Research Brief

Primary and Secondary Textbook Complexity in England

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ABSTRACT

The study examined the text complexity of textbooks available for use in English maintained primary and secondary schools that address select mandatory courses: English, mathematics, science, history, geography and citizenship, for years one through 11, key stages 1 through 4.

The research hypothesis was that text complexity varies within school year and key stage and that the median text complexity increases with school year/key stage. The results supported the hypothesis.

However the findings highlight the fact that the greatest increase in complexity across the years and key stages occurs early on when young readers are still developing their reading skills: between years one and two and between key stage 1 and 2. After this time, the increase in complexity is less marked.

BACKGROUND

The new curriculum is intended to raise standards and assure universities and employers that pupils exiting the secondary education system will have adequate literacy and numeracy skills to be successful. One element of this curriculum change has been a debate over the use of textbooks in England's schools.

In November 2014, Tim Oates, director of research at Cambridge Assessment, released a policy paper with a foreword from Nick Gibb, Minister of State for School Reform, highlighting the state of textbooks for primary and secondary pupils in England and the importance of quality materials (Oates, 2014). This paper noted the increasingly negative attitude in England towards textbooks over the last 60 years as well as changing opinions in pedagogy, schools' economic concerns, and increasing demands on educators. MP Gibb's foreword cited the 2011 Trends in International Mathematics and Science Study (TIMMS) survey finding that only 10 per cent of England's pupils used textbooks in mathematics compared to high performing jurisdictions (70 per cent in Singapore and 95 per cent in Finland) (Oates, 2014). While the use of textbooks alone cannot be the sole reason behind those countries' significant educational accomplishments, it also should not be ignored as a possible contributor toward achieving them.

Instead of textbook reliance in England's schools, pupils are using differentiated learning activities and lessons from a combination of sources: teacher-created materials, publisher's products, and others via the internet. A recent survey of 3,000 teachers (50 per cent being UK teachers) conducted indicated that 69 per cent of respondents felt that open resources were used more than textbooks (TES Global, 2015).

While text complexity alone does not provide insight into the quality of the materials being published for pupils in any genre, it does speak to the accessibility of the content. If year three pupils are presented with reading materials at a level of complexity above their reading ability level, learning the material could be quite challenging. Conversely, materials written significantly below a pupil's ability level may foster boredom in the classroom and limit the pace of learning. A first step in understanding the relationship between pupils and text is to understand the text complexity of the materials. This is the purpose of the current study.

MATERIALS

The unit of analysis in this study was textbooks (N = 211) available for use in England's primary and secondary schools. An effort was made to obtain textbooks written specifically for the new 2015 National Curriculum. If textbooks written specifically for the new curriculum were not yet available or in reprint, textbooks deemed still appropriate for the curriculum by their publisher were included. The majority of the books were aligned with a specific year (n = 146), however, some were written for use across multiple years but within a single key stage (n = 65). All the textbooks could be grouped by their key stage placement. Textbooks for key stage 4, years 10 and 11, were written primarily to help pupils prepare for their GCSE examinations. An effort was made to represent all of the Examination Boards in the selection of texts for the study.

PROCEDURE

Historically, pupils are formally assessed at the completion of key stages 2-4. The new National Curriculum requires the assessment of pupils completing key stage 1 starting in 2016. Ideally, this study would have focused on the most commonly used texts as reported by school districts. However, due to the decentralized structure of the education system in England, decisions regarding which textbooks to include in the study were based upon publisher-provided information regarding their most popular titles.

Titles listed as "developed for" or "appropriate for" the new 2015 National Curriculum were selected. The 2015 National Curriculum has been implemented in waves, allowing older pupils to complete their studies under the former National Curriculum. New textbooks have also been produced in waves. Therefore, in some cases, most notably at key stage 4, textbooks current for the 2015 school year did not yet reflect full implementation of the new National Curriculum.

The study focused on six compulsory courses: English, mathematics, science, geography, history and citizenship. English, mathematics, and science are compulsory at every key stage. Geography, history and citizenship were combined into one group labelled "social studies" to provide a consistent group across the key stages. **Table 1** outlines the core subjects and when they are taught under the 2015 National Curriculum (UK Department of Education, 2014).

Table 1: Subjects and Distribution through Key Stages

	Key Stage 1 Years 1-2	Key Stage 2 Years 3-6	Key Stage 3 Years 7-9	Key Stage 4 Years 10-11
Core Subjects				
English	✔	✔	✔	✔
Mathematics	✔	✔	✔	✔
Science	✔	✔	✔	✔
Foundation Subjects				
Art and Design	✔	✔	✔	
Citizenship			✔	✔
Computing	✔	✔	✔	✔
Design & Technology	✔	✔	✔	
Languages	✔	✔		
Geography	✔	✔	✔	
History	✔	✔	✔	
Music	✔	✔	✔	
Physical education	✔	✔	✔	✔

MEASURES

MetaMetrics® measured the textbooks' complexity using The Lexile® Framework for Reading and the Lexile Analyzer®. The resulting Lexile® measures of text complexity were statistically summarised by subject, key stage and school year.

The Lexile measure represents a pupil's reading ability or a text's complexity (or difficulty) followed by an L (for Lexile measure). The Lexile scale ranges from 0L and below for early readers and texts to above 1600L for advanced readers and texts. The Lexile Analyzer is a software program specially designed to evaluate the reading demand of text based on its semantic and syntactic characteristics and determine its Lexile measure. Independent psychometric studies of the Lexile scale indicate that it is a valid and reliable measure of reader ability and text complexity (Mesmer, 2007; White & Clement, 2001). Extensive information about the development of the Lexile Framework for Reading and the Lexile Analyzer can be found at www.Lexile.com.

ANALYSIS

The texts were grouped by subject, key stage and school year. All texts had a key stage designation as determined by the publisher, but not all texts had a school year designation. The interquartile ranges of text complexity in each school year and key stage were calculated and used to construct box-and-whisker plots for the distributions. The box-and-whisker plots were displayed in school year and key stage ascending order.

The mean Lexile measures of each subject by school year and key stage were plotted in line graphs to illustrate the change in Lexile measure as both the school year and key stage increase. The Lexile measures of all textbooks were combined to create a variable called "combined subject Lexile measure." This variable was added to the figures to demonstrate a subjects' relationship to the mean at each school year and key stage.

RESULTS

Table 2 shows the final textbook sample by school year and key stage. The key stage totals do not match the school year totals as 65 textbooks were not written for specific years but rather entire key stages. **Table 3** contains select data—25th percentile, median and 75th percentile Lexile measures—from the interquartile statistics by school year and key stage. **Figures 1** and **2** display the interquartile range of text complexity for the combined subjects by school year and key stage, respectively. The lower box represents the 25th to 50th percentile while the upper box represents the 50th to 75th percentile of text measures for each group. The ends of the whiskers represent the minimum and maximum text measures for each group. The boxes focus attention to where the data is located around the median values. Table 3 and Figures 1 and 2 illustrate that the median text complexity increases monotonically as the school year and key stage increase.

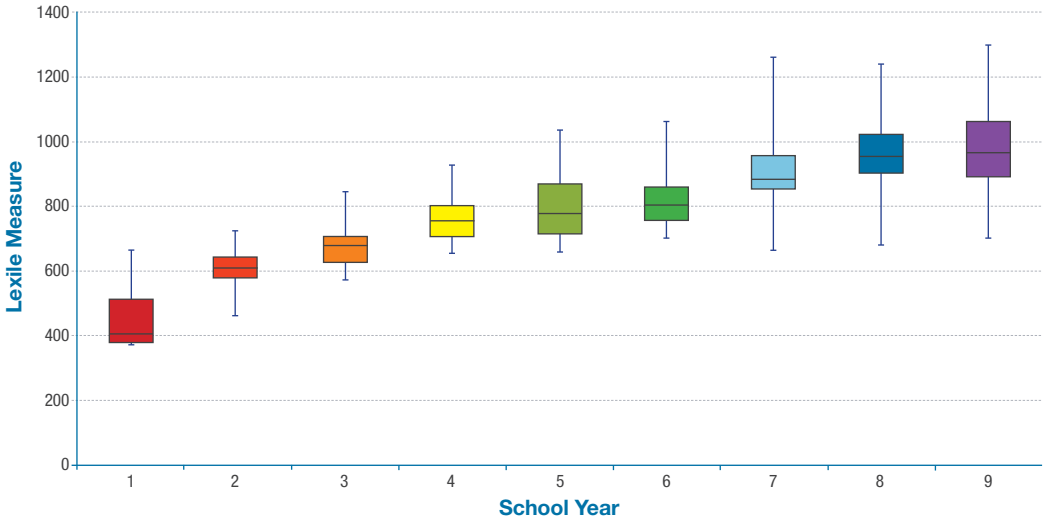
Table 2: Final Sample Sizes for Textbook Study

School Year Sample Size			
Year 1 (n=7)	Year 3 (n=15)	Year 7 (n=23)	Year 10 (n=1)
Year 2 (n=9)	Year 4 (n=15)	Year 8 (n=23)	Year 11 (n=1)
	Year 5 (n=15)	Year 9 (n=22)	
	Year 6 (n=15)		
Key Stage Sample Size			
Key Stage 1 (n=17)	Key Stage 2 (n=65)	Key Stage 3 (n=100)	Key Stage 4 (n=29)

Table 3: Median Text Complexity Measures and Interquartile Range Boundaries by Key Stage and Year

Year	25th Percentile	Median	75th Percentile
Year 1	375L	400L	505L
Year 2	580L	610L	640L
Year 3	625L	680L	700L
Year 4	705L	740L	795L
Year 5	710L	770L	860L
Year 6	750L	800L	855L
Year 7	845L	880L	950L
Year 8	905L	950L	1015L
Year 9	885L	965L	1055L
Year 10	-	-	-
Year 11	-	-	-
Key Stage	**25th Percentile**	**Median**	**75th Percentile**
Key Stage 1	430L	540L	610L
Key Stage 2	700L	750L	830L
Key Stage 3	870L	960L	1020L
Key Stage 4	920L	1030L	1110L

Figure 1: Text Complexity Distributions by Year



Due to small sample sizes it was not possible to represent interquartile measures for the individual subject areas. In an effort to capture the relationship between subject and text complexity, the sample statistics of Lexile measure mean, standard deviation, minimum and maximum were collected for each subject by year and key stage. Data for the combined subjects by school year and key stage were also collected. **Table 4** shows the combined subject Lexile measure mean, standard deviation, minimum and maximum by school year and key stage.

The combined subject Lexile measure means by school year increased steadily. The differences between each year's combined subject Lexile measure mean ranged from 14L to 151L. The largest difference was between years one and two (151L). The differences from consecutive years across years two to nine were all less than 85L. These findings support both hypotheses of Lexile measure variation between school years as well as the positive relationship between text complexity and increasing year. The range of combined subject Lexile measure means from year one to nine is 512L.

Figure 2: Text Complexity Distributions by Key Stage

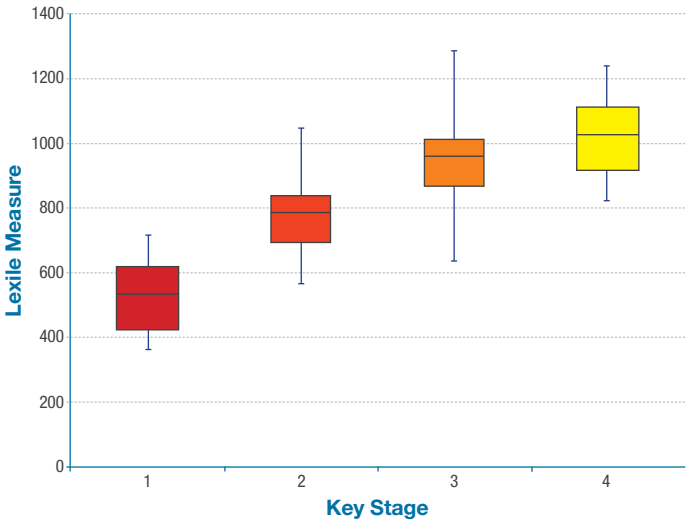


Table 4: Lexile Mean by Year and Key Stage

Year	Mean (SD)	Min-Max
Year 1	456L (110.00)	370L - 660L
Year 2	607L (79.00)	460L - 720L
Year 3	672L (71.93)	570L - 840L
Year 5	755L (110.24)	650L - 920L
Year 5	793L (110.24)	650L - 1020L
Year 6	817L (90.53)	700L - 1050L
Year 7	901L (115.87)	660L - 1250L
Year 8	954L (111.59)	680L - 1230L
Year 9	968L (126.97)	700L - 1290L
Year 10	-	-
Year 11	-	-
Key Stage	**Mean (SD)**	**Min-Max**
Key Stage 1	534L (118.11)	370L - 720L
Key Stage 2	767L (102.61)	570L - 1050L
Key Stage 3	949L (124.02)	640L - 1290L
Key Stage 4	1020L (128.00)	820L - 1240L

The combined subject Lexile measure means for the key stages also increased in a gradual manner. The differences between each key stage's combined subject Lexile measure mean ranged from 71L to 233L. The largest difference was between key stages 1 and 2 (233L). The range of combined subject Lexile measure means from key stage 1 to 4 is 486L.

The line-graphs in **Figures 3** and **4** illustrate the mean Lexile measure of each subject by school year and key stage, respectively. The solid line represents the combined subject Lexile measure mean. Note how the different subjects' mean measures tend to fall around the combined subject Lexile measure mean. The English and social studies texts tend to be higher than the combined subject Lexile measure mean while mathematics and science tend to be lower.

Figure 3. Lexile Measure Means by Subject and School Year

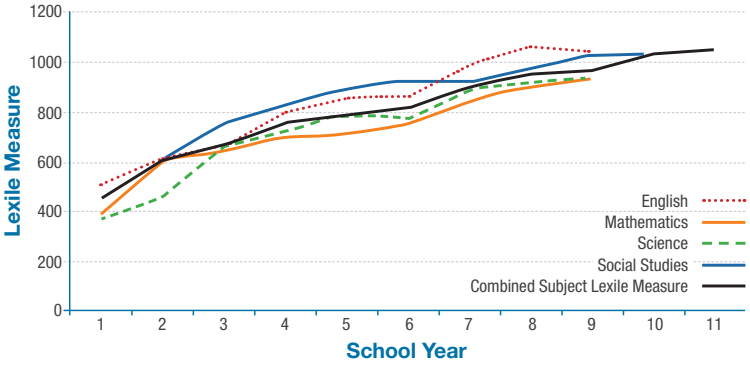
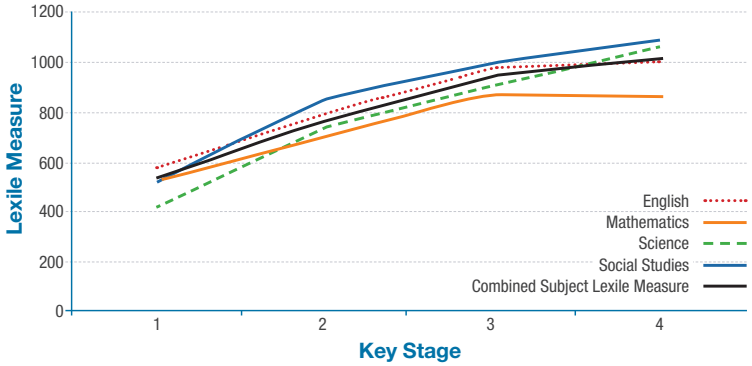


Figure 4. Lexile Measure Means by Subject and Key Stage



DISCUSSION/CONCLUSION

These analyses support the hypotheses that text complexity varies within school years/key stages and the median text complexity generally increases with school year/key stage. Publishers and educators may have reason to reflect on the fact that the greatest increase in complexity across the years and key stages occurs early on when young readers are still developing their reading skills —between years one and two and between key stage 1 and 2.

Further investigation into the pupil side of the reader ability and text complexity equation would reveal how closely England's primary and secondary pupils' reading ability aligns with the complexity of the text in their textbooks. Likewise, an opportunity to survey administrators and teachers to find which materials are most commonly utilised would provide the best understanding of what is happening in England's classrooms. It is anticipated that over time, as publishers and educators become accustomed to the new National Curriculum, more focused materials will be produced.

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