U. S. Fourth Graders' Informational Text Comprehension: Indicators from NAEP

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Abstract

This study is a secondary analysis of reading data collected from over 165,000 fourth graders as part of the U.S. National Assessment of Educational Progress. Using hierarchical linear modelling, the authors investigated factors associated with students' informational text comprehension, including out-of-school reading engagement, and in-school measures of cross-curricular reading, discussion about reading, and reading-related activities (e.g., book reports, projects). In addition, this study examined the interactions between these factors, informational text comprehension, and students' eligibility for Free and Reduced Priced Meals (FARMS). There were positive associations between students' informational text comprehension and their reading engagement, cross-curricular reading, and discussion about reading. However, reading-related experiences were associated with lower than expected scores. In addition, out-of-school reading engagement and in-school reading experiences may not be associated with informational reading comprehension to the same degree for the most at-risk U.S. students, as most results differed in strength of association for FARMS-eligible students.

Keywords: Informational text, Content area literacy, Reading engagement, Discussion, Poverty.

Introduction

Closing the achievement gap between students from middle- and low-income homes has long been a goal in the United States (US) (Coleman, et al., 1966) and remains a major concern as evident in the No Child Left Behind Act (2001). To address the achievement gap, reading performance is a top priority (Bell, 2009/2010; United States Department of Education (USDE), 2002). Promising long-term trend data analyses have shown the gap between low-income and not low-income students in reading achievement narrowing in most states since the enactment of No Child Left Behind (NCLB); unfortunately, however, a sizable minority of states have shown a widening gap (e.g., at fourth grade 28% of states had a widening gap between low-income and non-low income students (Chudowsky, Chudowsky, & Kober, 2009). Moreover, although the results from these analyses suggest some progress toward the goals of NCLB, the gap in reading achievement between

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students from lower and higher socioeconomic backgrounds is still quite large. For example, on the 2011 fourth-grade National Assessment of Educational Progress (NAEP) reading assessment, there was a 26-point gap (on a 500-point scale) between low-income students and their wealthier peers in public schools for literary reading and a 28-point gap for informational reading (calculated using NAEP's Data Explorer: http://nces.ed.gov/nationsreportcard/naepdata/dataset.aspx).

Although the achievement gap is a concern for both literary and informational reading, we focus in this study on the reading of informational texts. Elementary school students in the US performed statistically significantly lower on measures of informational reading than measures of literary reading on a recent international assessment, although this finding is not necessarily true for students worldwide. [See Mullis, Martin, Kennedy, and Foy (2007) for more information on the achievement differences of students in 40 countries.] In the US, informational texts are typically not a focus in reading instruction, particularly in the early grades (e.g., Duke, 2000; Jeong, Gaffney, & Choi, 2010; Moss, 2008; Ness, 2011). [See, however, Smith (1986) and Venezky (2000) for a view of informational text earlier in the history of US reading instruction.] But there is increasing recognition that without early exposure to this type of text, students may be unprepared to handle the unique demands of informational texts, especially exposition (Pressley, Wharton-McDonald, Mistretta-Hampston, & Echevarria, 1998; Williams, 2005) and may face difficulty as school tasks require them to independently comprehend these texts. As students progress through school and into the workplace, they are expected to comprehend more and more informational writing (Common Core State Standards, www.corestandards.org/the-standards; Venezky, 2000; White, Chen, & Forsyth, 2010), particularly in textbooks (Chambliss & Calfee, 1998) and on standardized tests (Calkins, Montgomery, Santman, & Falk, 1998; Flood & Lapp, 1986: National Assessment Governing Board, 2008). The expository structures in textbooks and standardized tests can be challenging for many students, as exposition contains structures and features that differ from those found in narrative texts (Chambliss & Calfee, 1998). Thus, without early experiences, students may not have the skills and strategies needed to understand these texts.

In this study, we focus on fourth grade, which may be a particularly important juncture for examining informational reading. In her description of the stages of reading development, Chall (1983, 1996) noted that it is at about the fourth grade that children must deal with school reading tasks that increasingly move from "learning to read" to "reading to learn." As this shift in reading demands occurs, children must move beyond stories and relatively familiar vocabulary to deal with unfamiliar vocabulary and expository text structures. For many children, these changing expectations result in what Chall termed a fourth-grade slump in reading development. Indeed, Chall, Jacobs, and Baldwin (1990) found that low-income students may be at greater risk of a fourth-grade slump compared to their middle-income peers. Among the reasons is that without exposure to a rich curriculum, they may not have the opportunity to develop the academic vocabulary necessary to comprehend informational texts.

The purpose of our study was to identify factors that are associated with informational reading achievement at the fourth-grade level. To accomplish this purpose, we used data from the fourth-grade NAEP reading assessment. Considering what factors are related to informational text comprehension may shed light on the achievement gap between students of differing socio-economic status. More specifically, by pinpointing aspects of students' home and school reading that are associated with students' informational text comprehension, we sought to provide information that will help inform future research on closing the income-achievement gap.

Important Factors in the Consideration of Students' Informational Text Achievement

Despite the increased focus on the success of low-income students under NCLB (USDE, 2002), progress towards closing the achievement gap has been slow. For example, the reading achievement gap between low-income students and their peers did not narrow between 2007 and 2009 (National Center for Educational Statistics (NCES), 2009). Furthermore, as noted, the 2011 NAEP results for fourth graders -– even after considerable lag time since the implementation of NCLB -- indicate a performance gap between low-income students and their wealthier peers for both literary reading and informational reading. The 2011 gap differs very little from the gap in 2002 NAEP performance just as the NCLB act was passed (a 25-point gap for literary reading and a 29-point gap for informational reading) or from 2005 data used in this study (26-point gap for literary reading and a 28-point gap for informational reading) when fourth graders would have been subject to NCLB changes for approximately 2 ½ years before being assessed in the middle of the school year (NAEP's Data Explorer). [A new NAEP Reading Framework effective in 2009 altered the definitions of informational and literary reading (NCES, 2010b).]

Some scholars suggest that lack of opportunity to engage with content area materials such as science and social studies textbooks may be an important, but often overlooked, contributor to the achievement gap between students from differing socioeconomic backgrounds. Chall and her colleagues (1990) noted that, typically, prior to fourth grade most of the focus of reading instruction is on decoding, fluency, and comprehension of familiar topics and vocabulary. At about fourth grade, students are increasingly expected to uncover the meaning of many technical, content area words, deal with unfamiliar topics and non-narrative text structures, and demonstrate higher order thinking skills. The change in focus between early elementary grades and upper elementary grades may put some low-income students who have not been exposed to a content-rich curriculum at a disadvantage in reading achievement when compared to their middle-income peers. This possibility is supported by longstanding evidence that a broad curriculum is important to reading achievement (Singer, McNeil & Furse, 1984). By providing early opportunities for students to learn from informational texts both in (Dreher, 2000; Neuman, 2006; 2010) and out of school (Sonnenschein & Schmidt, 2000), teachers and parents may expose students to vocabulary and text structures that they would not otherwise encounter.

In the following section, we review some of the factors that may be associated with informational reading achievement, organizing them into two groups: (1) factors associated with out-of-school reading engagement and (2) factors associated with in-school reading experiences. Because a comprehensive review of all variables related to out-of-school and in-school reading experiences is beyond the scope of this paper, we focused our review on factors that appear relevant to those targeted in the NAEP questionnaire items used in this study.

Factors Associated with Out-of-School Reading Engagement

The types of experiences and interactions that students have with reading outside of school can contribute to their success with reading in school (Gottfried, Fleming, & Gottfried, 1998). One important factor in students' out-of-school reading engagement is their access to appropriate reading material. Academic achievement is associated with the number of books in a child's home (Sheldon & Carrillo, 1952). Delpit (1988) and Purcell-Gates (1995) have posited that children from low-income homes may not have access to interesting and diverse texts. In fact, Feitelson and Goldstein (1986) found that 60% of Kindergarteners at low-performing schools had no books of their own at home. Neuman and Celano (2001) also found inequities in the number and quality of books available for

purchase and at libraries in low-income areas compared to middle-income neighborhoods. Access to appropriate reading material is important for early reading experiences (Bus, 2003), and the lack of books in many low-income homes may partially explain why the average middle class child has engaged in over 1,000 hours of read alouds with family members before entering school, while low-income students are predicted to have on average only 25 hours of this type of interaction (Adams, 1990).

The type of talk that caregivers and children engage in may be another important factor in students' out-of-school reading engagement. A number of studies have documented an association between parent socioeconomic status and children's vocabulary growth, with children of higher socioeconomic status parents characterized by larger vocabularies and more rapid vocabulary growth (e.g., Hart & Risley, 1995; Hoff, 2003; Rowe, 2008). Weizman and Snow (2001), for example, noted "profound quantitative and qualitative differences in early vocabulary exposure among low-income preschoolers" (p. 276), with mothers' use of sophisticated (low-frequency) vocabulary strongly associated with children's vocabulary later in school. Lareau (1989), on the other hand, found that low-income and middle-income families engaged in similar types of education-related discussions, but the former did so less frequently.

Peer groups may be another motivating factor for out-of-school reading engagement. Studies of library circulation records show that books are often shared among groups of friends and that reading peer-approved books may be important for children's sense of group membership (Moss & McDonald, 2004). When children then discuss the books they are reading with their friends, research findings as well as expert opinion suggest that they are likely to have better comprehension than if they had not discussed them (Goatley, Brock & Raphael, 1995; Guthrie & McCann, 1996; Ketch, 2005).

Experience with informational texts out of school is another factor that can contribute to children's reading achievement. Although experts have argued that children have access to very few expository materials in the home in comparison to narrative texts (Moss, 2003), some common resources are more likely to provide access to exposition than others. The presence of newspapers in the home is associated with the science achievement of seventh graders (Akyol, Sungur, & Tekkaya, 2010), which may suggest that students are gaining necessary scientific vocabulary and understanding of concepts from these resources. Yet with circulation down nationwide, few students report reading these materials (Nippold, Duthie, & Larsen, 2005; Project for Excellence in Journalism, 2004). Magazines are another source of informational text in the home. But magazines written for a male audience are more likely to contain exposition than those written for females, suggesting that children who read magazines geared towards boys would have more exposure to this text type (Hall & Coles, 1999). However, in one study of sixth graders, Spear-Swerling, Brucker, and Alfano (2010) found no correlation between magazine reading and reading achievement. A third source of informational texts in many homes is the Internet. Having the Internet at home is related to overall reading achievement, even when socioeconomic status has been taken into account (Atwell & Battle, 1999). Having access to the Internet at home may also be related to informational text achievement, as the vast majority of texts on children's websites are exposition and many academic tasks require students to strategically read informational Internet sites (Coiro & Dobler, 2007; Kamil & Lane, 1998). These Internet resources may also require students to navigate the multimodal nature of many online texts, requiring an advanced skill set in order to determine purposes for reading, monitor their selected "pathway" for reading, and decide which features are distracting to their purposes (Coiro, 2011). In some countries (e.g., the United States, Germany, and some Canadian provinces), informational text, particularly exposition, is more difficult for children to read (Mullis et al., 2007; Langer, 1986), but out-of-school engagement with

such texts may help facilitate children's interaction with the challenges they may face when reading exposition especially given that often students have less opportunity to learn to read with this type of text in school (Chambliss & Calfee, 1998).

Factors Associated with In-School Reading Experiences

Because children from low-income homes are less likely to engage in school-like tasks and discussions at home (Coleman, et al., 1966), school may be particularly important for them. However, in the US, schools are often both racially and socioeconomically segregated (Orfield, 2001), and schools that serve low-income students often have "fewer and lower-quality books, materials, computers […] as well as less-qualified and less experienced teachers…" (Darling-Hammond, 1995, p. 610).

For example, access to interesting, appropriate, and varied texts at school is associated with overall student achievement (Chall et al., 1990). Yet US classrooms can differ drastically in the types of texts that are available for students. For instance, Oakes and Saunders (2002) found that one-third of students in California did not have textbooks available to them outside of school to do homework or study for exams – and that access to these resources varied considerably between students in at-risk schools and their counterparts. Although access to resources in itself is not enough to jumpstart students' reading motivation and achievement (Morrow & Weinstein, 1986), resources such as classroom libraries can certainly promote independent reading (Martinez, Roser, Worthy, Strecker, & Gough, 1997) and achievement (Applebee, Langer, & Mullis, 1988) when teachers use these resources in an effective manner (McGill-Franzen & Allington, 1999).

The role of teachers' classroom practices has been cited as an important factor in closing achievement gaps worldwide. In New Zealand, for instance, teachers who created rich literacy environments for their students had practices that were associated with closing the gender achievement gap (Wilkinson, 1998). Collaboration and student grouping are some of the important instructional techniques that are commonly recognized as ones that can enhance student learning (Cohen, 1994; Slavin, 1986). Collaborative learning experiences are based on social and cognitive theories proposing that when students work together to achieve similar goals, they will attain more than each student could on his or her own (Johnson & Johnson, 1989/1990). Students may particularly benefit from working with a "more knowledgeable other" who can scaffold content for them (Vygotsky, 1978).

Another factor associated with students' reading achievement is their ability to employ a variety of comprehension strategies (Samuelstuen & Bråten, 2005; Willson & Rupley, 1997). Unfortunately, strategy instruction is evident in far too few classrooms (e.g., Durkin, 1978/1979; Pressley, 2002; Taylor, Pearson, Clark, & Walpole, 1999), because teachers are often unprepared to teach students how to use strategies (National Institute of Child Health and Human Development (NICHD), 2000). Chall and her colleagues (1990) found that students who were afforded opportunities to practice strategies in their classrooms showed gains in their vocabulary and comprehension. Yet students frequently struggle when expectations change from "learning to read" to "reading to learn" around fourth grade, oftentimes because they have not developed the skills and strategies needed to effectively do so (Chall et al., 1990).

Research also supports the claim that cross-curricular reading at school is associated with reading achievement (Fang & Wei, 2010; Morrow, Pressley, Smith, & Smith. 1997; Romance & Vitale, 1992; Vitale & Romance, 2011). One of the most prominent research agendas regarding cross-curricular reading has been Guthrie and colleagues' Concept-Oriented Reading Instruction (CORI). When reading and science instruction were integrated using the CORI approach, students became intrinsically-motivated readers, and

in turn made better use of reading strategies, had better reading comprehension, and read more often and broadly than students who did not participate in this engaging, integrated curriculum (Guthrie, Anderson, Alao, & Rinehart, 1999; Guthrie et al., 1996, 2004, 2009; Guthrie, Wigfield, & VonSecker, 2000).

Cross-curricular reading practices may facilitate reading achievement for several reasons. For example, when students read science and social studies content, they are likely to develop the technical vocabulary and background knowledge necessary to comprehend informational texts. Furthermore, it is not uncommon for more than half of all content on standardized reading tests to consist of informational passages (Calkins, et al., 1998; National Assessment Governing Board, 2008). Thus familiarity with informational reading would likely prepare students for the demands of these tests.

Along with cross-curricular reading instruction, research indicates that students benefit from opportunities to participate in activities that allow them to extend their understanding of what they have read (Beck & McKeown, 2001). Similarly, articles in practitioner journals address the need to move away from worksheets, workbooks, and similar assignments toward engaging students in more meaningful, collaborative tasks that involve higher-level thinking about what they read (Meyer, 2010; Pincus, 2005). Classroom discussion is one way to engage students in critically thinking about reading materials. Some studies have found that when conversation is peer-led as opposed to teacher-led, it allows for more occasions for students to engage in higher-level thinking to resolve conflicts that arise when reading and responding to the text as well as to opportunities to use more complex language to talk about text (Almasi, 1995; Murphy, Wilkinson, Soter, Hennessey, & Alexander, 2009). However, many discussions that take place in schools follow a pattern of teacher initiation, student response, and teacher evaluation (IRE), a participation structure that can limit the possibilities for students to engage in quality, high-level discussions (Cazden, 2001).

Although evidence indicates that certain instructional practices result in better reading achievement than others, decisions made at the school or district level can constrain what teachers are able to do. For example, in an effort to raise student achievement, some schools require that teacher provide scripted instruction or strictly follow a basal reading program. Such mandates constrain the range of what is read, the skills that are taught, and the types of interaction students are able to experience with teacher and peers (Pease-Alvarez & Samway, 2008). In such schools, instruction is often driven by standardized testing, which may reflect narrowly-focused literacy goals. Evidence indicates that in the era of NCLB, test-driven curricular constraints are common even in school districts with relatively high performance (Valli, Croninger, Chambliss, Graeber, & Buese, 2008), but appear even more likely in high poverty, low performing school districts (Center on Education Policy, 2007). However, highly-constrained reading programs rarely provide opportunities for wide reading or promote classroom discussions, activities that have been shown to have a positive impact on student reading comprehension (Murphy et al., 2009).

The characteristics of a school's population also may influence students' reading performance. Extensive documentation indicates that a school's student eligibility for Free and Reduced-Price Meals has a strong association with the performance of individual students. Students in schools with high percentages of low-income students have lower academic achievement than low-income students who attend other schools (e.g., Palardy, 2008; Sirin, 2005).

To understand students' reading achievement requires researchers to consider both individual and school factors that may be associated with student performance, as well as

both out-of-school and in-school factors that can contribute to their success. The current study investigates factors associated with students' achievement through a multilevel model aimed at examining out-of-school and in-school factors related to individual and school-wide informational text comprehension.

Research Questions

Four research questions guided this study: (1) To what degree do FARMS-eligible students differ from other students in their comprehension of informational text? (2) What individual reading experiences are associated with students' comprehension of informational text? (3) To what degree are students in some schools better able to comprehend informational text than students in other schools? (4) What characteristics of schools are associated with students' comprehension of informational text?

Method

Data Source

The data for this study were collected as part of the 2005 fourth-grade NAEP reading assessment. NAEP is the only ongoing assessment of US children's academic progress. Federally-mandated in 1969, NAEP uses nationally-representative samples to examine US students' achievement in reading, mathematics, civics, science, writing, US history, geography, and the arts (USDE, Institute of Educational Sciences, & NCES, 2007). Data are collected in January through March of the testing year using both stratification and clustering sampling strategies. Schools are selected based on their membership in particular explicit (e.g., public, Roman Catholic, private) and implicit (e.g., percent of minority status, local Census division) strata. Within selected schools, students are clustered, as student selection is limited by students' enrollment in a school selected based on school strata membership. The theory behind this sampling technique is that schools selected based on their strata would house the subpopulations targeted by the NAEP assessment (NCES, 2010a). Detailed information on the NAEP assessment, including research design and analysis, can be found at http://nces.ed.gov/nationsreportcard/.

The 2005 NAEP reading assessment gathered data from over 165,000 fourth graders using a reading achievement test, and student, teacher, and administrator questionnaires. The reading achievement test consisted of two-subscales: (1) reading for literary experience and (2) reading for information, each scored on a 0 to 500 scale. About half of the test was multiple choice, while the rest of the test consisted of both brief and extended constructed response questions. NAEP employs a matrix sampling design, so students answer only 20-25 of the 100-170 questions on the achievement test. For questions students are not given, five plausible values are calculated based on their performance on other items and available demographic information. A 32-question student questionnaire enabled NAEP to collect information about variables such as classroom practices children had experienced, materials in their homes, and reading-related practices they engaged in outside of school, while a 47-question teacher questionnaire and a 19-question administrator questionnaire allowed for the collection of classroom and school information including reading experiences and practices. In the current study, we used achievement data from the reading for information subscale and children's questionnaire responses, as described in Measures.

Measures

Measures of students' background information. In our analysis, we examined data collected from school records regarding students' (a) race/ethnicity, (b) gender, and (c) Free and Reduced-Price Meals (FARMS) eligibility (USDE et al., 2007). Since race/ethnicity was not a variable that we were focusing on in this study, we decided to simplify race into

a dichotomous variable to minimize the complexity of the analysis model, described below. Based on overall NAEP performance on reading for information, we grouped Caucasians, Asians, and Pacific Islanders together in one racial category, and Blacks, Hispanics, and American Indians into another category. The rationale for this grouping was based on past trends in achievement between these racial groups (NAEP's Data Explorer). In fact, on the 2005 fourth grade reading assessment, Whites (*M* = 229, *SD* = 0.2) and Asians/Pacific Islanders (*M* = 229, *SD* = 0.7) had the same mean average score, while Black (*M* = 200, *SD* = 0.3), Hispanic (*M* = 203, *SD* = 0.5), and American Indian/Alaskan Native (*M* = 204, *SD* = 1.3) performed in a similar range. Although we acknowledge concerns with collapsing race/ethnicity variables, we believe that these groupings described above make sense in this context given that race/ethnicity is being used as a control variable. [It should be noted, however, that since the 2005 NAEP assessment used in this study, the Center on Educational Policy (2010) has reported that a gap between Asian Americans and Caucasian students has emerged, with Asian American students performing statistically significantly better than their peers in both reading and math.]

FARMS eligibility was used as a proxy for student poverty and was examined in relationship to students' out-of-school and in-school reading experiences. In the past, FARMS has been criticized as an income proxy because this service can be refused by parents and may not be available in some non-public schools. However, in the 2005 database, NAEP collected information from school records regarding whether students were eligible to receive FARMS, not whether they were actually receiving these services. In The Nation's Report Card, NCES's report of general findings from NAEP, FARMS is routinely used in isolation to report differences in achievement for children from various socioeconomic backgrounds (NCES, 2007).

We collapsed a three-category FARMS measure (eligible for free meals, eligible for reduced-priced meals, and not eligible for free or reduced-priced meals) into two categories (eligible for free or reduced-priced meals and not eligible for free or reduced-priced meals) because we were concerned with comparing students from households with lower incomes to all other students. More specifically, students who come from households where the family income was within 185 percent of the poverty line were classified as FARMS-eligible in this study (United States Department of Agriculture, 2011).

Other researchers have used proxies for students' family income, including parental education and the presence of educational materials in the home (e.g., Guthrie, Schafer, & Huang, 2001; Lee, Croninger, & Smith, 1997). However, NAEP no longer collects information on fourth graders' parental education because many students were unable to provide accurate responses (NCES, 2011). Although FARMS is sometimes considered a weaker measure of family income than the aforementioned variables, NAEP uses school records to determine whether a student's family reported income would make him or her eligible to receive free or reduced priced meals. Since some families may have unreported income, if anything, this approach may have led to a more modest analysis, as students from families with unreported income may have been erroneously included in the FARMS-eligible category.

Measure of students' out-of-school reading engagement. As noted, fourth graders completed a questionnaire that provided background information about themselves. With only 32 items, the questionnaire is limited in scope and depth. However, we posit that the information it provides offers a starting point for exploring children's out-of-school reading engagement and in-school reading experiences that are associated with informational text comprehension.

Based on literacy research, we identified 11 questionnaire items that were likely to be associated with out-of-school reading engagement with informational texts (see Table 1).

Table 1. *Items Used For Initial Out-Of-School Reading Engagement Analyses*

Item	*M* (*SD*)	In Final Analysis
Items with response options: (a) *hardly or hardly ever*, (b) *once or twice a month*, (c) *once or twice a week*, and (d) *almost every day*.		
1. How often do you talk about things you have studied in school with someone in your family?	3.48 (1.52)	Yes
2. How often do you talk to your friends or family about something you have read?	2.48 (1.14)	Yes
3. How often do you read to learn about real things (such as facts about dinosaurs or other countries) for fun outside of school?	2.65 (1.16)	Yes
4. How often do you read stories or articles that you find on the Internet for fun outside of school?	2.32 (1.21)	Yes
Items with response options: (a) *not like* me, (b) *a little like* me, (c) *a lot like* me.		
5. Reading is one of my favorite activities.	2.09 (0.78)	Yes
6. When I read books, I learn a lot.	2.32 (0.63)	Yes
Item with response options: (a) *few (0-10)*, (b) *enough to fill one shelf (11-25)*, (c) *enough to fill one bookcase (26-100), or* (d) *enough to fill several bookcases (more than 100)*.		
7. About how many books are there in your home?	2.95 (0.97)	No
Items with response options: (a) Yes or (b) No.		
8. Is there an encyclopedia in your home? It could be a set of books, or it could be on the computer.	1.20 (0.40)	No
9. Does your family get a newspaper at least four times a week?	1.49 (0.50)	No
10. Does your family get any magazines regularly?	1.25 (0.43)	No
11. Is there a computer at home that you use?	1.14 (0.35)	No

A principal components analysis (PCA) was performed to evaluate the relationships among these items (Pett, Lackey, & Sullivan, 2003). Based on the PCA, items 7 through 11 in Table 1 were dropped from the study. The PCA of the remaining items (1-6 in Table 1) showed loadings of .594, .683, .608, .542, .629, and .668, respectively, with a Cronbach alpha of .651. This resulting component, termed Out-of-School Reading Engagement, accounted for 38.75% of the variance in students' informational text comprehension.

An examination of the initial pool of items for this measure suggests that several of the items were likely to be sensitive to socioeconomic status because they queried the presence of particular materials in the home (newspapers, magazines, computers, encyclopedias, and books). However, all these items were dropped based on the PCA. In fact, there was little variation in these responses. All the dropped items, except the one

that addressed the number of books in the home, were yes/no responses, with most participants answering "yes" for magazines (75%), encyclopedias (80%), and computers (85%). Likewise, approximately half of students reported getting newspapers four or more times a week and 70% of students reported having at least 26 books in their home. Thus, the remaining items focused on reading-related activity, as opposed to materials in the home.

Measures of students' in-school reading experiences. Although, as noted, teacher questionnaires are part of NAEP and also supply some information regarding classroom practices, researchers have argued that student reports are often better indicators of actual classroom practice (Mullens & Gaylor, 1999). Therefore, we only used student reports of classroom practice. Drawing on literacy research, we identified ten items from the students' questionnaire that were likely related to in-school reading experiences with informational texts for the initial analysis (see Table 2).

Table 2. *Items Used For Initial In-School Reading Experiences Analyses*

Item	M (SD)	Component
Items with response options: (a) *never or hardly ever*, (b) *once or twice a month*, (c) *once or twice a week*, and (d) *almost every day*.		
1. How often do you read paperbacks, soft cover books, or magazines for reading?	2.75 (1.18)	Materials for Cross-Curricular Reading
2. How often do you read paperbacks, soft cover books, puzzle books, or magazines for science?	2.24 (1.15)	Materials for Cross-Curricular Reading
3. How often do you read paperbacks, soft cover books, or magazines for social studies or history?	2.32 (1.17)	Materials for Cross-Curricular Reading
Items with response options: (a) *none*, (b) *1*, (c) *2 or 3*, (d) *4 or 5*, and (e) *6 or more*.		
4. So far this year, how many times have you written a book report?	2.76 (0.35)	Reading-Related Activities
5. So far this year, how many times have you made a presentation to the class about something you have read?	2.20 (1.22)	Reading-Related Activities
6. So far this year, how many times have you done a school project about something you have read (For example, written a play, created a poster)?	2.40 (1.16)	Reading-Related Activities
7. When you have reading assignments in school, how often does your teacher give you time to read books you have chosen yourself?	3.09 (1.08)	Not Included in Final Analysis
Items with response options: (a) *never or hardly ever*, (b) *a few times a year*, (c) *once or twice a month*, and (d) *at least once a week.*		
8. For school this year, how often do you have a class discussion about something the class has read?	2.95 (1.13)	Discussions about Reading
9. For school this year, how often do you work in pairs or small groups to talk about something you have read??	2.66 (1.15)	Discussions about Reading
10. For school this year, how often do you write in a journal about something you have read for class?	2.52 (1.50)	Not Included in Final Analysis

Based on the results of a PCA, items 7 and 10 in Table 2 were dropped from the final analysis. The PCA of the remaining items resulted in three distinct components after being rotated orthogonally using Varimax. The Cronbach alpha for the overall PCA for in-school reading experiences was .641 and explained a total of 57.03% of the variance in informational text comprehension. The first component, termed Materials for Cross-Curricular Reading, explained 28.81% of the total variance and included the three items about the frequency with which students read materials other than textbooks for reading, science, and social studies/history. The loadings for this component were .618, .789, and .776, respectively, with a Cronbach alpha of .593.

The second component, labeled Reading-Related Activities, accounted for an additional 15.53% of the total variance and consisted of the three items regarding the frequency with which students engaged in book-report writing, projects, and presentations about what they had read. The loadings for this component were .715, .715, and .741, respectively, with a Cronbach alpha of .570.

The third component, Discussion About Reading, accounted for an additional 12.69% of the total variance and was comprised of two items related to how often students had a class discussion about reading and how often students talked in small groups about what they had read. The loadings for this component were .786 and .738, respectively, with a Cronbach alpha of .396.

Measure of students' comprehension of informational texts. Student achievement was based on the reading for information subscale questions on the 2005 NAEP assessment. NAEP defines the content of the reading for information subscale as follows: "[the reading of texts in which] Readers gain information to understand the world by reading materials such as magazines, newspapers, textbooks, essays, and speeches" (NCES, 2010b, n.p.). Our analysis of retired fourth-grade passages from NAEP revealed that these texts vary in structure, ranging from mainly expository text to hybrids of narrative and expository texts.

Measures of school characteristics. To measure school demographic information (e.g., proportion of students' eligible for FARMS, proportion of students with minority status, type of school) and school-wide reading practices (average out-of-school reading engagement and in-school reading practices), data were aggregated from information at the student level to the school level in SPSS, and then analyzed using hierarchical linear modeling, as explained in the next section.

Analysis

Because of the clustered nature of the students within schools, we used hierarchical linear modeling (HLM) to analyze the data (Bryk, Raudenbush, & Congdon, 1996). HLM allowed us to build a model that represented the nested nature of the NAEP data. In our model, we had two levels: (1) level 1, student level information and (2) level 2, school level data. At level 1, the model illustrated the associations between individual variables and individual achievement, while at level 2, the model examined the associations of variables aggregated to the school level and overall achievement within the school. In this sense, HLM allowed us to account for variance attributed to differences at both the individual and school levels.

To justify the use of HLM, an unconditional model (a model without within or between factors used to estimate partitioned variance) is first calculated to determine the intraclass correlation (ICC) (i.e., the proportion of variance that occurs between schools) (see research question 1). An ICC of .10 or higher warrants the use of HLM (Bryk & Raudenbush, 1992). The ICC for this study was .234 meaning that 23.4% of the variance in informational text comprehension in this study occurred between schools.

It is important to note that although over 165,000 fourth graders participated in the 2005 NAEP reading assessment, some data were lost at level 2 (school) in the HLM analysis. No data were missing for race, school type, gender, or any of the plausible values for student informational text comprehension. But, at the school level, FARMS information was not collected at 680, or 7.8%, of the schools. In addition, for approximately one percent of the schools (190 schools) data were missing for the out-of-school reading and in-school reading factors. However, an analysis of the characteristics of students with missing data for out-of-school reading, in-school reading, and FARMS eligibility showed no statistically significant differences from the original sample of 8620 schools in terms of achievement, race, school type, and gender.

Results

Overall achievement data on the reading for information subscale of the 2005 NAEP assessment indicate that fourth graders' informational text comprehension (*M*=216, *SD* = 38) is statistically significantly lower than both overall comprehension (*M*=219, *SD* = 36) and narrative text comprehension (*M*=222, *SD* = 37), according to public-use information available through NAEP's Data Explorer. Thus, fourth graders in the United States have more difficulty comprehending informational texts than narrative texts. But do FARMS-eligible students differ from their peers on comprehension of informational texts (research question (RQ) 1)? Using the NAEP Data Explorer, we determined that there is a 28-point gap between the informational text comprehension scores of students eligible and not eligible for FARMS. Students who were eligible for FARMS (*M*= 199, *SD* = 36) scored .80 of a standard deviation below children who were not eligible for FARMS (*M* = 227, *SD* = 34), indicating a sizeable disadvantage for low-income children in terms of their abilities to comprehend informational texts. [As noted earlier, there is a 26-point difference in literary comprehension between FARMS-eligible (*M* = 206, *SD* = 36) and non-FARMS-eligible students (*M* = 232, *SD* = 33).]

In this study, our results identify factors that are associated with informational reading achievement on the NAEP assessment, with a particular focus on students of differing socio-economic status. We first report the associations between students' informational reading achievement and out-of-school reading engagement and in-school reading experiences (RQ 2). We then report the degree to which students in some schools are able to comprehend informational texts compared to students in other schools (RQ 3) and the characteristics of schools that are associated with students' informational text comprehension, including demographics and school-wide reading practices (RQ 4). Our original research design called for the examination of whether or not schools' FARMS composition is related to students' informational text comprehension as part of RQ 4; however, since NAEP uses background information such as income, gender, and race to determine the plausible values for unanswered items, we found that these background items became confounded with achievement. In particular, students in similar schools with similar background attributes are more likely to receive similar plausible values, influencing the variability of student responses. Therefore, our results for RQ 4 address out-of-school and in-school factors related to differences in school-wide informational text comprehension, but they do not address how the FARMS composition of the school might be associated with school-wide informational text comprehension.

Students' Reported Out-of-School Reading Engagement

As part of addressing RQ 2, we analyzed the full within-school model for out-of-school reading engagement. This model compares students within schools (and in this case included the variables of Out-of-School Reading Engagement, FARMS eligibility, race/ethnicity, and gender), accounted for 10.2% of the group variance (σ2) beyond that

explained in the unconditional model. In this study, a standard deviation (SD) increase in the frequency students' engaged in out-of-school reading activities (e.g., discussions with family and friends about books, reading to learn, reading on the Internet) was associated with a 6.29 point coefficient in their overall informational text comprehension score (see Table 3).

Table 3. *Results for the Within-School Model (Out-Of-School Reading)* [a][b]

Fixed Effect	Coefficient	se	*t*-ratio
Overall Mean 4th grade informational text achievement γ_{00}	214.57	.22	973.37***
Mean out-of-school (OOS) reading - achievement slope γ_{10}	6.29	.18	35.23***
Mean minority - achievement slope γ_{20}	-13.30	.45	-29.72***
Mean FARMS-eligible - achievement slope γ_{30}	-13.10	.45	-28.84***
Mean female – achievement slope γ_{40}	2.11	.26	8.24***
Mean FARMS*OOS reading – achievement slope γ_{50}	-2.70	.24	11.13***
Random Effect	Variance Component	df	Chi-Square
4th grade informational text achievement	109.22	8611	25029.61***
Level-1 effect r_{ij}			

[a] Note: Analysis done with adjusted school weight, SCHOOLWEIGHT.
[b]*,**, and *** significant at .05, .01, and .001 levels, respectively, using two-tailed t-tests.

However, the association between out-of-school reading engagement and informational text comprehension varied with students' FARMS status. The coefficient for FARMS-eligible students was 2.11 points lower than the coefficient for students not eligible for FARMS ($p < .001$).

Students' Reported In-School Reading Experiences

To address RQ 2, we also examined the contributions of three components of in-school reading: (1) Materials for Cross-Curricular Reading, (2) Reading-Related Activities, and (3) Discussions About Reading. This within-school model – which included the variables of Materials for Cross-Curricular Reading, Reading-Related Activities, Discussions About Reading, FARMS eligibility, race/ethnicity, and gender -- accounted for 11.1% of the group variance ($\sigma 2$) beyond that explained in the unconditional model (see Table 4).

Table 4. *Results For the Within-School Model (In-School Reading)*

Fixed Effect	Coefficient	se	t-ratio
Overall Mean 4th-grade informational text achievement γ_{00}	214.86	.22	984.55***
Mean minority - achievement slope γ_{10}	-12.83	.45	-28.54***
Mean FARMS-eligible - achievement slope γ_{20}	-12.86	.46	-28.02***
Mean female – achievement slope γ_{30}	3.37	.26	-12.97***
Mean materials for reading - achievement slope γ_{40}	1.10	.18	6.05***
Mean reading-related activities - achievement slope γ_{50}	-3.67	.20	-18.05***
Mean discussion of reading - achievement slope γ_{60}	3.29	.18	18.43***
Mean FARMS*Materials – achievement slope γ_{70}	-.025	.23	-1.13
Mean FARMS*Discussion – achievement slope γ_{80}	0.58	.26	2.23*
Mean FARMS*Reading-Related Activities – achievement slope γ_{90}	-1.82	.25	-7.29***

Table 4 (Cont.). *Results for the Within-School Model (In-School Reading)*

Random Effect	Variance Component	df	Chi-Square
4th grade informational text achievement Level-1 effect r_{ij}	108.00	8609	24011.50***

[a] Note: Analysis done with adjusted school weight, SCHOOLWEIGHT.
[b] *,**, and *** significant at .05, .01, and .001 levels, respectively, using two-tailed t-tests.

Every SD increase in the frequency with which students reported using Materials for Cross-Curricular Reading was associated with a coefficient of 1.10 points on their informational comprehension score (p < .001). For using materials across the curriculum, there was no statistically different association for FARMS-eligible students compared to non-FARMS-eligible students.

Every SD increase in the frequency with which students reported engaging in Reading-Related Activities (e.g., book reports, presentations, and projects) was associated with a coefficient of -3.67 points (*p* < .001) on their score. The strength of this negative association between Reading-Related Activities and text comprehension varied with students' FARMS status. The coefficient for FARMS-eligible students was 1.82 points lower than the coefficient for non-FARMS-eligible students (*p* < .001).

Finally, a SD increase in the frequency with which students reported Discussions About Reading (e.g., talking about what they read as a class and in small groups), was associated with a coefficient of 3.29 points on their text comprehension score (*p* < .001). The strength of this positive association between student participation in whole-class or small-group discussions and achievement also varied according to students' FARMS status. The coefficient for FARMS-eligible students was .58 points higher than the coefficient for non-FARMS-eligible students (*p* < .05).

School Characteristics Associated with Text Comprehension

We were interested in examining the degree to which students in some schools were able to comprehend informational texts compared to students in other schools (RQ 3). We found that school characteristics were often important in predicting students' text comprehension. Because of the way that NAEP calculates plausible values for students by comparing their performance to students from similar backgrounds, there was not much variance in how FARMS status was associated with students' out-of-school reading engagement and in-school reading experiences across schools. However, a SD increase in the proportion of FARMS eligible students in a school was associated with a coefficient of -10 (see Tables 5 and 6).

We used the between-school model for out-of-school reading engagement, which compares schools to other schools (and in this case included the variables of Out-of-School Reading Engagement, proportion of FARMS-eligible students, proportion of minority students, and public/private status) to determine which characteristics of schools were associated with informational text comprehension (RQ 4). This model accounted for 66.8% of the group variance ($\tau 00$) beyond that explained in the within-school model. In this study, a SD increase in the school average of students' reported frequency of out-of-school reading engagement had an 8.59 point positive association with their informational text comprehension (see Table 5).

Table 5. *Results for the Between-School Model (Out-Of-School Reading)* [a][b]

Intercept γ_{00}	
4th grade informational text achievement γ_{00}	214.56***
Proportion Minority γ_{01}	-6.16***
Proportion FARMS eligible γ_{02}	-10.01***
Private school γ_{03}	2.61*
Mean out-of-school reading γ_{04}	8.59***
Out-of-School Reading γ_{10}	6.29***
Minority γ_{20}	-13.30***
FARMS eligible γ_{30}	-13.10***
Female γ_{40}	2.11***
FARMS*Out-of-School Reading Interaction γ_{50}	-2.70***

[a] Note: Analysis done with adjusted school weight, SCHOOLWEIGHT.
[b] *,**, and *** significant at .05, .01, and .001 levels, respectively, using two-tailed t-tests.

In other words, students in schools with other children who engage in various out-of-school reading activities have a statistically significant positive association with achievement above and beyond that of just engaging in out-of-school reading on their own.

School-Wide, In-School Reading's Association with Average Text Comprehension

To determine how school-wide, in-school reading practices were associated with students' average text comprehension (RQ 4), we examined the full between-school model. The full between-school model for in-school reading experiences included variables for the three aspects of in-school reading experiences: (1) Materials for Cross-Curricular Reading, (2) Reading-Related Activities, and (3) Discussion About Reading, as well as variables for proportion of FARMS-eligible students, proportion of minority students, and public/private status. This between-school model accounted for 66.6% of the group variance (τ00) beyond that explained in the unconditional model (See Table 6).

A SD increase in the school average of students' reported frequency using Materials for Cross-Curricular Reading was positively associated with informational text comprehension, with a coefficient of 3.46 points on students' comprehension scores ($p <$ .001).A SD increase in the school average of students' reported frequency of Reading-Related Activities was negatively associated with comprehension, with a coefficient of -.84 on comprehension scores ($p <$ .01). Finally, a SD increase in the school average of students' reported frequency in Discussion About Reading was positively associated with comprehension, with a coefficient of 5.49 points on students' comprehension scores ($p <$ .001).

There were also statistically significant contextual effects for students who were in schools where students reported using Materials for Cross-Curricular Reading (2.36 points, $p <$ .001) and having Discussions about Reading (2.20 points, $p <$ .001). This means that the coefficient associated with being in a school where students report these activities resulted in a stronger than expected association with achievement scores (based on how these variables were related to student achievement at the individual level).

Table 6. *Results for the Between-School Model (In-School Reading)* [a][b]

Intercept γ_{00}	
4th grade informational text achievement γ_{00}	214.86***
Proportion minority γ_{01}	-5.67***
Proportion FARMS eligible γ_{02}	-9.69***
Mean materials for reading γ_{03}	3.46***
Mean reading-related activities γ_{04}	-0.84**
Mean discussion of readings γ_{05}	5.49***
Private school γ_{06}	3.20**
Minority γ_{10}	-12.83***
FARMS eligible γ_{20}	-12.86***
Female γ_{30}	3.37***
Materials for Reading γ_{40}	1.10***
Reading-Related Activities γ_{50}	-3.67***
Discussion of Readings γ_{60}	3.29***
FARMS*Materials Interaction γ_{70}	-0.025
FARMS*Discussion Interaction γ_{80}	0.58*
FARMS*Reading-Related Activities Interaction γ_{90}	-1.82***

[a] Note: Analysis used adjusted school weight, SCHOOLWEIGHT.
[b] *,**, and *** significant at .05, .01, and .001 levels, respectively, using two-tailed t-tests.

Discussion

Our results indicate that certain reading experiences are associated with informational text comprehension, and that these associations are not always the same for FARMS-eligible students as for other students. Specifically, Out-of-School Reading Engagement was positively associated with the informational reading comprehension for all students, but less so for FARMS-eligible students. The in-school reading measures of Materials For Cross-Curricular Reading and Discussion About Reading were also positively associated with informational text comprehension, with no difference for FARMS-eligible and other students on the former but a higher positive association for FARMS-eligible students on the latter. In contrast, the in-school reading measure Reading-Related Activities was negatively associated with comprehension, with a stronger negative association for FARMS-eligible students. In addition, being in a school in which other students engaged frequently in certain out-of-school and in-school reading practices (out-of-school reading engagement, material for cross-curricular reading, and discussions about reading) was associated with higher than expected achievement scores.

Out-of-School Reading Engagement

The difference that we identified in the strength of association between out-of-school reading engagement and informational text comprehension for students from different socioeconomic backgrounds makes sense in relation to the literature. Children who enjoy reading and who are motivated to read from multiple genres of texts may be more prepared to handle the cognitive demands of reading informational texts. Specifically, expository texts require readers to interact with texts in a way that is different than the way in which most children read narrative texts. In addition to having to navigate the unique text features and structures found in exposition (Dreher & Kletzien, 2015; Pappas, 2006; Purcell-Gates, Duke, & Martineau, 2007), readers often read these texts with the purpose of gaining information (Rosenblatt, 1978), a stance quite different than that promoted by most teachers as students learn to read. With the abundance of informational text found on the Internet, and the multimodal nature of many Internet texts, students may be required to both process and create various types of text (e.g., print, video, illustrations, and audio files) in order to make meaning. Thus, the evolving nature of informational reading, and its importance in new technological "spaces" with undefined

borders, makes preparing students to comprehend informational texts both a pressing and international concern (Coiro, Knobel, Lankshear, & Leu, 2008).

Another reasonable explanation for the association between students' out-of-school reading and informational text comprehension is that when children talk about (and potentially summarize) what they read with others, they may develop a better understanding of what they have read. Such talk may occur at home, but may also take place during extracurricular activities at school, community libraries, churches, and clubs (e.g., Green-Powell, Hilton, & Joseph, 2011; Kellett, 2009; Ly, 2010). Participation in such activities has been linked to positive outcomes including achievement (Mahoney, Larson, Eccles, & Lord, 2005). However, the poorest children are the least likely to be able to take advantage of such activities (Dearing et al., 2009).

In their research examining the home and classroom environments of low-income, Mexican Americans, Moll and his colleagues (1992) found that families and communities had "historically accumulated and culturally developed bodies of knowledge and skills essential for household or individual functioning and well-being" that were potentially beneficial to students' overall academic achievement (p. 134). Similar arguments could be made for other low-income groups (e.g., Dudley-Marling & Lucas, 2009). If schools were to bring these "funds of knowledge" into classrooms, it might help bridge the gap between the out-of-school experiences of students from differing backgrounds. In addition, when children talk to their peers about what they read, it can create a sense of community, enhance their understanding of the text, and introduce ideas about the text that children may not have thought of themselves. Also, children often read books recommended by peers because doing so can be a way to become socially accepted (Fleener, Morrison, Linek, & Rasinski, 1997; Moss & McDonald, 2004; Timion, 1992). The sharing of books with peers can lead to more active and frequent reading.

Being in a school with other children who reported frequently engaging in out-of-school activities was also related to children's informational text comprehension. Students in schools where other children experienced out-of-school reading engagement may have been surrounded by students who were motivated to read, had a lot of practice reading, and were more prepared to talk about what they had read. Therefore, even if students are not frequently engaged in out-of-school reading themselves, the motivation and practice of their peers may influence their own school practices. In schools where students do not value reading activities outside of school, students may be less likely to be in school with peers who would find it socially acceptable or important to read in school.

Although there is a positive association between out-of-school reading engagement and achievement for all students, the association was less strong for FARMS-eligible students. Even though low-income children reported that they engaged in out-of-school reading-related activities, the NAEP questionnaire asked only how often they participated in various activities and gathered no information regarding the quality of these experiences. Prior research supports the notion that, on average, low-income children have out-of-school literacy-related experiences, including access to literacy-related resources in the home and community (Neuman & Celano, 2001, 2012), that are less well matched to school achievement demands than the experiences of their peers. Similarly, although low-income children may have reported frequently discussing books with their families and friends, studies suggest differences between low-income children and their peers, on average, in quality and/or quantity of the kind of parent-child conversation that support the type of vocabulary development expected in school (Lareau, 1989;Weizman & Snow, 2001). Such findings may partially explain why out-of-school reading activities were not as highly associated with informational text achievement for low-income students as for wealthier children in our study.

As with family discussions, the quality of what children are reading for information is unclear. For example, a child in a middle-class home might have several highly engaging informational texts to read. However, some low-income children may not have quality resources available (Neuman, 1999) and may be reading older, out-of-date sources for information, possibly relating to our finding of a weaker association with achievement than for fourth graders' overall.

In-School Reading Experiences

The experiences that children have with reading in schools are important for their understanding of informational texts. Schools can provide opportunities for students to read from different genres, respond to texts in multiple ways, and to discuss texts they have read. In this study we explored the relationships between informational text comprehension and reading across the curriculum, reading-related activities, and classroom discussions.

Reading across the curriculum. Reading trade books and magazines in science, social studies, history, and reading is positively related students' informational text comprehension. According to Moss (2003), trade books and magazines are likely to be more accessible informational texts for fourth graders than the typical textbook, because they are often visually engaging, focused on a specific topic, and written at a level that students can understand. Textbooks, on the other hand, often give general information about multiple topics, not delving deeply into any particular subject (Chambliss & Calfee, 1998). Moreover, Moss (2003) noted that textbooks are often written by experts in various fields (e.g., geology) while the majority of trade books are written by authors who write for children.

In addition to potentially substituting for or supplementing textbook instruction, reading trade books and magazines across the curriculum is likely to expose children to informational texts. By reading trade books and magazines, children may gain familiarity with the structures, purposes, and features of informational texts. In using these texts, teachers may be engaging students in activities and strategy instruction that have been shown to enhance student comprehension, such as pulling information from multiple texts, answering questions, making inferences, making connections, and writing about what they have learned (Harvey & Goudvis, 2000; NICHD, 2000; Pressley & Afflerbach, 1995). In order to do well on the NAEP assessment, students need to use these strategies with informational texts (NCES, 2007).

We found a contextual effect associated with being in a school in which students reported reading across the curriculum. This means that being in a school in which students report these activities is associated with higher than expected achievement, based on how reading across the curriculum was related to student achievement at the individual level. There are many plausible explanations for this increase, including having a school culture that values reading to learn, providing exposure and practice with various genres, and integrating the curriculum across subject areas. Although some students prefer storybooks and some prefer informational books, many students have an equal affinity for stories and informational books (Chapman, Filipenko, McTavish, & Shapiro, 2007; Kletzien, 1999). Such evidence suggests that students in schools with positive learning cultures might be more inclined to read informational texts.

As noted earlier, some schools mandate scripted instruction and/or adherence to a basal reading program, with this situation more common in schools serving low-income neighborhoods. It is possible that such restrictions limit schools in preparing students to handle the wide variety of genres and content that students will encounter as they are expected to read across the content areas. Although basal reading programs in general

have become more inclusive of informational texts, a recent study of basal readers found that the distribution still does not match the proportion informational text in the 2009 NAEP Framework (Moss, 2008). Moreover, strict adherence to a program and the use of a scripted curriculum have been criticized as not serving the needs of children. Pease-Alvarez and Samway (2008) noted that these practices result in the prevalence of whole class instruction, lack of time for independent reading (during students might broaden their exposure to diverse texts), and an emphasis on standardized tests. Portes and Salas (2009) argued that students from low income families typically receive narrow, skill-based instruction that restricts their literacy development, and that a broader view of literacy with rich instructional contexts would better serve the needs of this population. In schools characterized by this type of instruction, students may have fewer opportunities for wide reading or discussions that might promote facility with informational text.

Reading-related activities. Reading-related activities such as writing book reports, making presentations, and doing projects were negatively associated with informational text achievement. Practitioner literature reports that in order for these activities to extend thinking, teachers need to scaffold these activities carefully as part of their instruction (Atwell, 1998). Students likely need clear directions as to how to complete these activities, support when doing them, and clear purposes as to why they are doing them (Many, Fyfe, Lewis, & Mitchell, 1996).

It is possible that teachers assign these activities as busywork or because they are unfamiliar with other alternatives for how students can respond to texts. Thus, they assign book reports, presentations, and projects that may be inauthentic and may not challenge students within their zone of proximal development (Vygotsky, 1978). Under such conditions, these activities may involve little reading. Yet Guthrie and McRae (2011) found that students' dedication or behavioral engagement, defined as "effort, time, and persistence in reading" (p. 119), is positively correlated with reading achievement even when factors such as socioeconomic status and gender are controlled. As a result, Guthrie and McRae argued that it is important that instructional practices support behavioral engagement in reading as opposed to practices that involve little actual reading.

In addition, any reading that may occur as part of book reports and presentations is likely to focus on narrative texts since stories predominate in many elementary classrooms (e.g., Jeong et al., 2010; Ness, 2011). Narrative texts do not provide children with experience with text structures and other features that may facilitate informational text comprehension (Pappas, 2006). Moreover, if students are working on book reports, presentations, and projects during class time, they may not be sharing what they have read with each other or interacting with the teacher. But, as explained in the next section, the opportunity to discuss what is read with other students can improve comprehension. Similarly, research has shown that students benefit from quality interactions with their teachers (Coleman et al., 1966; Cadima, Leal, & Burchinal, 2010). Likewise, teachers may be "wasting" valuable instructional time if they assign these activities with little direction. Instead, students may benefit from response activities that encourage thinking about texts but are less time intensive than reports, presentations, and projects. Low-income students might be particularly vulnerable to the negative implications of engaging in these activities, as they are more likely to experience inferior schooling conditions than their middle-class peers (Coleman et al., 1966; Darling-Hammond, 1995).

Discussing books as a class or small group. Research supports the notion that when students have an opportunity to talk about what they read, it may lead to better understanding of these texts (Johnson & Johnson, 1989/1990). In a meta-analysis of research on discussion about text, Murphy and her colleagues (2009) found that classroom discussions which followed an efferent approach were particularly effective at

increasing students' literal and inferential comprehension. These results support the findings here that students' engagement in discussions with teachers and classmates was positively associated with informational text achievement. Students who talked with each other likely benefited from ideas that they might not have developed independently, using other students' ideas to build, clarify, or enrich their own ideas.

When participating in class or small group discussions, students may be forced to juggle several contradicting ideas at the same time. Several students may offer alternative explanations or different answers that require discussion participants to evaluate how accurate or relevant they are to the discussion. Likewise, when participating in a discussion, students may be encouraged to connect ideas to their own knowledge, a skill that can promote comprehension and retention (Anderson & Pearson, 1984). At their most basic level, discussions hold students accountable for completing assigned readings because in order to be an active participant in a discussion, students must have read the text being discussed.

We also found a contextual effect for attending a school in which other students cited frequent discussion of books. This situation was positively associated with children's informational text achievement. It is possible that schools in which students reported high frequency of discussion have a more positive and motivating school environment. CORI classrooms (see Guthrie, McRae, & Klauda, 2007) are a prime example of how discussion may be associated with a motivating social context for students. In CORI classrooms, students explore questions of interest to them, have shared learning experiences, talk with one another, and build strategies for answering and communicating the answers to their own questions. Instead of a lecture format in which the teacher tells students what is acceptable or important to think, students talk with one another and engage in their own thinking about the concept of interest. Although the teacher introduces strategies as the students need them, students have a role in determining their own learning needs and the direction they take in their learning. This, in turn, can be quite motivating for students. Similarly, the types of participation structures that are used for classroom discussion may make a difference in how effective classroom discussions are in promoting comprehension of informational texts, as evidence suggests that peer-led discussion can be of higher quality than those that are teacher-led (Almasi, 1995).

Recommendations for Future Research

Given the frequency with which students are expected to engage with informational texts in their academic endeavors, it is important that educators understand how students can be prepared for the demands of informational reading. In this study, we identified factors -- out-of-school reading engagement, cross-curricular reading, discussions about texts, and reading related activities -- associated with informational reading and hence deserving of more research to determine how and why they are associated. However, three of the four factors seem particularly worthy of future exploration because their association with informational reading performance differed in degree when FARMS-eligible students were compared to other students: out-of-school reading engagement, reading-related activities, and discussions about reading.

First, although there is a substantial body of literature relating students' out-of-school reading engagement to reading abilities and socioeconomic status, much of this literature focuses on reading materials and parent/child interactions, while very few studies specifically relate out-of-school reading engagement to informational reading. Based on the extant research, we believe that reading literary fiction does not necessarily prepare students for the unique requirements of comprehending informational texts (Duke & Roberts, 2010; Moje, Stockdill, Kim, & Kim, 2011; RAND Reading Study Group, 2002); thus,

more research regarding attributes of out-of-school reading activities that may affect informational reading is warranted. For instance, future studies might further explore the attributes of community programs such as homework clubs and library services that may be associated with informational reading comprehension. In addition, because the Internet provides a major source of out-of-school opportunity to engage with informational text, continued research is needed about how readers navigate and comprehend these texts and how in-school reading instruction might be informed by such informational reading.

Second, perhaps the most striking finding from our study was the negative association between students' informational text comprehension and their participation in reading-related activities such as book reports, presentations, and projects, with the negative association stronger for FARMS-eligible students than others. Although we have discussed possible reasons for the negative association between frequent engagement in these activities and informational text comprehension, more research is needed to understand the quality, content, and purpose of such activities in today's classrooms.

Third, the higher than expected association with informational text comprehension for FARMS-eligible students who reported frequent whole-class and small group discussions warrants further examination about the attributes of discussions that are particularly beneficial for this demographic. In particular, further research might examine how classroom talk introduces academic vocabulary to prepare students from low socioeconomic backgrounds to comprehend informational texts. Research on classroom talk seems especially important given that many schools serving low-income children have adopted test-driven, highly-constrained reading instruction that does not provide opportunities for wide reading or promote classroom discussions. In short, although the results from this study cannot explain why the associations that we found exist, they do suggest areas for additional exploration in the quest to close the achievement gap between students of differing socioeconomic backgrounds.

Limitations

A limitation of this study is that NAEP does not collect prior achievement data for their participants. Therefore, it is difficult to isolate whether student achievement is directly related to what students reported happened in their homes and classrooms during fourth grade. However, this lack of data may be less important for this study because it explores fourth graders' comprehension of informational texts, and research has shown that many students have relatively few experiences with informational texts, particularly exposition, before this juncture in their education. In addition, this study is limited by its use of FARMS eligibility as a proxy for socioeconomic status. Yet, although FARMS is sometimes considered a weaker measure of family income than other variables (e.g., parental education), NAEP statisticians consider their FARMS variable strong enough to use as the sole measure of family income in their Nation's Report Card results (NCES, 2007). Furthermore, NAEP eases some concerns about using FARMS eligibility by collecting family income information from school records rather than student reports.

As with most large-scale assessments, the data are limited in both scope and depth. In our case, we were particularly aware of the fact that in a 32-question survey of background information, there is only room to address a sampling of variables related to out-of-school and in-school reading achievement. We agree with the recent recommendations that call for the reexamination of the scope and content of the NAEP background questions (Smith et al., 2012). In particular, we argue that a socioeconomic status measure that encompasses not only FARMS but also more specific information about student literacy experiences (e.g., where out-of-school discussions take place; what types of text students read for enjoyment) would make the background data more useful for analyses. In

addition, although it is likely that NAEP examines whether there are differences in how students from various demographics report information on questionnaires as part of their guidelines for developing questions (see http://nces.ed.gov/statprog/2002/stdintro4.asp), it is possible that some subgroups of students may respond differently to items than other groups. For example, the NAEP questionnaire has a heavy focus on frequency questions, but it is possible that FARMS-eligible students and non-FARMS-eligible students report their time use differently for social and/or cultural reasons. Finally, the results of this study are not necessarily generalizable to the US population of fourth graders because some data were lost when HLM could not accommodate missing data at level-2. When all data are used, the 2005 NAEP reading sample represents the population of US fourth graders; however, this study was based on a sample that may have been marginally different than the overall population of US fourth graders.

Conclusion

There has been a longstanding concern for closing achievement gaps in the US (Coleman, et al., 1966; USDE, 2002), as well as in other countries (e.g., Smith, 2011; Wilkinson, 1998). In order to make headway in closing these gaps, educators likely need a better understanding of the factors that are associated with differences in achievement. The achievement difference between low-income students and their peers has been a particular concern. Recent evidence suggests that in the US the gap between rich and poor students is increasing (Reardon, 2011) and that in many states poor children make up the majority in public schools (Southern Education Foundation, 2013). Biyearly in the US, the Nation's Report Card documents the gap in reading achievement between children who are eligible for FARMS and those who are not eligible (NCES, 2007). However, these reports have not addressed potential reasons behind these differences in achievement. This study explored the associations between low-income fourth graders' out-of-school and in-school reading and their comprehension of informational texts. Out-of-School Reading Engagement, Materials for Cross-Curricular Reading, Discussions About Reading, and Reading-Related Activities were identified as factors associated with fourth graders' informational text achievement, and some of these factors differed in the strength of the association for FARMS-eligible and students and fourth graders overall. Thus, the results from this study may enhance discussion of and research on factors that may contribute to understanding why the income-achievement gap exists and what to do about it.

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