).

6.2.2 Grade 6

One textbook had six units and the other five. The distribution of skills targeted varied across textbooks. One textbook focused on activities for expanding learned knowledge (34.86%), whereas the other focused on activities to consolidate contents and to deepen knowledge (both 36.05%). As in Grade 4, almost all texts were informative with charts or demonstrative images (93.24% and 96.97%). Consistently across both textbooks, the majority of reading comprehension questions asked for the retrieval of factual information (83.41% and 76.47%) and favored open-question response formats (91.47% and 82.35%).

7 Discussion

This study examined how textbooks approach reading comprehension in primary and middle Portuguese grades. Textbooks were examined for the subjects of Portuguese (mother-tongue language) and Science at the end of the first and second cycles of basic education. Though based on a small sample of textbooks (total of eight), this study may provide some hints about students' difficulties in reading, given the foundational role that textbooks have in the acquisition and development of that skill.

The characteristics of the two Portuguese textbooks in Grade 4 were very similar. Both emphasized orality over reading comprehension skills, tended to ask for open answers and the majority of texts were narrative. Nonetheless, they differed in the focus of the reading comprehension questions. Whereas one textbook focused more on the retrieval of factual information, the other focused more on the generation of inferences. In Grade 6, one textbook had a major focus on orality, whereas the other had a major focus on reading comprehension. Both textbooks had a similar presence of narrative texts and an equivalent focus on questions asking for the retrieval of factual information, through open answers. In sum, it seems that across the two grades, Portuguese textbooks tended to privilege orality, focus on factual information and require open answers.

The two Science textbooks in Grade 4 and one textbook in Grade 6 were also found to be very similar. The three textbooks focused on activities for expanding knowledge, included informative texts supported by charts or images and used questions requiring retrieval of factual information through open answers. The other textbook in Grade 6 differed in terms

Table 3 Analysis of Science Textbooks

	Grade 4				Grade 6			
	E		F		G		H	
	N	%	*N*	%	*N*	%	*N*	%
Skills targeted								
Expansion of knowledge	21	36.84	28	38.36	61	34.86	0	0
Experiments execution	12	21.05	17	23.29	26	14.86	53	36.05
Review of knowledge	18	31.58	19	26.33	22	12.57	38	25.85
Long-term project	2	3.51	9	12.33	0	0	0	0
Knowledge evaluation	0	0	0	0	59	33.71	53	36.05
Other	4	7.02	0	0	7	4.00	4	2.72
Total	57	100	73	100	175	100	158	100
Text types								
Informative with charts	50	87.72	47	61.04	69	93.24	64	96.97
Informative without charts	7	12.28	30	38.96	0	0	2	3.03
Other	0	0	0	0	5	6.76	0	0
Total	57	100	77	100	74	100	66	100
Focus of RC questions								
Factual	66	39.06	114	61.29	176	83.41	78	76.47
Summary	0	0	0	0	0	0	3	2.94
Inference	32	18.93	19	10.22	14	6.64	5	4.90
Vocabulary	2	1.18	0	0	0	0	0	0
Application of knowledge	44	26.04	39	20.97	11	5.21	15	14.71
Reflection	1	0.59	0	0	0	0	0	0
Text production	5	2.96	3	1.61	1	0.47	0	0
Search	14	8.28	10	5.38	9	4.27	1	0.98
Other	5	2.96	1	0.54	0	0	0	0
Total	169	100	186	100	211	100	102	100
RC Response Format								
Fill in the gaps	5	2.96	19	10.22	4	1.90	1	0.98
Multiple choice	4	2.37	3	1.61	1	0.47	1	0.98
Open questions	105	62.13	139	74.73	193	91.47	84	82.35
Diagrams	5	2.96	6	3.23	3	1.42	13	12.75
Text search	8	4.73	0	0	0	0	0	0
Generate inferences	0	0	0	0	0	0	0	0
Association	3	1.78	2	1.08	3	1.42	0	0
Transcription	0	0	0	0	1	0.47	0	0
True and false	0	0	6	3.23	4	1.90	1	0.98
Search	2	1.18	6	3.23	0	0	0	0
Class discussion	32	18.93	5	2.69	2	0.95	0	0
Other	5	2.96	0	0	0	0	2	1.96
Total	169	100	186	100	211	100	102	100

RC = reading comprehension

of the activities included, with the majority aiming to promote the consolidation of contents taught in each lesson.

The program and curricular goals for the Portuguese subject emphasize the key role of reading comprehension to achieve success in a specific grade and present explicit contents to be taught and mastered in that same grade (Buesco et al. 2015). These materials serve as a guide to teachers, particularly in terms of the attention they should give to the several literacy domains (i.e., orality, reading, writing, literary education and grammar) and in terms of the learning aims at the different educational stages. However, as observed here, the selected textbooks do not seem to capture this distribution, given that we found a clear focus on one domain (typically orality) over the others. As teachers rely on textbooks to structure the lessons and support their students, textbooks' reduced focus on reading comprehension can lead teachers to target reading-related skills to a lesser extant than other skills, more present in textbooks' exercises. At least in part, this can be related to students' performance on national and international assessments. The national results showed a need to improve students' competences concerning textual interpretation, inference of meanings of expressions and explanation of agent-action relations. It is also noteworthy that, despite the importance of reading comprehension for Science, the curriculum for this subject did not mention this skill at all. However, it is expected that around Grade 4, students are able to use their reading comprehension skills not only in language classrooms, but also in other subjects, such as Science, with an increasing replacement of narrative texts with expository ones (Chall 1983). This was not observed in the textbooks examined, which provided reduced learning opportunities for reading comprehension skills. Indeed, the comparison between the textbooks between the two subjects (Portuguese and Science) revealed that reading comprehension did not receive much attention outside the mother-tongue subject.

It is also worth mentioning that the reading comprehension questions presented across all textbooks were mostly factual, requiring answers solely based on the retrieval of information explicitly presented. Questions focusing on this type of information demand less involvement of students with the texts, since the expected answers are clearly stated. This kind of questions seem very easy to answer and are not likely to promote critical thinking and inference making abilities, which are critical competences of reading comprehension. Concerning response formats, most of the questions presented asked for an open answer. The use of other formats could however be beneficial. For example, multiple choice requires the integration of several skills, such as inferential thinking, problem-solving skills and prior knowledge, to select an acceptable answer (Davey 1988; Rupp et al. 2006). However, it should be noted that regardless of response formats, the way the question is formulated may also play a role on how students comprehend what is asked.

Concerning the texts included in the textbooks, we found a reduced diversity of text types, in line with previous research in the US context (Duke 2000). Portuguese textbooks mainly focused on narrative texts, whereas Science textbooks mainly included informative texts. This lack of diversity in text types can have a negative impact on students' literacy development as they advance throughout school years. Because students are not used to working with and learning from texts with varying typologies and structures, they can struggle to extract knowledge and interpret information presented in new text types. A key educational aim should be to develop citizens that are able to read, write and think critically about information conveyed in different formats. Teachers should provide contact with different text types, which will provide opportunities not only to promote reading and writing, but also to apply knowledge and develop other domains of expertise. In order to choose the appropriate reading strategies, students need to understand the goal of what they read. To recognize the features of the different text types is critical for that understanding

(Carreti et al. 2014). This will only be possible if students have contact and experience with varying genres.

8 Future Research Directions and Educational Implications

Textbooks are a fundamental tool in the teaching and learning of reading comprehension and thus worthy of research attention. However, it is important to keep in mind that textbooks are only a part of several tools that can be used in the classroom. Future research should include other materials and components involved in the teaching of reading comprehension. For example, it would be important to examine workbooks that complement textbooks (i.e., books that only have consolidation activities, without any content explanation), as well as to consider teachers' role. Teachers can create their own materials or use complementary resources to promote reading comprehension besides the questions and activities proposed in the textbooks. Moreover, there has been an increasing development of technological tools that teachers have at their disposal. Although the use of technology is somehow limited in the earlier grades of the Portuguese educational system, the current pandemic situation may have promoted the widespread use of technological resources, due to the need of continuing teaching in online formats. Technological resources are becoming more and more powerful tools to support the acquisition and development of reading comprehension skills by complementing textbooks contents and, in some instances, by replacing them.

Although textbooks are a crucial tool to be used in classrooms, it is important to provide teachers with other materials to boost the development of reading comprehension skills of their students. The exercises presented on textbooks could be complemented by different activities to promote reading strategies, in addition to the retrieval of information explicitly presented on text. Some of these strategies include cooperative learning; activities that promote comprehension monitoring before, during and after reading; skimming for main ideas; and paraphrasing (Babbitt 2002; Brown 2001; McNamara 2009). Teaching practices for reading comprehension are an effective way to improve this skill. Some of these strategies may include reading and thinking aloud procedures (Ferlazzo et al. 2018). Teachers should model strategies that are important to promote engagement in reading and language acquisition processes (e.g., graphic and semantic organizers, summarization, making connections and inferring) and provide students with opportunities to practice these strategies collaboratively and individually (Ferlazzo et al. 2018). As noted above, the increasing presence of technology in students' lives and school contexts, this could also be used as means to overcome students' difficulties in reading comprehension. The use of computer-based learning environments, such as the web-based intelligent tutoring system for the structure strategy, seems to be an effective tool to promote reading comprehension skill in students across different age groups (Slavin et al. 2008; Wijekumar et al. 2012, 2017; Xu et al.2019).

Reading comprehension is not only an academic skill underlying academic success throughout schooling, but also a life skill essential for people in their daily lives. Its mastery depends upon several sources, which cannot be reduced to students and teachers' cognitive and psychological factors (Aaron et al. 2008). Indeed, ecological aspects, such as the textbooks as here addressed, cannot be overlooked. These are the primary tools in which teachers rely to promote their students' reading skills. With this study, we hope to stimulate more research into these ecological aspects and the development of evidence-based resources that teachers can have at their disposal.

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Appendix

Grade	Subject	Textbook	Complete reference
4	Portuguese	A	Melo, P. and M. Costa. 2013. A Grande Aventura. Português—4º Ano. [The Great Adventure. Portuguese – Grade 4]. Lisboa: Texto Editores
		B	Lima, E., N. Barrigão, N. Pedroso and V. Rocha. 2015. Alfa. Português 4. [Alfa. Portuguese 4]. Porto: Porto Editora
	Science	E	Pires, P. and H. Gonçalves. 2013. A Grande Aventura. Estudo do Meio—4º Ano. [The Great Adventure. Science – Grade 4]. Lisboa: Texto Editores
		F	Lima, E., N. Barrigão, N. Pedroso and V. Rocha. 2015. Alfa. Estudo do Meio 4. [Alfa. Science 4]. Porto: Porto Editora
6	Portuguese	C	Silva, P., S. Rente and E. Cardoso. 2012. Dito e Feito. Português—6º Ano. [Said and Done. Portuguese – Grade 6]. Porto: Porto Editora
		D	Almeida. A. and L. Coelho. 2017. Palavras 6. Português – 6º ano [Words 6. Portuguese – Grade 6]. Porto: Areal Editores
	Science	G	Lopes, A., D. Brandão, J. Mendes and S. Vaz. 2017. 100% Vida. Ciências Naturais—6º Ano (Vol. 1–2). [100% Life. Science – Grade 6]. Lisboa: Texto Editores
		H	Sales, A., I. Portugal, I. and J. Amorim. 2011. Clube da Terra. Ciências da Natureza—6º Ano. [Earth Club. Science – Grade 6]. Lisboa: Texto Editores

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