

## **Children's comprehension of informational text: Reading, engaging, and learning**

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### **Abstract**

The Reading, Engaging, and Learning project (REAL) investigated whether a classroom intervention that enhanced young children's experience with informational books would increase reading achievement and engagement. Participants attended schools serving low income neighborhoods with 86% African American enrollment. The longitudinal study spanned second through fourth grades. Treatment conditions were: (1) Text Infusion/Reading for Learning Instruction -- students were given greater access to informational books in their classroom libraries and in reading instruction; (2) Text Infusion Alone -- the same books were provided but teachers were not asked to alter their instruction; (3) Traditional Instruction -- students experienced business as usual in the classroom. Children were assessed each year on measures of reading and reading engagement, and classroom instructional practices were observed. On most measures, the informational text infusion intervention did not yield differential growth over time. However, the results inform efforts to increase children's facility with informational text in the early years in order to improve reading comprehension.

**Keywords:** Reading comprehension, informational text, reading instruction

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## Introduction

The tremendous nationwide emphasis on early reading achievement that came about through No Child Left Behind had as a primary focus the development of the basic skills of word recognition. The ability to read words fluently and automatically is critical to achievement, but it is not sufficient. Nor is the ability to comprehend stories sufficient. Although stories comprise a major proportion of the materials children encounter in early reading instruction (Duke, 2000; Hoffman et al., 1994; Jeong, Gaffney, & Choi, 2010, Moss, 2008; Moss & Newton, 2002; Ness, 2011), older students are expected to comprehend and learn from informational text, and they must continue to do so as they move through school and into the job market (Common Core State Standards (CCSS), 2010; Salinger, Kamil, Kapinus, & Afflerbach, 2005; White, Chen, & Forsyth, 2010; Venezky, 2000). Thus, facility with informational text is also critical to achievement, in school and beyond.

The Reading, Engaging, and Learning project (REAL) that is the focus of this article was designed to respond to the national goals of raising reading achievement and closing the achievement gap. The intervention study was funded by the Spencer Foundation in 2000, at a time when national experts had begun to recommend that children be given more exposure to informational text in the early years of schooling (e.g., Snow, Burns, & Griffin, 1998), but when support for this recommendation was mostly anecdotal and correlational (Campbell, Kapinus, & Beatty, 1995; Caswell & Duke, 1998). The REAL project was a multi-component intervention study that yielded information about a variety of facets of children's experiences with informational text, including comprehension of text as assessed on a standardized multiple-choice instrument and on a performance assessment, ability to use the features of informational text that enhance comprehension, reading motivation, out-of-school reading activity, instructional practices of the classroom teachers, preferences for reading, and gender differences.

The three-year longitudinal study, spanning grades two through four, yielded only limited evidence of an effect of the intervention to increase students' access to and comprehension of informational text (Baker & Dreher, 2005; Dreher & Baker, 2005). For that reason, we did not pursue publication of the REAL study at the time it concluded in 2005. However, this decision did not mean that we thought efforts to enhance children's comprehension of informational text were bound to be unsuccessful. Rather, we attributed the null effects primarily to school and teacher factors beyond our control. With hindsight, we have come to realize that the study provides much valuable information about children's understanding of informational text, independent of intervention effects. Accordingly, the purpose of this article is to describe the study in the context of the growing body of knowledge on informational text comprehension and use in the early elementary grades.

Traditionally, learning through reading has been delayed until children have learned how to read, using familiar topics in stories. But expert opinion has converged on the notion of integrating learning to read and reading to learn (e.g., CCSS, 2011; International Reading Association/National Council of Teachers of English, 1996; National Council for the Social Studies, 1994; National Council of Teachers of Mathematics, 1989; National Research Council, 1994; Snow et al., 1998; Salinger et al., 2005). Changes have begun to appear in the past decade, but the elementary school reading experience continues to be predominantly stories (Jeong, et al., 2010, Moss, 2008, Ness, 2011). Analyses of classroom reading materials suggest that up to 90% of what is read in the classroom consists of stories (Dreher, 2000), yet there is no compelling reason why this should be so, even in the primary grades.

Research shows that young children can and do appreciate and understand informational text (Cervetti, Bravo, Hiebert, Pearson, & Jaynes, 2009; Diakidoy, Stylianou, Karefillidou, &

Papageorgiou, 2005; Horowitz & Freeman, 1995; Pappas, 1993; Smolkin & Donovan, 2001). Furthermore, they can be taught strategies for learning from it (Aarnoutse & Schellings, 2003; Culatta, Hall-Kenyon, & Black, 2010; Duke & Carlisle, 2011; Hall, Sabey, & McLellan, 2005; O'Hara, 2007; Williams et al., 2005; Williams, Stafford, Lauer, Hall, & Pollini, 2009). The new Common Core State Standards (CCSS, 2010) specify that children should acquire competencies with informational text beginning in kindergarten. For example, with prompting and support, kindergartners should be able to ask and answer questions about key details in a text, ask and answer questions about unknown words in a text, and identify basic similarities in and differences between two texts on the same topic (e.g., in illustrations, descriptions, or procedures). The fact that informational text processing skills are to be part of the standard language arts curriculum is a powerful indicator of the importance of fostering children's comprehension of such text from the earliest years of formal schooling.

Indeed, early attention to informational text is needed if by fourth-grade children are to be "capable—independently and productively—of reading to learn" (Snow et al., 1998, p. 207). The National Assessment of Educational Progress (NAEP) now reflects this expectation (Foorman & Connor, 2011). Beginning with the 2009 reading assessment, the NAEP framework for fourth grade specifies a 50-50 proportion of total testing time devoted to reading informational vs. literary text (National Assessment Governing Board, 2008), compared to a 45-55 allocation in the 1992 to 2007 frameworks. In addition, for the first time, the 2009 NAEP reports scores separately by genre.

Performance on the NAEP, however, indicates the schools have far to go. The 2009 NAEP found two thirds of American fourth graders can only read at or below a basic level (33% below basic and 34% at basic), meaning they exhibit only partial mastery of reading skills (NCES, 2009). This figure has decreased only slightly since 1992, when the percentage at or below basic was 71%, indicating that the recent federal initiatives to improve early reading skills have met with limited success. In fact, evaluations of Reading First have revealed that benefits do not extend beyond decoding to reading comprehension (Gamse, Jacob, Horst, Boulay, & Unlu, 2008).

The 2009 NAEP results also document that certain subgroups of fourth graders continue to perform lower than the national average. For example, 52% of black and 51% of Hispanic children scored *below* a basic level in reading, whereas 22% of white and 20% of Asian/Pacific Island children did so. Furthermore, 71% of English language learners (ELL) scored below basic in comparison to 30% of non-ELLs, as did 49% of children eligible for free or reduced-cost meals, in comparison to 20% of those not eligible ([http://nationsreportcard.gov/reading\\_2009/](http://nationsreportcard.gov/reading_2009/)). Thus, overall fourth-grade reading performance needs improvement, but for poor and minority children the situation is particularly urgent.

To pursue our specific interest in comprehension of informational text, we accessed the NAEP data base and used their statistical tools to compare scale scores achieved on literary and informational text across selected demographic subgroups. The data for fourth graders on the 2009 assessment are provided in Table 1. Overall, students scored better on the literary passages than the informational. Note that the demographic disparities in performance are even greater on informational text than on literary text. For example, children eligible for free lunch scored 28 points lower than non-eligible children on informational text, compared to 25 points lower on literary text.

Students from high-poverty areas often lack exposure to the academic vocabulary needed for reading comprehension (Chall, Jacobs, & Baldwin, 1990; Neuman, 2006). Informational text is a major source of difficult, abstract, specialized, and technical words.

The narrow focus on word recognition so typical in early literacy instruction should be replaced by content-rich environments that include informational books, given their considerable potential for increasing children's background knowledge and conceptual development (Foorman & Connor, 2011; Neuman, 2001; 2006; 2010).

Focusing on both learning to read and reading for learning -- with early, balanced attention to both stories and informational text -- may increase children's reading achievement (CCSS, 2010; Dreher & Voelker, 2004). Support for this suggestion comes from the NAEP, where it was found that on the 1992 assessment, fourth graders who reported reading not only stories, but also magazines and informational books had the highest achievement (Campbell et al., 1995).

**Table 1.** Mean Scale Scores for Fourth Graders on the 2009 NAEP Reading Assessment by Type of Text and Selected Demographic Variables

Demographic Variable	Subgroup	Literary Text	Informational Text
Full Sample	-----	222	219
Income	Eligible for free lunch	208	203
	Not eligible	233	231
Language	ELL	190	185
	Non-ELL	225	222
Race	White	231	229
	Black	207	202
	Hispanic	208	202
	Asian/Pacific Isl.	236	234
Gender	Girls	226	222
	Boys	218	216

*Note.* Maximum scale score is 500. Differences as a function of income level, language status, and gender were statistically significant at  $p < .001$  for each text type. For the Race variable, Asian/Pacific Islanders had the highest scores, followed by whites; Blacks and Hispanics did not differ significantly. Differences across text types were not analyzed due to limitations of the NAEP online software.

An important enabler of reading comprehension is reading engagement (Baker, Dreher, & Guthrie, 2000). Engaged readers read widely and frequently, and they seek opportunities to learn from reading. Their motivations include the beliefs, desires, and interests that lead them to choose to read. Yet reading motivation drops as children move through the grades (Chapman & Tunmer, 1997; McKenna, Ellsworth, & Kear, 1995; Wigfield et al., 1997). This decline occurs for all achievement levels but is most pronounced for children of lower reading ability. Effective use of more diverse material, including informational books, may help to counteract this drop in motivation to read by arousing children's interest and curiosity, which in turn should increase independent reading activity (Baker & Wigfield, 1999; Duke & Carlisle, 2011; Wigfield & Guthrie, 1997). Guthrie and Wigfield and their colleagues have provided compelling evidence that classroom interventions that increase reading engagement also increase reading comprehension (Guthrie, Wigfield, Barbosa et al., 2004). Furthermore, the more motivated the reader, the more growth in comprehension over time (Guthrie, et al., 2007).

A variety of frameworks have been used to categorize text types as fiction vs. nonfiction or literary vs. informational. The guidelines of Kletzien and Dreher (2004) were used in the REAL project. The informational text category includes narrative-informational, expository, and mixed. Narrative-informational text uses a story or narrative format to convey factual information. Expository texts do not include story elements such as characters, goals, and resolutions. Instead they might be characterized as reports, using text structures such as cause and effect, comparison and contrast, sequence, description, and problem and solution. They explain things about the natural and social world such as animals, places, and cultural groups. Mixed texts, also referred to as dual-purpose, blended, or hybrid texts, mix narrative and expository writing in the same texts. For example, in *The Popcorn Book* (dePaola, 1984), the story of brothers making popcorn is accompanied by encyclopedia-like facts about popcorn which one brother reads aloud.

The REAL project was based on the premise that increasing students' access to informational text would enhance their knowledge and comprehension. Accordingly, the central thrust of the project involved an infusion of informational books into classroom libraries. Classroom libraries are frequently limited in the resources they offer, and this is particularly true in schools serving low income neighborhoods (Neuman, 2006). The effective classroom library provides a variety of book genres including informational books, stories, poetry, references, and multimedia, and it offers a range of difficulty levels and caters to a range of interests (Dreher & Voelker, 2004). Given the opportunity to access diverse materials in the classroom library, student interest in reading should increase, the amount of time spent reading should increase, and gains in reading skills and strategies should be realized (Chambliss & McKillop, 2000). Of course, at the same time, teachers need to provide instruction designed to help children read and learn from diverse genres. Accordingly, one of the treatment conditions included professional development for teachers on reading for learning.

The project was a three-year longitudinal study, commencing in second grade and continuing through fourth grade. Second grade was selected as the starting point because children at this level have begun to master the skills of word recognition and are capable of comprehending other than the simplest of texts. Fourth grade was selected as the ending point because it is at this level that many children begin to struggle, as the demands shift more from learning to read to reading to learn. It is not our intention in this article to provide a comprehensive empirical report of the entire REAL project but rather to describe certain components of the project in greater depth than others, consistent with the theme of this special issue on reading comprehension. Students within classrooms were assigned to one of three treatment conditions. It was expected that students who experienced both text infusion and reading for learning instruction would exhibit the greatest gains in reading achievement and engagement; students who received text infusion alone would also benefit relative to those receiving traditional instruction, but not to the same extent as those in the combined treatment condition.

#### *Overview of the Methods of the REAL Project*

##### *Treatment Conditions*

*Informational text infusion/Reading for learning (RFL) instruction (Text infusion/RFL Instruction).* Classroom libraries were enhanced with informational books, and teachers participated in professional development sessions on reading for learning, as described below. Students were assessed on reading comprehension using both standardized and researcher-developed measures, motivation for reading, and reading activity each year of the project. Students kept logs of books read during independent reading time, and teachers kept logs

of books read aloud to the students. Classrooms were visited regularly to observe instruction and collect logs.

*Informational text infusion/Traditional instruction (Text infusion alone).* To control for the possibility that the informational text infusion alone might be responsible for any positive outcomes (i.e., book flood effects, Ingham, 1982), classroom libraries were enhanced with the same informational books as in the RFL instructional condition, but teachers were not asked to modify their usual instructional practices. All of the same data were collected.

*Traditional Instruction.* Classroom libraries were not supplemented with informational text, and teachers were not asked to modify their usual instructional practices. The same assessments were used, but students and teachers did not keep logs of their reading as this in itself might influence outcomes. However, classroom observations were made to provide data on informational book availability and instruction relating to informational text. (Teachers received books of their choice at the end of the school year for use with the next year's students.)

### *Participants*

The study was conducted within three demographically similar public elementary schools in a large suburban school system with a majority African American student population. The three schools that were selected also had a majority of children receiving free or reduced price lunch and a majority scoring below average on statewide assessments. The ethnicity distribution of participants at project outset was 86% African-American, 10% European-American, 2% Hispanic-American, and 1% Asian-American. During the first year of the project, 222 second-grade children participated. In subsequent years, the number of participants was affected by withdrawals, new enrollees, and redistricting. In Year 2, 195 third graders participated, and in Year 3, 209 fourth graders. Each school was randomly assigned to one of the three treatment conditions. Table 2 shows the distribution of classrooms and teachers across conditions and years, as well as the number of students remaining in the REAL project for all three years.

**Table 2.** *Number of Classes and Students in the Reading, Engaging, and Learning (REAL) Project by Treatment Condition*

Project Year	Text Infusion/RFL Instruction		Text Infusion Alone		Traditional Instruction	
	Classes	Students	Classes	Students	Classes	Students
1: Grade 2	2	60	3	77	4	85
2: Grade 3	3	62	4	79	3	69
3: Grade 4	2	51	4	69	3	89

*Note.* The number of students participating in the project across all three project years was 28 in Text Infusion/RFL, 51 in Text Infusion Alone, and 30 in Traditional Instruction.

### *Teacher Training*

At the beginning of each school year, brief orientations were given to the teachers who were participating in the project at all three schools, followed by in-service sessions with teachers in the text infusion schools. For the Text Infusion Alone teachers, a single short session focused on procedures for completing the teacher and student reading logs. Text infusion/RFL Instruction teachers received in-service sessions on RFL instruction, one in the fall at the beginning of the intervention and one after winter vacation. In addition, we held informal discussions during our regular visits to the classrooms and via email. Key instructional components were selected on the basis of research evidence attesting to their promise: (1) balancing the use of informational books in daily read-alouds; (2) promoting

diverse daily independent reading; and (3) teaching children strategies and text features for comprehending and using informational text.

At second-grade, the fall session included modeling and providing guidelines on how to use information books in read-alouds (e.g., teach children to use text access features, activate prior knowledge, highlight new vocabulary, engage children in discussion). We explained the Questioning the Author (QtA) approach to enhance children's comprehension (Beck McKeown, Hamilton, & Kucan, 1997). We also discussed examples of different types of informational text (narrative-informational, expository, and mixed) and the importance of instruction on expository text. In the second-grade winter session, we continued working with teachers to offer suggestions and address any concerns on the earlier topics. In addition, we introduced ways to use informational books to encourage expository writing.

At third and fourth grades, in-service sessions continued attention to the same topics but with additional foci. At third-grade, we modeled the use of a variety of I-charts (Hoffman, 1992) for organizing new information. We also provided additional techniques to support vocabulary development, and more ways to encourage expository writing such as paragraph frames (Lewis, Wray, & Rospigliosi, 1994). At fourth grade, we provided teachers with a strategy instruction plan, overviewed key comprehension strategies for use with informational text, reviewed common expository text structures, and modeled how to help children search for and monitor their hunt for information (Kletzien & Dreher, 2004). In all grades, teachers received handouts, and a notebook in which to keep them, including a summary of research support for each topic, specific guidelines, and examples.

#### *Availability of Informational Text in Classrooms*

Classroom libraries were inventoried each year, at the beginning before books were provided in the text infusion conditions and at the end. Books were counted, listed, and categorized by type. Classroom libraries varied greatly in size, but most were quite modest. As second grade began, children in one class had no classroom library at all, whereas in another class, the teacher had over 800 books. The books in these classroom libraries were predominantly fiction. This same variability was apparent in subsequent years of the project, as we worked in Grade 3 and then 4. For example, in Grade 4, the average classroom library at the Traditional Instruction school had 276 books, of which 21% were informational books. At the Text Infusion Alone school the average was 169, of which 20% were informational. At the Text Infusion/RFL Instruction school, one teacher had no classroom library and the other teacher had only 24 books, of which 17% were informational.

This limited availability of informational text was similar to data reported in a number of other studies conducted prior to the beginning of the REAL project (Duke, 2000; Moss & Newton, 1998), but recent analyses have yielded similar results. For example, Jeong et al. (2010) inventoried five classroom libraries at each of grades 2, 3 and 4. The percentages of informational text were 22%, 18%, and 19% across the three grade levels. In a study of 318 teachers in K-5 classrooms conducted in 2007-2008 by Ness (2011), teachers reported on average that 33% of the books in their classroom libraries were informational texts. Across grades 2, 3, and 4, means were 36%, 35%, and 37%, respectively, with ranges from 15% to 75%.

Informational books were provided in the REAL text infusion classrooms in two phases. In the fall, we selected books from booklists to appeal to the interests of children at each grade level, and whenever possible to correspond to the science and social studies themes in the county curriculum. Most of these contained expository writing, with text features such as tables of contents, indexes, and captions. After winter break, children and teachers both played a role in selecting additional books. Children received "catalogs" of informational

books and placed stickers on their top choices, and, in addition, they indicated what topics they would like to see addressed in other books. Teachers were also given a list of books from which to make selections. As an illustration, we describe here the books added to classroom libraries in fourth grade. Sixty-six informational books were purchased for each classroom, including 61 expository, 4 narrative-informational, and 1 mixed text book. Eleven of the books were selected to reinforce topics in the social studies curriculum. Others featured animals, famous people, sports, nature, and science. Most of the books had text access features. The selection of books included those that were appropriate for students at a range of reading levels.

#### *Student Reading Comprehension in the REAL Project*

Reading achievement was measured using a standardized assessment and two researcher-devised assessments. The standardized test was the Gates-MacGinitie Reading Test (GMRT) 4th edition (MacGinitie, MacGinitie, Maria, & Dreyer, 2000). At Level 2, the GMRT has subtests for decoding (word recognition), word knowledge, and comprehension; at Levels 3 and 4 it has vocabulary and comprehension subtests. Although the GMRT includes both fiction and informational passages on its comprehension assessment, scores are not broken down by type of passage. Because of our primary interest in comprehension of informational text, we conducted supplementary analyses where we categorized passages according to text type so that we could compare scores on fiction and nonfiction (Ruetschlin, Finger, & Dreher, 2005). One of the researcher-devised comprehension assessments was based on open-ended written responses to extended informational texts, and the other tapped student competencies in the use of text access features specific to informational text (e.g., indexes and glossaries).

Because of the small scale of the study, with only one school per treatment, and the limited number of teachers within each condition, it was not possible to conduct multi-level analyses. This is a significant limitation because differences among teachers were strong, even within the same school/treatment condition. Moreover, the clustering of children within classrooms varied across the years; that is, students did not remain in intact classes as they moved from grade to grade. The longitudinal analyses are also limited by the decreasing sample size due to attrition from Fall of Grade 2 through Spring of Grade 4.

#### *The GMRT Assessments*

In the first year of the study, children took the GMRT in the fall to provide baseline information and again in the spring. In subsequent years, they took it only in the spring. Analyses of variance using extended scale scores (ESS) were conducted, with time of test as the repeated measure and treatment condition (Text Infusion/RFL Instruction, Text Infusion Alone, and Traditional Instruction) as the between-subjects factor. Extended scale scores allow one to compare achievement across the entire range of grade levels tested on the GMRT. A score of 500 represents the normative achievement of a 5th grader at the beginning of the school year; the normal curve equivalent score (NCE) would be equal to 50. The same pattern of results was obtained in the analyses on each of the GMRT subtests and on total reading. We focus here on the Comprehension assessment. Mean scale scores are shown in Table 3. During the first year of the project, in second grade, children improved significantly from fall to spring, as one would expect given regular classroom instruction,  $F(1, 176) = 271.72, p < .001, \text{partial } \eta^2 = .61$ . Children in all three conditions had similar scores at the outset of the project and showed comparable gains in comprehension. Thus, contrary to predictions, reading achievement as indexed by a widely-used standardized assessment was not greater as a result of enhanced exposure and use of informational books in the classroom during second grade. Results were similar in the longitudinal analyses; children



continued to improve in their reading skills through fourth grade,  $F(103) = 239.45, p < .001$ , partial  $\eta^2 = .70$ , but with no differential effects related to treatment condition.

In order to better contextualize the reading comprehension abilities of the children in the REAL project, we relate their performance at the end of grade 3 to national norms. This time point corresponds to the "Reading by 9" initiative popularized in the late 1990s that emphasized the need to be ready to transition to "reading to learn" in 4th grade. Children who have a grade equivalent (GE) of 3.9 in comprehension on the GMRT would have an ESS of 477 and an NCE of 52. In the REAL sample, only 25% of the children were reading at or above 3.9 on the spring of Grade 3 assessment. The median GE was only 2.8. Moreover, 25% of the students were reading at or below a GE of 2.3. Clearly, as intended when we selected the district and the schools within it, children's reading comprehension was low relative to national norms.

**Table 3.** *Extended Scale scores for GMRT Comprehension by Treatment Condition and Grade Level (SDs in Parentheses)*

Treatment	N	Fall Gr. 2	Spring Gr. 2	Spring Gr. 3	Spring Gr. 4
Text Infusion/RFL	28	383.71 (34.19)	422.46 (34.27)	445.82 (27.60)	470.50 (21.78)
Text Infusion Alone	48	395.63 (37.99)	416.63 (36.46)	447.15 (38.83)	468.27 (33.23)
Treatment	N	Fall Gr. 2	Spring Gr. 2	Spring Gr. 3	Spring Gr. 4
Traditional	30	392.60 (58.08)	422.37 (44.88)	458.07 (30.03)	475.77 (31.69)

To address our specific interest in informational text comprehension, the passages on all four forms of the GMRT comprehension subtests were classified as fiction or nonfiction, with nonfiction further categorized as narrative-informational or expository. (No instances of mixed text were identified.) Two raters independently categorized each passage and established good inter-rater reliability. The classifications were subsequently compared to those reported in the GMRT technical manual. For Levels 2 through 4, the GMRT categorizes passages by content as fiction, social sciences, or natural sciences, and by type as narrative, expository, or setting. They used setting for "passages that seemed characteristic of those sections of stories that do not actually move the account forward in time" (MacGinitie et al., 2002, p. 21), and we classified all the setting passages as fiction.

Our passage classification matched on 36 of the 42 passages (86%) across the four forms. For two of the passages on which there was disagreement (one on each of the Level 2 forms), the GMRT technical manual indicated that the source material was social studies exposition. However, when taken out of context as in an assessment, these passages appeared to be stories and we coded them as such. On Level 2T, two other mismatches occurred for (a) a passage the GMRT considered social studies narrative but appeared to be a story so we coded it fiction, and (b) a passage the GMRT classified as natural science narrative but we classified as expository. On Level 4S, there were two mismatches. In one case, the GMRT classified a passage as social studies narrative, but we classified it as exposition. In the other case, the passage was labeled exposition, but we judged it to be narrative-informational. Although there were few mismatches, those that occurred underscore the difficulty of classifying short segments out of context.

Table 4 shows the number of passages of each type on each form coded according to our system, as well as the number of test items of each type. The proportion of nonfiction passages increases with grade level, as one would expect. Unexpectedly, the two types of nonfiction passages, expository and narrative-informational, were unevenly distributed across forms and grade levels. Proportion correct of each item type was calculated for each

student, and these data were used to test for internal consistency reliabilities for each of the item subsets; Cronbach's alphas are presented in Table 4. (In an additional set of analyses not described here, we determined that the nature of the questions changes from predominantly literal in Grade 2 to predominantly inferential in Grades 3 and 4 and that students performed better on literal questions at all four testing points.)

Within-subject analyses of variance were conducted to compare comprehension on the different passage types. Treatment condition was not included as a factor in order to increase power. All children who completed each test were included in the analyses, regardless of how long they had been enrolled at the participating schools. Mean proportions correct on fiction and nonfiction items are shown in Table 5. In the fall of Grade 2, on Form 2S, and in the spring of Grade 2, on Form 2T, students scored significantly better on the fiction questions than the nonfiction,  $F(1,222) = 223.70, p < .001$ , partial  $\eta^2 = .50$ , and  $F(1, 211) = 42.23, p < .001$ , partial  $\eta^2 = .17$ , respectively. Grade 3 Form S data also indicated significantly better performance on fiction than on nonfiction,  $F(1, 183) = 33.09, p < .001$ , partial  $\eta^2 = .15$ . However, in Grade 4 Form T, performance was comparable on the two text types,  $F(1, 206) < 1$ . The commonplace generalization that children comprehend fiction better than nonfiction was supported in Grades 2 and 3, but by Grade 4 informational text was comprehended as well as fiction. This latter outcome contrasts with the 2009 NAEP results, which showed an advantage for literary over informational comprehension for fourth graders. The pattern also varies from that reported by Diakidoy et al. (2005) who found that fourth graders had better scores on expository than on narrative, but second graders were comparable.

Outcomes on reading assessments may vary depending on the nature of the nonfiction passages that are used (e.g., narrative-informational and/or expository). Because the Grade 4 test had sufficient numbers of items of each type, with good internal consistency reliability on each subscale, an additional analysis was conducted comparing comprehension of fiction, narrative-informational, and expository text types. The overall main effect was significant,  $F(2,206) = 6.90, p < .001$ , partial  $\eta^2 = .06$ , with follow up analyses showing that expository text comprehension was significantly better than comprehension of narrative-informational text; comprehension of fiction was at an intermediate level, not significantly different from either of the other two text types. A parallel analysis was conducted for Grade 2 (Form S), but results should be interpreted cautiously given the low reliability of the expository text subscale. This analysis also revealed an overall effect of text type,  $F(2,222) = 129.64, p < .001$ , partial  $\eta^2 = .37$ . Comprehension was best on fiction, with narrative-informational text in the middle, and with expository text comprehension the weakest; all pairwise comparisons were significantly different. These data are also shown in Table 5.

Several issues must be kept in mind in interpreting these results, the most important of which is that the passages were very short, averaging from 82 words in the Grade 2 tests to 93 words in Grade 4. Classification as to text type is more accurate with longer passages. Moreover, students reading short expository passages often do not encounter the same text features they would encounter in longer expository texts, such as bold-faced words, headings, and glossaries. Also, complex organizational text structures are not as evident in short expository passages as they are in longer expository texts. A final limitation of this analysis is that the developers of the GMRT did not design the test to yield separate scores on comprehension of fiction and non-fiction. Although we found acceptable internal consistency reliability on all but one of the subscales, we were not using the test as the developers intended.

**Table 4.** *Number of Passages and Items of Different Text Types on the GMRT Comprehension Test and Internal Consistency Reliabilities of the Derived Sub-scales*

Form	Passage Type			
	Fiction	Overall Nonfiction	Narrative Info	Expository
Grade 2 (S)	6	4	2	2
Grade 2 (T)	6	4	0	4
Grade 3 (S)	6	5	0	5
Grade 4 (T)	4	7	3	4
	Item Type			
	Fiction	Overall Nonfiction	Narrative Info	Expository
Grade 2 (S)	24	15	8	7
Grade 2 (T)	24	15	0	15
Grade 3 (S)	29	19	0	19
Grade 4 (T)	15	33	17	16
	Cronbach's Alpha			
	Fiction	Overall Nonfiction	Narrative Info	Expository
Grade 2 (S)	.87	.75	.78	.46
Grade 2 (T)	.87	.79	..	.79
Grade 3 (S)	.86	.80	..	.80
Grade 4 (T)	.79	.85	.70	.70

**Table 5.** *Proportion of Correct Responses (SDs in parentheses) on the Fiction and Nonfiction Items of the GMRT Comprehension Test*

Form	N	Type of Test Item			
		Fiction	Overall Nonfiction	Narrative Info	Expository
Grade 2 (S)	223	.53 (.25)	.36 (.22)	.41 (.27)	.30 (.22)
Grade 2 (T)	212	.61 (.23)	.54 (.25)	..	.54 (.25)
Grade 3 (T)	184	.51 (.24)	.45 (.23)	..	.45 (.23)
Grade 4 (S)	207	.51 (.24)	.51 (.20)	.48 (.22)	.52 (.21)

The analysis of passage types on the GMRT points to an important issue with regard to nonfiction text: how it is categorized. In particular, the distinction between expository and narrative-informational text is often problematic. For example, although the intent of the GMRT developers was that Forms 2S and 2T present children with equivalent numbers of expository and narrative-informational passages, we found disparity between the forms. Our classification indicates that each form has 15 nonfiction items; but 2T has 15 items on expository passages, whereas 2S has 7 items on expository passages and 8 on narrative-informational. As noted, part of the difficulty may be that these passages are not only very short, but that they appear out of context. But to complicate matters, nonfiction is not categorized consistently in the literature. In the classification system used on the 2009 NAEP,

narrative-informational passages are included within the literary category, and expository passages are included within informational (NCES, 2009). In contrast, the Common Core State Standards include both types in their definition of informational text (CCSS, 2010). This variability in classification schemes limits generalizability across studies.

It is clear from our analyses that the distinction between narrative-informational and expository text is important, and these text types should be examined separately. Moreover, it is not yet understood whether children process narrative-informational texts more similarly to fictional narratives or to nonfictional exposition. However, research reveals differences in the competencies that contribute to comprehension of the different genres. Best, Floyd, and McNamara (2008) found that among third graders, comprehension of narrative text was most influenced by decoding skills, whereas comprehension of expository text was most influenced by world knowledge. The study provides confirmation of the widely-stated assertion that children need a solid knowledge base in order to understand expository text.

#### *Reading-and-Writing-to-Learn Assessments*

To more directly tap the comprehension skills that were the focus of the REAL project, performance assessments were developed for each grade level and were pilot tested prior to implementation. For second and third grade, two alternate form expository texts were created and were presented in counterbalanced order across fall and spring test sessions. The second grade texts dealt with either snakes or frogs, and each was bound in an 8-page booklet with color illustrations and a table of contents. The third grade texts dealt with either Rome or Egypt. Booklet length was increased to 16 pages; the texts included color illustrations and text access features (a table of contents, glossary, and index). For fourth grade, the task increased in complexity with children receiving two booklets at each testing session, requiring them to integrate information across booklets. Fourth graders received booklets on either Boston and Chicago, or Hawaii and Alaska, presented in counterbalanced order across fall and spring testing. The four booklets for fourth grade were each 18 pages long, including illustrations, a table of contents, glossary, and index. At all three grade levels, children responded in writing to open-ended prompts about the materials they read, as described below.

The Reading and Writing to Learn assessments differed across the years because of children's increasing competencies. Although we developed this assessment prior to the publication of the Common Core State Standards, the expository text comprehension demands at each grade level were consistent with the standards. Table 6 shows the specific prompts that were used in each assessment and examples of the qualitative scoring rubrics that were used.

*Grade 2 Performance Assessment.* Students were presented with one of the two books and an accompanying response sheet. Children's responses to the prompts shown in Table 6 were scored according to a 5-point scale ranging from 0 to 4. Portions of the rubric for question 2 are also shown. Each response was scored by two independent coders; reliability was strong, with correlations averaging about .90. The two questions were summed for a total score. Although the scores were significantly correlated, internal consistency reliability was rather low, .52 in the fall and .47 in the spring.

**Table 6.** Prompts and Sample Scoring Rubrics for the Reading and Writing to Learn Performance Assessments

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Grade 2

Prompt

1. Use your book to learn new information about frogs. Find out interesting information about frogs. Write down what you have learned on the lines below.

Today I learned about frogs. Here are some interesting things that I learned. ...

2. Pretend your friend wants to pick one of these frogs as a pet. Use your book to find out about these two frogs. Which frog should your friend pick as a pet? Explain why your friend should pick that frog.

Circle the frog your friend should pick (photographs were provided of the two frogs described in the text).

My friend should pick this frog as a pet because ....

Portions of the Scoring Rubric for Question 2

*5 points:* Answer is written in student's own words, claims one of the animals as the best choice, uses information from more than one place in the text to support the choice, and includes a contrasting of the two animals to further explain and justify the choice.

*1 point:* answer is expressed as an opinion, or uses only picture clues, but does not include information from the text.

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Grade 3

Prompt

Pretend that you are going back in time to visit the people of Rome/Greece long ago. Write what the people would be like. Be sure to include information on how they would dress, what they would eat, what they do for fun, and any other information that would help you tell us what their life would be like.

Portions of the Scoring Rubric for the Use of Notes

*4 points:* Notes are clear and serve as the primary basis for the details in the writing and the organizational structure.

*1 point:* Notes are recorded but there is little or no use of notes in the writing.

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**Table 6 (Continue).** Prompts and Sample Scoring Rubrics for the Reading and Writing to Learn Performance Assessments

Grade 4
Prompt
<i>Where do we go?</i>
Today you will pretend your class has won an all-expense paid trip to 1 of 2 exciting places. Your job is to research both locations and decide which place you think your class should visit. You will have two short books to read about these places.
We will give you time to read the first book and take notes about what you like and don't like. Then we will give you time to read the second book and take notes. You will use the information you have gathered to choose where you think your class should go.
After you have decided where you think your class should go, you will write a letter to your teacher persuading him or her to take your class to this place. Be sure to include information from the 2 books to support your choice.
Portions of the Scoring Rubric for Persuasion
<i>4 points:</i> The student takes a clear stand on where the class should go and fully supports it with reasons based on the reading and their prior knowledge. The student details why they should go to the chosen place, and why they should not go to the other place.
<i>1 point:</i> The student does not take a stand on the issue. The student presents some information but it is not clear where he/she would prefer to go, or why they came to his/her decision.

**Table 7.** Mean Scores on the Reading and Writing to Learn Assessments (SDs in Parentheses) by Treatment Condition, Grade Level, and Assessment Time

Grade	Treatment Condition		
	Text Infusion/RFL Instruction	Text Infusion Alone	Traditional Instruction
2	<i>n</i> = 47	<i>n</i> =67	<i>n</i> =65
Fall	3.13 (1.41)	3.30 (1.76)	3.31 (1.89)
Spring	4.13 (1.75)	4.18 (1.57)	4.14 (1.94)
3	<i>n</i> =33	<i>n</i> =52	<i>n</i> =35
Fall	12.45 (3.48)	12.58 (4.23)	13.69 (5.02)
Spring	14.64 (3.34)	14.73 (4.24)	16.60 (5.01)
4	<i>n</i> =27	<i>n</i> =30	<i>n</i> =31
Fall	11.19 (2.94)	11.23 (2.81)	11.35 (3.05)
Spring	10.56 (3.03)	11.87 (3.14)	11.94 (3.35)

Table 7 shows the mean scores on the Reading and Writing to Learn assessment in the fall and in the spring for each treatment condition. Preliminary analyses revealed that scores on the two alternate forms were comparable and that scores were comparable across conditions at baseline. A repeated measures analysis of variance revealed significant growth over the school year  $F(1, 176) = 41.24, p < .001, \text{partial } \eta^2 = .19$  (fall mean = 3.26 and spring

mean = 4.15). Contrary to predictions, however, children who received the text infusion with reading for learning instruction did not outperform children experiencing only the text infusion or traditional classroom instruction, even though this assessment was more closely aligned with the focus of the intervention than was the GMRT.

*Grade 3 Performance Assessment.* In Grade 3, children responded to a single elaborated question, shown in Table 6. Along with the passages, they were provided with a grid for taking notes to help them prepare their response. The worksheet included spaces for recording information about clothes, food, dress, and other information. Responses were scored according to four criteria: topic use, use of notes, accuracy of information, and quality of writing. Scores on each could range from 0 to 4. See Table 6 for a portion of the rubric for use of notes. Each response was scored by two independent coders, and inter-rater reliability was strong, with correlations above .90. The four separate scores in the coding rubric were summed for a total score. Cronbach's alpha revealed good internal consistency reliability (.78 in the fall and .75 in the spring).

Mean scores are shown in the middle section of Table 7. Analysis of variance revealed significant improvement from fall to spring,  $F(1, 117) = 24.24, p < .001$ , partial  $\eta^2 = .17$ , with a mean score of 12.87 in the fall and 15.25 in the spring. However, again contrary to predictions, children in the Text Infusion/RFL Instruction condition did not achieve higher comprehension scores than children in the other two conditions, nor was there differential growth over the school year.

*Grade 4 Performance Assessment.* The Grade 4 task required students to integrate information across two expository texts to derive their responses to a single question (see Table 6). Along with the passages, students were given a response sheet with columns for taking notes about what they liked and did not like about each of the two possible destinations for a class trip. A 5-element coding rubric was used for the responses, with 0 to 4 points on each element. Students were scored on persuasiveness, organization, style, grammar, and use of notes. A portion of the rubric for persuasion is shown in Table 6. Each response was scored by two independent coders, with reliability again strong (correlations among raters averaged .88). The five elements in the coding rubric were summed for a total score. Cronbach's alpha revealed good internal consistency reliability (.82 in the fall and .85 in the spring).

On this more challenging performance assessment, students showed no significant improvement from fall to spring,  $F(1, 85) < 1$ . The mean score in the fall was 11.26 and in the spring it was 11.45. Once again, contrary to predictions, informational text infusion in the classroom, with or without reading for learning instruction, did not affect performance (see Table 7).

*Predictors of Performance on the Reading and Writing to Learn Assessments.* As was just demonstrated, a key question that motivated the REAL project was answered negatively; that is, the Text infusion/RFL Instruction intervention did not promote growth over time in children's comprehension of expository text on the RWTL assessment. Another important question concerns the role of early literacy competencies on subsequent achievement. As has been amply shown in the literature, children come to school with vast differences in background knowledge that are not easily supplemented in the classroom, and the comprehension skills that children have acquired by the end of first grade are strong predictors of performance throughout their school years (Duke & Carlisle, 2011; Neuman, 2006). Multiple regression analyses were therefore conducted to examine the extent to which competencies at the beginning of Grade 2 predicted growth on the performance assessments from fall to spring in each of Grades 2, 3, and 4. If children's early facility in reading and writing about informational text continues to predict performance in

subsequent years, above and beyond comprehension as measured by the GMRT, it would provide evidence that further efforts to enhance children's experiences with informational text are indeed warranted.

In each analysis, students' scale scores on the Fall of Grade 2 administration of the GMRT were entered into a regression analysis, treating Decoding, Word Knowledge, and Comprehension as separate variables, along with the Fall of Grade 2 scores on the Reading and Writing to Learn Assessment. For the regression predicting Spring of Grade 2 RWTL scores, no other predictor variables were entered. For the regressions of Spring of Grade 3 and 4 RWTL scores, the Fall RWTL scores were used for the respective grade level in order to test for growth across the year. The results of the three analyses are shown in Table 8.

The overall model for Grade 2 was significant,  $F(4, 172) = 15.97, p < .001$ , accounting for 27% of the variance. Significant variance was accounted for by the Fall RWTL scores, by GMRT Decoding, and GMRT Word Knowledge. The GMRT Comprehension scores did not contribute additional variance beyond that accounted for by the other variables. At this early grade level, students' entering decoding skills best predicted growth in the performance assessment. The overall model for Grade 3 was also significant,  $F(5, 112) = 4.59, p < .001$ , accounting for 17% of the variance. However, no individual predictors were significant, with GMRT Comprehension the only one that even approached significance at  $p < .10$ .

Of most interest was the longer-term analysis of predictors of reading and writing to learn at the end of Grade 4. This analysis provided clear evidence of the importance of early informational text competencies. The model was significant,  $F(5, 78) = 18.44, p < .001$ , accounting for 54% of the variance. The Fall of Grade 2 RWTL score was the strongest individual predictor of RWTL growth in Grade 4. The beta weight was even stronger than that of the Fall of Grade 4 RWTL score. None of the early GMRT scale scores significantly predicted unique variance, although Decoding came close at  $p < .07$ . Thus, the children who at the beginning of Grade 2 already had the comprehension skills needed to read an expository text and respond in writing to open-ended prompts fared better on the end-of-grade 4 RWTL assessment. We believe that Question 2, which called for the child to justify the choice of a pet for a friend, was a particularly sensitive assessment of comprehension because one of the animals was described as harmless and the other as poisonous.

**Table 8.** Regression Analyses of Early GMRT Scores and Reading and Writing to Learn (RWTL) Scores as Predictors of Growth in RWTL in Grades 2, 3, and 4

	<i>B</i>	<i>SE B</i>	Beta	<i>t</i>	Sig.
Spring Grade 2 RTWL					
Intercept	-.18	1.41		-.127	.90
Fall Gr. 2 RWTL	.33	.07	.33	4.54	<.001
Fall Gr. 2 Comprehension	.003	.004	.07	.81	.42
Fall Gr. 2 Decoding	.02	.01	.44	3.42	.001
Fall Gr. 2 Word Knowledge	-.01	.01	-.25	-2.03	.04
Spring Grade 3 RTWL					
Intercept	-1.40	5.28		-.27	.79
Fall Gr. 2 RWTL	.31	.25	.12	1.23	.22
Fall Gr. 2 Comprehension	.02	.01	.19	1.70	.09
Fall Gr. 2 Decoding	.02	.02	.16	.88	.38

Note.  $R^2 = .27$  for Grade 2,  $R^2 = .17$  for Grade 3, and  $R^2 = .54$  for Grade 4.



**Table 8 (Continue).** *Regression Analyses of Early GMRT Scores and Reading and Writing to Learn (RWTL) Scores as Predictors of Growth in RWTL in Grades 2, 3, and 4*

	<i>B</i>	<i>SE B</i>	Beta	<i>t</i>	Sig.
Spring Grade 2 RTWL					
Intercept	-.18	1.41		-.127	.90
Fall Gr. 2 RWTL	.33	.07	.33	4.54	<.001
Fall Gr. 2 Comprehension	.003	.004	.07	.81	.42
Fall Gr. 2 Decoding	.02	.01	.44	3.42	.001
Fall Gr. 2 Word Knowledge	-.01	.01	-.25	-2.03	.04
Spring Grade 3 RTWL					
Intercept	-1.40	5.28		-.27	.79
Fall Gr. 2 RWTL	.31	.25	.12	1.23	.22
Fall Gr. 2 Comprehension	.02	.01	.19	1.70	.09
Fall Gr. 2 Decoding	.02	.02	.16	.88	.38
Fall Gr. 2 Word Knowledge	.001	.02	.004	.03	.98
Fall Gr. 3 RWTL	.07	.10	.07	.67	.50
Spring Grade 4 RTWL					
Intercept	1.61	3.14		.51	.61
Fall Gr. 2 RWTL	.92	.19	.44	4.86	<.001
Fall Gr. 2 Comprehension	.01	.01	.09	.82	.42
Fall Gr. 2 Decoding	.03	.01	.35	1.86	.07
Fall Gr. 2 Word Knowledge	-.02	.02	-.25	-1.50	.14
Fall Gr. 4 RWTL	.27	.10	.24	2.64	.01

#### *Use of Informational Text Features*

Children's ability to access information using text features was assessed in the first two years of the project. Text access was a central component of the instruction teachers in the Text Infusion/Reading for Learning condition were asked to provide. Considerable attention was given to text access features in the in-service training, and texts were selected for the classroom libraries based on the quality of these features.

Samples of the text access items are provided in Table 9. The same assessment instrument was used in the fall and spring. In the Grade 2 task, children were asked six questions about finding information in a table of contents and an index. In Grade 3, a more demanding assessment was used, consisting of 12 questions, most of which required children to decide whether the requested information could be derived from the table of contents, the index, or the glossary. Text access was not examined in fourth grade because many students scored at or near ceiling on the third grade measure. The decision to focus only on the primary grades turned out to be consistent with the subsequently-disseminated Common Core standards, which specifically address use of text access features in Grades 2 and 3, but not in Grade 4.

**Table 9.** *Sample Items from the Text Access Tasks*


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Grade 2

TABLE OF CONTENTS

What Is a Bear?	5
Where Do Bears Live?	8
What Do Bears Eat?	13
Baby Bears	20
Polar Bears	25
Brown Bears	29
Black Bears	35
Bears In Danger	38
Bears Are Wild Animals	43
Words You Should Know	46
Index	47

1. Which page would tell you what bears eat? \_\_\_\_\_

1. Which page would tell you about brown bears? \_\_\_\_\_

---

Grade 3

Here are the table of contents, glossary, and index from a book about France.  
(Materials are provided to the students.)

1. On what page does the chapter "Vacation Time" begin? \_\_\_\_\_
2. On what page can you find information on castles? \_\_\_\_\_
3. What does "immigrant" mean? \_\_\_\_\_

---

Table 10 provides the mean proportion of items answered correctly on the text access tasks in Grades 2 and 3. The Grade 2 repeated measures analysis of variance revealed significant improvement from fall to spring,  $F(1, 173) = 111.99, p = .001$ , partial  $\eta^2 = .39$ . Of most importance to the goals of the study, and consistent with predictions, was the presence of a reliable interaction of time of test and treatment condition,  $F(2, 173) = 3.09, p = .048$ , partial  $\eta^2 = .03$ . Children in the Text Infusion/RFL Instruction condition made relatively greater gains over the school year than children in either of the other conditions. In Grade 3, repeated measures analysis of variance revealed gains from fall to spring,  $F(1, 158) = 17.90, p < .001$ , partial  $\eta^2 = .10$ , but no differential improvement across conditions.

Across all three project years, scores on the GMRT were significantly correlated with text access scores. Similarly, scores on the Reading and Writing to Learn tasks were significantly correlated with use of informational text features.

#### *Motivation and Voluntary Reading Activity*

Because the REAL project was conceptualized within the engagement model of reading (Baker, Dreher, & Guthrie, 2000), we examined not only reading achievement, but also enablers of that achievement. In this view, students who are motivated to read and who choose to read frequently will be better comprehenders than those who are less motivated and who read less. It was hypothesized at project outset that increasing student access to interesting texts would increase reading motivation and reading activity, which in turn would increase reading comprehension. We briefly report the results of our analyses of motivation and reading activity, but without the level of detail given to comprehension.

**Table 10.** Mean Proportion Correct on Text Access Tasks in Grades 2 and 3 by Treatment Condition and Time of Test

Grade	Text Infusion/RFL Instruction	Text Infusion Alone	Traditional Instruction
2			
Fall	.44	.51	.57
Spring	.82	.84	.78
3			
Fall	.66	.77	.78
Spring	.75	.80	.81

*The Motivations for Reading Questionnaire – Primary (MRQ-P)*, a shorter and simplified form of an instrument designed for older elementary school children (Baker & Wigfield, 1999; Wigfield & Guthrie, 1997) was administered in the fall and spring of Year 1 and in the spring only in Years 2 and 3. Students rated their motivation with respect to different aspects of reading on a 3-point scale. Item ratings were summed for a total motivation score, and subscale scores for four dimensions were also obtained: perceived competence, interest (intrinsic motivation), recognition (extrinsic motivation), and social interaction. Analyses of internal consistency reliability were conducted each time the MRQ-P was administered, and alphas were at acceptable levels (typically around .85). Sample items are shown in Table 11.

In Grade 2, children showed a significant *decline* in overall motivation from fall to spring, consistent with a number of other studies showing declines in the early grades. However, longitudinal analyses did not reveal further declines in third and fourth grade. Similar to the results for the reading assessments, motivation was not impacted differentially by classroom text infusion. Analyses of the separate motivation subscales revealed generally similar patterns to the overall scale, with the exception of the perceived competence subscale. Although children's perceived competence in reading declined from fall to spring of second grade, it increased over the next two years.

**Table 11.** Sample Items from the Motivation for Reading Questionnaire (MRQ-P)

1. Perceived Competence			
How good a reader are you?			
Very good	OK		Not very good
2. Interest (intrinsic motivation)			
How much do you like to read about new things?			
Very much	A little		Not much at all
3. Recognition (extrinsic motivation)			
How much do you like to get praise for your reading?			
Very much	A little		Not much at all
4. Social			
How much do you like to tell your family about what you are reading?			
Very much	A little		Not much at all

*Note.* Responses at the positive end of the scale were scored as 3, those at the negative as 1.

Correlational analyses examined whether higher levels of reading motivation were associated with better reading comprehension. Motivation scores were associated with performance on the GMRT over the years, with the strength of the correlations greater for particular subscales. For example, in Grade 4, perceived competence and reading for

recognition (extrinsic motivation) were significantly correlated with achievement, but reading for interest (intrinsic motivation) and reading for social interaction were not. Motivation scores were more weakly associated with performance on the Reading and Writing to Learn assessment than the GMRT, especially for the assessments administered in the first year of the project. Children's motivation was also weakly associated with performance on the text access tasks, with stronger relations for the perceived competence subscale than for the overall measure or other subscales.

Table 12 shows the consistent relations between perceived competence and GMRT reading comprehension over the years. It is particularly noteworthy that as early as the beginning of second grade, children's perceptions of themselves as readers were associated with their actual performance, concurrently and into the future. Also noteworthy is the suggestion of bidirectional influences; Fall of Grade 2 perceived competence was associated with Grade 4 comprehension, and Fall of Grade 2 comprehension was associated with Grade 4 perceived competence.

**Table 12.** *Correlations between Perceived Competence and GMRT Comprehension*

Perceived Competence	Reading Comprehension			
	Fall Gr. 2	Spring Gr. 2	Spring Gr. 3	Spring Gr. 4
Fall Gr. 2	.24	.21	.23	.25
Spring Gr. 2	.27	.31	.28	.28
Spring Gr. 3	.25	.27	.22	.21
Spring Gr. 4	.38	.33	.36	.37

Note. Listwise  $N=101$ . All correlations are significant at  $p < .05$  or better.

*The Reading Activity Inventory – Primary (RAI-P)*, a simplified version of the instrument designed for older children (Wigfield & Guthrie, 1997) was administered following the MRQ-P. Students responded to two types of questions regarding their reading activity out of school, one asking how often they read particular types of books and the second asking whether they had read that type of book within the past week. The RAI-P assesses the amount and breadth of students' reading by examining the frequency with which students read texts of different genres (e.g., mysteries, biographies, nature books). Table 13 shows sample questions for fiction and for informational text.

In Grade 2, analyses revealed significant declines in self-reported reading activity from fall to spring; these declines occurred for children in all treatment conditions. The longitudinal analysis showed that reading activity scores did not decline further in Grades 3 or 4. However, the effect of treatment condition was statistically significant,  $F(2, 109) = 5.85$ ,  $p = .004$ ,  $\eta^2 = .10$ . Consistent with one of the REAL hypotheses, students who received only traditional instruction reported less frequent outside reading over the years than students who experienced text infusions in their classrooms. (For Traditional Instruction,  $M = 2.09$ ,  $SD = .54$ ; for Text Infusion Alone,  $M = 2.46$ ,  $SD = .56$ , and for Text Infusion/RFL Instruction,  $M = 2.30$ ,  $SD = .58$ ). Note that a mean rating of 2.0 corresponds to reported reading of a particular type of book "about once a month" whereas a mean rating of 3.0 corresponds to "about once a week." These results suggest that exposing children to interesting informational text in the classroom may stimulate more frequent out-of-school reading.

**Table 13.** *Sample Items from the Reading Activity Inventory (RAI-P)*

Question Regarding Fiction			
Did you read a make-believe story or book last week (like a mystery or an adventure for your own interest or for fun?)			
No	Yes		
How often do you read make-believe stories or books for your own interest or fun?			
Almost never	About once a month	About once a week	Almost every day
Question Regarding Informational Books			
Did you read a nature book last week for your own interest or for fun?			
No	Yes		
How often do you read nature books for your own interest or for fun?			
Almost never	About once a month	About once a week	Almost every day

*Note.* Responses of "almost every day" were scored as 4; those of "almost never" as 1.

Self-reported reading activity was consistently related to reading motivation, as is the case when the full versions of the MRQ and the RAI are used (Baker & Wigfield, 1999; Beall, 2011; Wigfield & Guthrie, 1997). However, self-reported reading activity was not associated with reading comprehension in this study, across any of the years. This contrasts with other research showing relations between out-of-school reading and reading achievement (Beall, 2011; Serpell, Baker, & Sonnenschein, 2005, Wigfield & Guthrie, 1997).

#### *Contextual and Individual Differences*

##### *Opportunities to Read Informational Text in the Classroom*

A central premise of the REAL project was that reading informational books would increase the likelihood that students would acquire the knowledge and motivation needed to become better comprehenders. An examination of what took place in REAL classrooms was therefore important as an implementation check and as a means of understanding how contextual factors might impact children's comprehension of informational text (Katenkamp, Garrett, & Baker, 2005).

Classroom observations were conducted in all of the REAL classrooms from October to May during each year of the project, usually three weeks apart. Because the use of informational text could occur at any time during the day, rather than being limited to reading instruction, these observations took place for the full school day. Observers used an adapted version of the Center for the Improvement of Early Reading Achievement (CIERA) School Change Classroom Observation Scheme (Taylor & Pearson, 2001). This scheme includes seven major categories that reflect who is leading the class, the kind of classroom grouping, the major focus of the lesson, the specific type of activity going on, the type of material being used, the nature of the teacher interaction, and the expected pupil response. In addition, the major focus of instruction (i.e., reading, math, science, social studies), the manner in which students were grouped (i.e., whole group, small group, individual), the number of students engaged in the activity, and the total number of the students in the room were recorded. A five-minute coding interval was followed by a five-minute break during which observers continued to take field notes.

We focus here on selected components of the observations. An overall reading composite was created that consisted of how often the coded activity reflected reading or listening to connected text. Word or sentence level activities were not included. The amount of classroom time spent in reading increased across grades two through four. More reading took place in text infusion classrooms; effects were significant in Text Infusion/RFL

Instruction classrooms in Grades 2 and 4 and in Text Infusion Alone classrooms in Grade 3. However, the amount of time spent reading in the classroom was not related to reading achievement or motivation. Increased access to informational books may thus have contributed to increased reading, but increased reading alone was not sufficient to impact comprehension.

Opportunity to listen to the reading of connected text was also examined. Given that teachers in the Text Infusion/RFL Instruction condition were explicitly asked to read aloud the informational books that were provided, it was expected that these teachers would spend proportionally more time in such activity. This expectation was met in second grade, but not in third or fourth. In second grade, teacher read-alouds comprised 20% of classroom reading activity in the Text Infusion/RFL Instruction condition, but only 9% in the Text Infusion Alone and 8% in the Traditional Instruction condition. Proportions decreased to less than 10% in all conditions by 4th grade. The amount of time teachers read aloud to their students was unrelated to reading achievement or motivation.

Opportunities to read different genres (stories and informational texts) were examined. A composite measure of all informational texts was created; this composite included both text and trade books classified as expository, narrative- informational and mixed texts. The percentage of materials used that were coded as informational texts increased significantly from 2nd to 4th grade, from 11% to 20% to 26%. Students in the text infusion classrooms used informational texts more often than those who were in the traditional instruction classrooms, as would be expected given the nature of the intervention. The difference was most dramatic in second grade, where informational texts were used 23% of the time in the Text Infusion/RFL Instruction classrooms but only 5% and 6% of the time in the other two types of classrooms. Contrary to predictions, greater use of informational text was not related to reading comprehension.

#### *Individual Preferences for Informational vs. Narrative Text*

Research has shown that young children respond positively to non-narrative text. For example, when Mohr (2003) gave first graders the opportunity to select a book to keep, 84% selected a nonfiction book. Relevant information was collected in the REAL project through reading logs and preference inventories (Beall, Morse, Baker, & Dreher, 2005). We focus here on fourth-grade findings, when students were asked to list their two favorite books for the year from any they had read at school or at home, to explain why they liked these books, and to select a book to keep as a thank-you gift for project participation.

Overall, and in contrast to the results of Mohr (2003), the majority of students listed a narrative book as their first and second favorite. Informational books were the first choice for 26% of the students and the second choice for 33%. Of particular note is that treatment condition was associated with the type of book chosen as a favorite. A greater percentage of students in the Text Infusion/RFL Instruction and Text Infusion Alone conditions listed an informational book as their first favorite than in the Traditional Instruction condition (41% and 31%, respectively, versus 10%), and the same pattern held for the second favorite (44% and 45% versus 17%), suggesting that increasing informational text availability can influence preferences.

The reason most frequently given by students for selecting a particular book as a favorite was emotional appeal (33%; e.g., "It was funny"). Personal interest was given as a reason by 19% of the students (e.g., "It has my favorite animals," and "It had something to do with my hobby"). Value to the reader was mentioned by 18% of the students (e.g., "It told me many things about cats," "It shows the basic steps how to play.") Students whose favorite books were informational more frequently gave reasons related to the value of the topic. Guthrie et

al. (2007) also found that fourth graders' motivation for reading expository text focused primarily on acquiring new knowledge.

Whether students identified informational books as their favorite was related to reading achievement in the Text Infusion/RFL Instruction condition. Students who selected an informational book as their favorite scored significantly higher on the Word Knowledge/Vocabulary subtest of the GMRT than students who selected a narrative book as favorite. Although student preference for a particular genre was not associated with reading comprehension per se, the fact that it was associated with vocabulary is noteworthy, given the importance of academic vocabulary to reading comprehension.

That the Text Infusion/RFL Instruction intervention had an impact was also suggested by the fact that students who chose an informational book as their favorite reported significantly higher perceived competence, interest, and overall motivation. In addition, students in this treatment condition who identified an informational book as a favorite reported more frequent out-of-school reading and more diversity of reading genres. No relations among these engagement variables were evident in the other two conditions.

#### *Gender Differences in Reading, Engaging, and Learning*

In this section we address gender differences on the various outcome measures in the REAL project. Gender is an individual difference variable of particular importance to this topic because it has often been argued that boys find informational text more appealing than do girls. If this is the case, one might expect boys to have differentially better comprehension of informational text than narrative text, or to be more motivated to read informational books than fiction. Oakhill and Petrides (2007) tested the possibility that the reason why boys in England showed a large reading comprehension increase from one administration of a national reading test to another is because the passage topic was more appealing to them. The topic the previous year had been about leaving home in wartime and that year it was about spiders. Using a within-subjects design, they found that boys overwhelmingly preferred the passage about spiders and girls the passage about wartime evacuation. Of particular relevance is that boys had better comprehension of the passage about the preferred topic, whereas girls had equally good comprehension of both passages.

*Reading Achievement.* On major large-scale reading assessments, both national and international in scope, girls consistently outperform boys. For example, on the 2009 NAEP, fourth-grade girls had significantly higher scale scores than boys, and fewer scored below the basic level (30% vs. 36%). On the 2006 PIRLS, fourth-grade girls had significantly higher scores than boys in all but two of the 46 participating educational systems around the world (Mullis et al., 2007).

Within the REAL project, reading achievement on the GMRT was consistently better for girls than for boys, across years and across GMRT subscales. The advantage was not statistically significant in grade two, but it was in grades three and four. Across the full longitudinal sample, the main effect of gender on GMRT comprehension was significant,  $F(1, 104) = 10.55, p = .002$ , partial  $\eta^2 = .09$ . The mean extended scale score for girls at the end of fourth grade was 458.58 whereas for boys it was 441.43.

We also tested the possibility that the gender difference in reading comprehension might be attenuated when informational texts are used as opposed to fictional. Using our constructed GMRT subscales, we found no evidence of an interaction of gender with text type, either when we compared informational vs. fiction, or when we compared expository and narrative-informational text types separately. In contrast, on the NAEP, girls had significantly better scores on both literary and informational text than did boys (see Table 1).

The advantage for girls on literary text was 8 scale points, but on informational text it was only 6.

On the Reading and Writing to Learn performance assessments, girls and boys performed comparably in second grade. Girls scored higher than boys during third grade but the effect of gender was not statistically significant ( $p = .07$ ), means = 14.60 and 13.75, respectively. The gender difference was statistically significant in Grade 4,  $F(1, 84) = 5.69$ ,  $p = .012$ , partial  $\eta^2 = .06$ , with mean scores of 12.10 for girls and 10.78 for boys.

Although considerable evidence shows girls outperforming boys on tests of reading, we are not aware of any studies that have specifically addressed gender differences in information access. Performance on the REAL text access tasks was better for girls than for boys, with statistically significant advantages in both years (second grade,  $F(1, 173) = 5.82$ ,  $p = .02$ , partial  $\eta^2 = .033$  and third grade,  $F(1, 155) = 7.84$ ,  $p = .006$ , partial  $\eta^2 = .048$ ). Mean proportions correct in Grade 2 were .71 for girls and .61 for boys, and in Grade 3, .78 and .69, respectively.

*Reading motivation, reading activity, and book preferences.* Gender differences in motivation are often reported in the literature. For example, Baker and Wigfield (1999) found consistently higher scores for fifth- and sixth-grade girls on the Motivations for Reading Questionnaire. However, in the REAL project, boys and girls generally had comparable levels of motivation across all three years. Similarly, there were no differences in perceived competence, despite the fact that girls earned objectively higher reading achievement scores than did the boys. At the final assessment point, at the end of Grade 4, girls had a mean score of 2.57 and boys 2.47 out of 3 possible. Clearly, all students had a positive appraisal of their competencies. Girls typically report more frequent out-of-school reading than boys (Beall, 2011; Baker & Wigfield, 1999), but gender differences were absent on the reading activity inventory in the REAL project.

Gender differences are often reported in the types of books students prefer to read. For example, Mohr (2003) found that 96% of first-grade boys selected nonfiction books for themselves, whereas 69% of the girls did so. In addition, Oakhill and Petrides (2007) reported that an unpublished survey of 10-11-year-olds found that boys preferred factual books and girls preferred storybooks. In contrast, Chapman, Filipenko, McTavish, and Shapiro (2007) found that first graders showed no gender differences in their preferences for stories or informational books when choosing books for themselves. But when asked about what other children would prefer, both boys and girls thought that boys would prefer informational books whereas girls would prefer stories. In the REAL project as well, no gender differences were found in the types of books that were identified as favorites, indicating that informational books can be equally appealing to both boys and girls. However, when given a choice of which book they would like to receive as a "thank you" gift at the end of the project, more boys than girls chose an informational book, but overall, stories were chosen by 68% of the children.

### **Summary and Conclusions**

The REAL project was designed to investigate whether a classroom intervention that enhances young children's experience with informational books would increase reading achievement and engagement. Contrary to expectations, the intervention had minimal impact on student outcomes. Students in second grade improved in GMRT reading comprehension from fall to spring to the same extent regardless of whether they had additional informational books in their classrooms and specific instruction in their use, and the same pattern obtained in grades three and four. The RWTL performance assessment, administered in both fall and spring every year, revealed improvement over the year in



second and third grades, but no differential progress related to the intervention. The one significant treatment effect was obtained on the text access task, which most closely parallels the instruction teachers were asked to provide. Students in the Text Infusion/RFL Instruction condition made greater gains in their ability to use text access features than students in the other two conditions. However, the treatment effect was found only in second grade, not in third.

Students declined in reading motivation during the course of second grade and into third grade, again regardless of intervention condition. Motivation stabilized, showing no further declines in fourth grade. Self-reported reading activity also declined over the first year of the project and stabilized subsequently. Of importance is that students with increased access to informational books in the classroom reported more out-of-school reading across the years than students without the increased access.

By the end of the project in fourth grade, the infusion of informational books into the classroom libraries appears to have influenced student preferences for reading material. Students in both text infusion treatments were more likely to select an informational book as one of their two favorites for the year. Students who selected informational books tended to do so because they satisfied a desire for information or taught the students something that was important to them. Students who expressed a preference for informational books at the Text Infusion/RFL Instruction school may also have experienced an increased interest in reading, as evidenced by more self-reported reading activity out of school.

Despite the lack of evidence of improved comprehension in the REAL project that can be attributable to the text infusion intervention, it should not be concluded that students will not benefit from increased access and instruction in using informational books in the early grades. Substantial correlational evidence exists that should not be ignored, both within our own study and external to it. Moreover, since the REAL project was conceptualized a decade ago, several empirical studies now provide evidence that interventions designed to increase children's understanding and use of informational text result in growth in reading comprehension (e.g., Guthrie, Wigfield, Barbosa et al., 2004; Guthrie et al., 2007; O'Hara, 2007; Williams et al., 2005; Williams et al., 2009). We intentionally chose not to change classroom practice dramatically, in order to gain greater buy-in on the part of the principals and the teachers. However, it appears that many teachers benefit from having very structured lessons prepared for them to deliver, and it is under these circumstances that intervention effects are most likely to be found (Guthrie, Wigfield, & Perencevich, 2004; Williams et al., 2005).

The type and amount of professional development that will help teachers successfully enhance children's comprehension of informational text may depend on the degree of change an intervention requires. Taking a broad focus, Guthrie, Wigfield, Barbosa et al., (2004) aimed at changing teachers' approach to reading instruction entirely. During a 12-week intervention, Guthrie et al. had teachers devote their daily 90-minute reading block to Concept-Oriented Reading Instruction (CORI). During CORI, they were to teach reading strategies in the context of hands-on science theme units that afforded children access to interesting texts and allowed them to make choices and collaborate. To make such a change possible, Guthrie et al. provided teachers with 10 days of professional development including instructional examples, materials, and time to plan lessons using a teacher's guide and with assistance available. In contrast, some interventions have had a narrower focus. Williams et al. (2009) focused on one aspect of informational text comprehension: compare-contrast text structure. They investigated the effect of teaching children to comprehend compare-contrast science texts in lessons that supplemented regular instruction. Teachers

taught 45-minute sessions 3 times a week for a total of 22 sessions. Because teachers were supplied with detailed lesson plans and all necessary materials, professional development required only about 30 minutes.

The issue of how best to help teachers provide effective instruction relevant to informational text is an important area of investigation. Teachers are less comfortable with such text than with stories (Donovan & Smolkin, 2001; Yopp & Yopp, 2006), and the task of integrating informational text into literacy instruction is difficult for many. Ness (2011) noted that although teachers held a favorable view of informational text, they nevertheless reported under-using it due to factors such as lack of time, lack of resources, and curriculum constraints. Dreher and Zelinke (2010) reached similar conclusions based on a review of literature, but also identified teacher knowledge as a major challenge. Concerns cited in the literature include lack of knowledge about features and types of informational text, the availability of informational text, and the use of such text in instruction.

To be successful in implementing instruction, teachers need knowledge about informational text. Thus, both initial certification programs and professional development for practicing teachers should include more focus on the why and how of using this genre. However, even if teachers have extensive knowledge about informational text, they likely will need additional support to take full advantage of that knowledge. Neuman and Cunningham (2009) found that although a professional development course was effective in developing teacher knowledge, it did not result in improving teacher practice unless accompanied by coaching in which an expert helped a teacher learn to apply knowledge to practice.

Limitations in teacher knowledge and practice with respect to informational text may contribute to null effects on reading comprehension, not only in the REAL project but also in other recent interventions. In a large-scale study at fifth grade, James-Burdumy et al. (2010) found no effect on reading comprehension for supplemental reading curricula, all of which targeted reading to learn. Remarkably, these programs, with titles such as *Read for Real* and *Reading for Knowledge*, also did not lead to increased use of informational text. It seems likely that the lack of improvement in reading comprehension and the failure of teachers to increase the amount of informational text in their instruction are related. Although the nature of the instruction itself is of course important, not just an increased use of informational text (Purcell-Gates, Duke, & Martineau, 2007), teachers who have difficulty including more informational text may also have difficulty providing optimal instruction on such texts. Further research on what will assist teachers to increase their use of and facility with informational text may be particularly important if the Common Core State Standards effort is to be successful. The standards, in various stages of implementation across most states in the US, call for a 50-50 mix of literary and informational text in elementary school, both in grades K-2 and in grades 3-6 (Coleman & Pimentel, 2011a; 2011b).

Although there is much still to investigate, the REAL project provides an informative lesson for those who call for randomized controlled trials as the gold standard of educational research. In her 2005 presidential address to the Society for the Scientific Study of Reading, Joanna Williams referred to the study to illustrate the challenges of conducting classroom-based intervention research. Although the schools were located within the same district, each school had a different ethos and experienced several unique events each year of the study. One school received additional funding because students failed to show improvement on state assessments, and the principal used this money to implement small class sizes. In addition, the Text Infusion Alone school had a new principal in Year 3 who decided to departmentalize instruction in the fourth grade. Thus, all children in the study moved from

classroom to classroom for language arts, science/social studies, and mathematics, and they were seldom given access to the informational books provided except during homeroom periods. Furthermore, the Traditional Instruction school became a magnet school for gifted and talented students during the course of the project, and many of the non-gifted students were transferred to other schools. And of course the small scale of the study meant that we were unable to control for teacher effects; teachers participating in the study varied dramatically in their experience and their effectiveness. The world of public schooling is such that it cannot be controlled.



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