

MEET THE “READING RANGERS”: CURRICULUM FOR TEACHING COMPREHENSION STRATEGIES TO URBAN THIRD GRADERS

Joan M. Lucariello, Boston College; The City University of New York, Allison G. Butler, Boston College; Bryant University, and Michele T. Tine, Boston College; Dartmouth College

The need to develop and implement more successful methods to improve the reading comprehension of school age children, particularly those from urban, lower income backgrounds, is pressing. According to the 2011 National Assessment of Educational Progress (NAEP), a nationally representative sample of fourth graders showed no improvement in reading scores compared to either the 2009 or 2007 assessments. Moreover, the results reveal an achievement gap between children of middle- and low-income families that has persisted since NAEP first began examining data by income groups in 2003. In 2011, students who were eligible for free or reduced school lunch, indicators of low family income, had average scores that were 29 and 17 points lower respectively, than students who were not eligible for free/reduced price school lunch. Fifty percent of students eligible for free school lunch could not read at the “Basic” level, compared to 35% of students eligible for reduced school lunch, and only 18% of those who were not eligible for free/reduced lunch (U.S. Department of Education, 2011) .

The approach adopted here to address the income-achievement gap in reading is to target low-income urban children’s social-cognitive strengths. Developmental research suggests that social cognition is a robust skill for all young children, and one that emerges as a particular strength for those from lower socioeconomic backgrounds. Numerous studies have documented an impressive array of social cognitive skills that are manifest in early childhood. For example, young children routinely engage in complex social interactions including cooperation, telling jokes, deception, and sharing (e.g., Dunn, 2002). Moreover, knowledge structures to interpret the socio-cultural world appear to be relatively easily and early acquired, as seen in young children’s representations for events (e.g., Nelson, 1986) and narrative (e.g. Bruner & Lucariello, 1989; Lucariello, 1990; Nelson, 1989; Peterson & McCabe, 1991). In addition, all through early childhood, children exhibit understanding of persons as psychological beings. This high-level cognitive skill is known as “theory of mind” (ToM), which entails our imputation of mental states, such as emotions and beliefs, to self and others to account for behavior (e.g., Astington, Harris, & Olson 1988).

Low-income children, although often found vulnerable compared to middle- and upper-income children in many high-level cognitive skills (Noble, Norman, & Farah, 2005), may be less vulnerable with respect to social cognitive skills. Remarkably, no income-based gap is observed on Social ToM, which entails reasoning about others’ mental states (versus one’s own mental states, labeled Intrapersonal ToM) (Lucariello, Durand, & Yarnell, 2007). Strength in social cognition for low-income children could result from their socialization experiences. There may be many socialization experiences that orient children to others and to the social world. Clearly, however, language use and self-concept would be among the primary mechanisms.

An “interpersonal-pragmatic” model of language use is very prevalent in low-income families and communities. Such language use directs attention to others and others’ mental states. Speech of low-income parents and children emphasizes contextualized uses, defined, in part, as the use of language for interpersonal negotiations (Blake, 1993, 1994; Brice Heath, 1983, 1989; Miller, 1986; Snow, 1991). Language use has a socio-emotional orientation (Blake, 1993, 1994) and serves interpersonal and emotional functions through practices such as teasing and storytelling. These practices are common in discourse between low-income adults and children (Brice Heath, 1983; Miller, 1986).

Socialization of self-concept in low-income and minority children is another means by which social cognition is emphasized. An interdependent or collectivist self-concept is typical of Asian, African, and Latin-American cultures (Greenfield, 1994; Markus & Kitayama, 1991). Hence, an interdependent self-concept is characteristic of many minority U.S. children who are also in urban, low-income schools (Delgado-Gaitan, 1994; Goldenberg & Gallimore, 1995; Greenfield, 1994).

Prior research has capitalized on children’s social cognitive strengths in instructional practice to achieve improvements in student learning. For example, in mathematics education, the Children’s Math Worlds (CMW) project involves linking children’s own narratives that incorporate their mathematical experiences outside the classroom with mathematical experiences in the classroom (Lo Cicero, De La Cruz, & Fuson, 1999). Another successful illustration of a social cognitive curriculum is Palincsar & Magnusson’s (2001) construction and use of a “scientist’s notebook,” in place of a standard science textbook, to enhance children’s learning of science concepts.

THE READING RANGERS CURRICULUM

The Reading Rangers (RR) curriculum is primarily designed for third grade children in urban schools. Its main instructional goals are: (1) to teach two reading comprehension strategies, *visualizing* and *making inferences* and (2) to teach literature concepts, including *reading comprehension*, *literature*, *fiction*, *non-fiction*, and *genre*. The selection of these instructional goals, including the choice to focus specifically on visualizing and making inferences, was initially informed by the principal and classroom teachers at the urban school in which the curriculum was implemented. In addition to our desire to meet the learning needs of the students in our target school, our curricular focus aligns well with NAEP descriptions of reading comprehension proficiencies. Since far too few low-income students are reading at even the “basic” level, we reviewed the NAEP description of this reading level, which indicates that fourth graders should be able to “make simple inferences” and “use their understanding of the text to identify details that support a given interpretation” among other requisite skills (National Center for Education Statistics, 2011). Further, our decision to focus on visualizing is supported by the report of the National Reading Panel (NRP) which indicates that “text comprehension is enhanced when readers actively relate the ideas represented in print to their own knowledge and experiences and construct mental representations in memory” (NRP, 2000, p.14). In general, formal instruction in the application of cognitive strategies is critical for teaching children to read for understanding (NRP, 2000).

Three central principles of learning were relied on in developing the RR curriculum. *Domain-based learning*, *modeling*, and *learning in multiple contexts* were particularly well-suited for creating a social cognitive reading program and were guiding frameworks during the curriculum development process.

Domain-based learning

The science of learning suggests that new material to be learned is best presented within a conceptual framework or domain. When information is organized into a conceptual framework, rather than presented in a disconnected manner, deeper processing of the information occurs, greater meaning is extracted, and relationships and patterns in the material are more easily grasped (see Bransford, Brown, & Cocking, 2000).

The RR curriculum utilizes the principle of domain-based learning in emphasizing reading as its own knowledge domain, with its own vocabulary, strategies, and texts. Furthermore, the RR curriculum converts the reading domain to a *social* domain in order to capitalize on children’s social-cognitive strengths. Conversion to a social domain is accomplished through four mechanisms: (1) personification of literature concepts and reading strategies, (2) creation of a socio-cultural context for learning through curriculum books, (3) development and use of socially-framed learning activities, and (4) creation of literature concept definitions that recruit social cognition. These mechanisms are discussed in turn.

Personification of literature concepts and reading strategies

A set of five lively, culturally diverse characters was developed, each depicting or personifying a reading strategy or literature concept. The entire group of characters was labeled the “Reading Rangers.” The Reading Rangers are cast as reading “experts” and figure prominently in the curriculum. They are the main characters in the curriculum read-aloud books that were created (described in the following section) and 30 inch stand-up versions of the Reading Rangers were brought to the classroom and selectively introduced to children during the appropriate lessons. The Reading Rangers are: *The Great Picturini*, *the Inference Investigator*, *Just the Text Rex*, *Nando the Non-Fiction Know-It-All*, and *Funky the Fiction Freestyler*. They are pictured in Figure 1.



Figure 1. The Reading Rangers: (left to right) Inference Investigator, Funky the Fiction Freestyler, Nando the Non-Fiction Know-It-All, The Great Picturini, and Just-the-Text-Rex.

The Great Picturini is an enthusiastic magician, who personifies the reading comprehension strategy of visualizing and helps

children to use the words they are reading to make pictures in their minds. A comedic pair of detectives, the *Inference Investigator* and his literal-minded, “stick-only-to-what-is-written,” sidekick *Just the Text Rex*, play off of each other to personify the strategy of making inferences. The *Inference Investigator* is a competent detective who encourages children to use the clues provided in the text to make appropriate inferences. *Just the Text Rex*, a detective-in-training, is incapable of going beyond the text and consistently frustrates the Inference Investigator with his literal interpretations and inference inability. *Nando the Non-Fiction Know-It-All*, a serious-minded scientist, appropriately personifies the literature concept “non-fiction.” Nando is always reminding children that non-fiction literature is based on facts and real people and events. Finally, *Funky the Fiction Freestyler* is a zany rapper who personifies the literature concept “fiction.” She is always rapping about different fictitious stories.

Creation of socio-cultural context for learning through curriculum books

The main instructional vehicle in the RR curriculum is a series of six read-aloud books that were created. The curriculum aims to teach five literature concepts (*reading comprehension, literature, fiction, non-fiction, and genre*) in addition to the strategy-related concepts (*visualizing and inference*). These concepts and their definitions (two for each) are embedded, systematically and repeatedly, in the six books.

These 20-minute read-aloud illustrated books tell stories of Lee (male) & Shantelle (female), who are third graders struggling with reading comprehension. Early in the series, Lee and Shantelle discover that their classroom teacher, Mrs. Alvarez, doubles as the Chief of the Reading Rangers. See Figure 2 for an illustration of Lee and Shantelle outside Mrs. Alvarez’s office.



Figure 2. Shantelle and Lee outside the office of Mrs. Alvarez: Reading Teacher and Chief of The Reading Rangers.

A “book-within-a-book” feature allows the concept of genre to be introduced within the larger concepts of fiction and non-fiction, respectively. In each of the strategy-specific read aloud books, Lee and/or Shantelle struggle to read a piece of literature (e.g., *The Tortoise and the Hare*). Thus, a book (e.g., a fable) is embedded within another book (the curricular read-aloud book) so that students get to witness Lee and Shantelle actually going through the process of comprehending text. Each curriculum read aloud book introduces concepts related to the domain of reading and that are to be taught in the curriculum. The six read-aloud books include:

- BOOK 1: *Lee and Shantelle Meet the Reading Rangers Literature Experts*
- BOOK 2: *Lee and Shantelle Meet the Reading Rangers Strategy Experts*
- BOOK 3: *Lee and Shantelle Visualize Fiction (Genre: Fable)*
- BOOK 4: *Lee and Shantelle Visualize Nonfiction (Genre: Science Text)*
- BOOK 5: *Lee and Shantelle Make Inferences with Fiction (Genre: Mystery Novel)*
- BOOK 6: *Lee and Shantelle Make Inferences with Nonfiction (Genre: Biography)*

See Table 1 for how the books are integrated into the implementation of the curriculum.

Table 1

Overview of Curriculum Implementation

Instructional Objective	Day	Lesson Overview: Reading Rangers Group	Lesson Overview: Making Meaning Group
Pre-test		Standardized Reading Comprehension Assessment	Standardized Reading Comprehension Assessment
Introduction of General Literature Concepts: Reading Comprehension, Literature, Fiction, Non-Fiction, & Genre	1	Read Aloud Book 1: <u>Lee and Shantelle Meet the Reading Rangers</u> <i>Learning Activities:</i> -Definition Generation Task with Perspective-Taking -Literature Categorization Task -Socially-Based Definition Recognition Task (He Said, She Said, Who is Right?)	Read Aloud <u>What Is a Fish?</u> (non-fiction) -Think-Pair-Share sessions -Whole Group Discussion -Read Aloud <u>Miss Nelson Is Back</u> (fiction) -Stop and Wonder -Whole Group Discussion
Introduction of Reading Strategies: Visualizing and Making Inferences	2	Read Aloud Book 2: <u>Lee and Shantelle Meet the Reading Rangers Strategy Experts</u> <i>Learning Activities:</i> -Definition Generation Task with Perspective-Taking -Visualizing Task -Inferences Task -Socially-Based Definition Recognition Task (He Said, She Said, Who is Right?)	Read Aloud <u>Tico and the Golden Wings</u> (part 1) -Think-Pair-Share -Visualizing Activities -Define Visualizing -Read Aloud <u>Tico and the Golden Wings</u> (part 2) -Think-Pair-Share -Inference Activities -Define Inferences
Visualizing Fiction Lesson	3	-Read Aloud Book 3: <u>Lee and Shantelle Visualize Fiction</u> <i>Learning Activities:</i> -Definition Generation Task with Perspective-Taking -Visualizing in Memory Context	-Read Aloud <u>Owl Moon</u> , -Turn to Your Partner -Whole Group Discussion -Define Words From Story
Visualizing Fiction Lesson	4	-Re-read Book 3: <u>Lee and Shantelle Visualize Fiction</u> , <i>Embedded Learning Activities:</i> 1. Draw It 2. Act It Out 3. Make a Mental Image	-Re-read excerpt from <u>Owl Moon</u> -Visualizing Drawing Activity -Guided Visualizing Practice with Independent Reading
Visualizing Nonfiction Lesson	5	-Read Aloud Book 4: <u>Lee and Shantelle Visualize Nonfiction</u> <i>Learning Activities:</i> -Definition Generation Task with Perspective-Taking	Read aloud <u>Wild Cats</u> Define Expository text -Think-Pair-Share -Guided Strategy Practice: Visualize and Draw -Whole Group Discussion

		-Visualizing in Daydream Context	
Visualizing Nonfiction Lesson	6	-Re-read Book 4: <u>Lee and Shantelle Visualize Nonfiction</u> <i>Embedded Learning Activities:</i> 1. Draw It 2. Act It Out 3. Make a Mental Image	Re-read <u>Wild Cats</u> -Define Expository text -Visualizing Activity: Create Mental Images -Think-Pair-Share
Visualizing Test	7	Draw 3 Fiction Sentences Draw 3 Non-Fiction Sentences	Draw 3 Fiction Sentences Draw 3 Non-Fiction Sentences
Inferences Fiction Lesson	8	-Read Book 5: <u>Lee and Shantelle Make Inferences with Fiction.</u> <i>Learning Activity:</i> -Definition Generation Task with Perspective-Taking	-Read aloud <u>The Lion and the Mouse</u> -Define Fables -Turn to Your Partner -Inferences Activity: Discuss Character -Reread <u>The Lion and the Mouse</u> , Pausing to Make Inferences
Inferences Fiction Lesson	9	-Re-read Book 5: <u>Lee and Shantelle Make Inferences with Fiction</u> <i>Embedded Learning Activities:</i> 1. Rehearse Inference Modeled in Text 2. Make Inference; Get Feedback 3. Make Inference by Fill-In Sequence	-Reread <u>The Lion and the Mouse</u> . -Inference Activity: Character web chart -Character Change Activity: -Identify clues from text worksheet -Whole Group Discussion
Inferences Nonfiction Lesson	10	-Read Book 6: <u>Lee and Shantelle Make Inferences with Nonfiction.</u> <i>Learning Activity:</i> -Definition Generation Task with Perspective-Taking	-Read aloud <u>Cesar Chavez</u> -Define Biography -Turn to Your Partner -Whole group Discussion -Guided Inferences Practice with Independent Reading
Inferences Nonfiction Lesson	11	Re-read Book 6: <u>Lee and Shantelle Make Inferences with Nonfiction.</u> <i>Embedded Learning Activities:</i> 1. Rehearse Inference Modeled in Text 2. Make Inference; Get Feedback 3. Make Inference by Fill-In Sequence	-Define Expository text -Inference Activity: Character web chart -Character Change Activity: -Identify clues from text worksheet -Whole Group Discussion
Inferences Test	12	4 Multiple Choice Recognition Items (2 fiction, 2 nonfiction) 4 Open-Response Production Items (2 fiction, 2 nonfiction)	4 Multiple Choice Recognition Items (2 fiction, 2 nonfiction) 4 Open-Response Production Items (2 fiction, 2 nonfiction)
Post-Test		Standardized Reading Comprehension Assessment	Standardized Reading Comprehension Assessment

Inclusion of socially-framed learning activities

The RR curriculum includes distinct learning activities. Almost all of these are socially framed and/or require social reasoning. These activities are incorporated into the read-aloud sessions for the six RR books and are also conducted in class after the read-aloud sessions. The learning activities serve three goals. One is to learn visualizing. Associated activities include: modeling of visualizing by the instructor; practice generating mental images (drawing, act-it-out, form a mental image); and teaching visualizing in multiple contexts (memory, daydreaming).

A second goal is to learn how to make inferences. Associated learning activities include: posing questions on social world knowledge (e.g., roles and routines) that require inferences; rehearsing and generating inferences through perspective-taking and role play; and generating inferences by completing a sequence. For example, perspective-taking is used to facilitate students' ability to draw inferences from textual clues. In one learning activity that follows Book 5, students are given a handout with an excerpt from the mystery text (*The Case of the Homesick Lion*) that Lee and Shantelle are reading with the Inference Investigator. An excerpt is below.

On the lion's birthday, the king woke early. He couldn't wait to give the lion his cake. But when the king arrived at the lion's cage... The lion was gone! The king's hands began to tremble, and a tear slipped from his eye.

The directions on the worksheet read: "Imagine you are Shantelle. The Inference Investigator asks you how the king is feeling. What will you say?" Next, students are asked to underline the words in the text that specifically helped them make an inference about how the king is feeling.

The third goal of the learning activities is to teach the literature and strategy concept definitions. Associated activities include: generating definitions through perspective-taking; recognizing definitions through perspective-taking; and categorization-sorting tasks where the categories are represented by the appropriate RR characters. See Table 1 for details on how these learning activities are incorporated into the curriculum.

Concept definitions that recruit social cognition

The five literature concepts (*reading comprehension, literature, fiction, non-fiction, and genre*) and two strategy-related concepts

(*visualizing* and *inference*) and their definitions (two for each) appear regularly in the six read-aloud books. Definitions were created, by the researchers, to be based in children's real-world social experiences (e.g., sports). For example, one definition for *genre* is: "In sports, there are different games, like baseball, football and soccer. In reading, there are different genres, like fables and mystery novels for fiction, and biographies and science text for nonfiction." The socially based definition for *inference* is "a real good guess or conclusion about what is happening, like when you see a team clapping after a game and you conclude that they won the game." These definitions provide opportunities for students to connect reading concepts to social and cultural experiences that they are familiar with.

Modeling of cognitive processes

Theory and research on learning and development point to modeling as a practice that can be used to facilitate learning. The practice of modeling has a long history in psychology. It is rooted in orientations as diverse as Bandura's (1977) Social Learning Theory, Vygotsky's (1978) Sociocultural Theory and the zone of proximal development, and the problem solving literature on scaffolding (Wood, Bruner, & Ross, 1976). More recently, CBLEs (computer based learning environments) are employing social-to-self instructional environments that involve modeling (Zimmerman & Tsikalas, 2005).

The Reading Rangers curriculum employs modeling in three key ways. One, already discussed, is the modeling of the central concepts related to reading comprehension (literature and strategies) through their personification (e.g., visualizing through a magician character).

Second, within every read aloud book, the RR characters model the cognitive processes related to reading for the classroom students. In Books 1 and 2, the characters model the learning process they experience when they are introduced to the literature concepts (e.g., *fiction* versus *non-fiction*). In Books 3-6, Lee and Shantelle actually go through the process of comprehending texts, therein modeling the reading comprehension strategies of visualizing and making inferences. In the following illustration from Book 2, *The Great Picturini* provides scaffolding for Shantelle who is learning to visualize. Shantelle then models the technique of visualizing *within* the story, albeit for the benefit of the students who are listening to the story.

"Let's say you read that a boy had a bump on his head the size of a lemon. What would you visualize? What would your mental image look like?" asked Picturini.

"Wow! That's a big bump! He must have really hurt himself!" exclaimed Shantelle.

"How do you know that?" asked Picturini.

"Well, I made a mental image. I made a picture in my mind when I visualized. It is like a memory or a daydream. I pictured Lee, because he's a boy that I know. And I pictured a lemon. Then, I pictured Lee with a bump on his head. The bump was the same size and shape as the lemon I pictured. That's how I know that this boy has a really big bump on his head!" explained Shantelle.

Finally, teachers and researchers model the reading comprehension strategies during the learning activities that take place at designated pause points within each book and after each read-aloud. For example, in one learning activity that took place after the read-aloud on Day 2, the teacher/researcher models visualizing a person and tells the class:

Let's imagine that Lee reads a story that says there is a girl as tall as a tree. To visualize it, Lee would make a mental image. First, he would picture Shantelle, because she is a girl that he knows. (Teacher draws Shantelle on chart paper.) And he would picture a tree in his front yard. (Teacher draws a tall tree on chart paper.) Then, he would picture Shantelle as tall as the tree in his front yard. (Teacher extends the legs of Shantelle to make her as tall as the tree.)

Following the teacher's modeling, the students in the class have an opportunity to practice the visualizing strategy and receive feedback:

Now, I want you to visualize on your own, using your own background knowledge and mental images. Imagine that Shantelle reads a story that says there is a boy with cheeks as red as apples. Who can describe what they are visualizing to the class?

Learning in multiple contexts to foster generalization

Generalization (transfer) of learning is fostered by teaching information beyond the parameters of a single context (Bransford et al., 2000; Spiro, Coulson, Feltovich, & Anderson, 1988; Stahl, 2005). Transfer of learning involves transferring one's knowledge and skills from one problem-solving situation to another.

The RR curriculum fosters transfer of learning by providing students with opportunities to experience the target strategies in

multiple contexts. Visualizing and making inferences were each presented in two learning activity contexts distinct from the context of the curriculum books. Visualizing was presented in the additional contexts of memory and daydreams. Specifically, the children were asked to visualize the memory of the first day they were introduced to the Reading Rangers (Day 3) and a daydream about any kind of fish (Day 5). Making inferences was presented in the context of make believe situations, such as a lion who escaped from his cage (Day 9), as well as historical settings, such as personality traits of George Washington (Day 11). These multiple contexts were presented to encourage transfer of student learning, which is a fundamental goal of education generally.

Once the Reading Rangers curriculum was developed, an evaluation study to assess its effectiveness in teaching the reading comprehension strategies of visualizing and making inferences and the literature concepts was conducted and is reported here. Its effectiveness was compared to that of a standard district-wide curriculum with the same instructional goals.

METHOD

Participants

Participants were 45 third graders in a low-income urban school. The school was considered low-income because 89% of the student body qualified for free or reduced price lunch (Massachusetts Department of Education, 2011). Students were classified into the following categories by their classroom teachers: advanced readers, average readers, students receiving special education services, and students receiving services for English-language learning. Stratified sampling based on these classifications was used to randomly assign students to the experimental Reading Rangers condition (RR) or the comparison condition (MM, labeled for the “Making Meaning” curriculum). The RR condition ($n=23$; 9 female, 14 male) was comprised of 6 advanced readers, 11 average readers, 4 students receiving services for English-language learning, and 2 receiving special education services. The MM condition ($n=22$; 9 female, 13 male) was comprised of 5 advanced readers, 12 average readers, 3 students receiving services for English-language learning, and 2 receiving special education services. Chi Square analyses showed that the conditions did not differ from each other in the distribution of participants across reading levels. Fisher's exact tests showed that conditions did not differ from each other in the distribution of students receiving services for English-language learning or special education services.

Conditions

Experimental group: “Reading Rangers” (RR) curriculum. The RR curriculum is described in detail above. Please refer to Table 1 for the information on RR lesson plans and their implementation.

Comparison group: “Making Meaning” (MM) curriculum. The MM curriculum, published by the Developmental Studies Center, was used as the exclusive resource in creating the comparison condition lesson plans. This curriculum was chosen as the comparison curriculum for three reasons. First, it was the curriculum being used in the school district. Second, its goals – to teach children reading comprehension strategies and literature concepts – match the goals of the Reading Rangers curriculum. Therefore, the two curricula could be compared directly on effectiveness at meeting these learning goals for students. Third, both curricula have a fundamentally social character--though Reading Rangers and Making Meaning rely on different social mechanisms. Making Meaning's social character is essentially limited to the cooperative learning structures it entails. These include the techniques of “Turn to Your Partner,” and “Think, Pair, Share.” Reading Rangers is social, primarily, by its reliance on social cognitive knowledge and on social-interactive activities, such as perspective-taking and role-playing, which depend on social cognition, and are common activities outside of curricular contexts.

Comparison group lessons were carefully created to include every teaching tool integral to the corresponding Making Meaning units (e.g., Turn to Your Partner, Think-Pair-Share, etc.). Lessons were constructed from across multiple Making Meaning units to ensure that comparison group lessons met the same goals as the experimental group lessons. Read-aloud books, activities, language, and lesson structure were taken directly from Making Meaning teacher manuals and implemented verbatim to preserve authenticity.

Procedure

The curriculum study took place in 12 sessions over four weeks, with a pre-test day before the start of instruction and a post-test day at the end. Each session lasted 45-60 minutes and took place during the regularly scheduled reading block. Two doctoral students with elementary teaching experience taught all sessions in both conditions. To minimize teacher-effects and randomly distribute them should any exist, the doctoral students alternated which condition they taught each session. The implementation schedule was organized to promote consistency in procedures between conditions. For example, a common structure for a teaching session in both the experimental and comparison classes was to begin with a read-aloud text and then follow up with learning activities. See Table 1 for the complete implementation schedule for both groups.

ASSESSMENTS AND SCORING

Reading Comprehension Tests

The pre-test was administered to all participants two days prior to the start of the curriculum study. The post-test was administered the day after the curriculum study ended. Both tests consisted of three standardized reading passages (1 fiction, 2 nonfiction- science and biography, respectively). The passages were selected from past and sample versions of the state's standardized reading test. Word counts and readability statistics were used to establish comparable levels of length and difficulty of passages.

There were five questions per passage assessing: 1. grasp of main idea; 2. fact retrieval; 3. making inferences; 4. visualizing; 5. fiction/nonfiction identification. Each student's reading pre- and post-tests were scored for *total correct responses* (of 15), *visualizing subscore* (ranging from 0-3 and based on answers to the visualizing question for each of the three passages), and *inference subscore* (ranging from 0-3 and based on answers to the inference question for each of the three passages).

Visualizing Test

The visualizing test was administered on Day 7 upon completion of the lessons around the Reading Rangers Visualizing Books (3 & 4). The test consists of three fiction sentences and three non-fiction sentences. Students were instructed to visualize when reading the sentences and then draw a picture of what they visualized. See Appendix A (fiction sentences) and Appendix B (non-fiction sentences) for a copy of this test. Figure 3 shows two sample student responses. Each sentence visualized/drawn received either a score of 1 or 0. A score of 1 indicated that all elements were included in the drawing (response A in Figure 3). A score of 0 indicated that fewer than all elements were included in the drawing (response B in Figure 3). Each student's visualizing test was coded for the total number of correct visualizations of the 6 sentences (0-6) and the total number of correct fiction (0-3) and non-fiction (0-3) visualizations.

A bird lays eggs in a nest. (5 elements)



Response A



Response B

Figure 3. Two different responses for one sentence of the Visualizing Test: "Response A" received a score of "0" and "Response B" received a score of "1".

Making Inferences Test

The inferences test was administered on Day 12 upon completion of the lessons used with the Reading Rangers Making Inferences Books (5 & 6). The test requires students to make inferences from short passages. Four questions (2 open-response, 2 multiple choice) were based on fiction passages. An additional four questions (2 open-response, 2 multiple choice) were based on non-fiction passages. See Appendix C for a copy of this test. Each student's inference test was coded for total number of correct responses on the 4 open-response production questions (0-4) and on the 4 multiple-choice recognition questions (0-4).

RESULTS

Reading Comprehension Tests

Each student's reading pre- and posttests were scored for *total correct responses* (of 15), *visualizing subscore* (0-3 based on

answers to the visualizing question for each of the 3 passages), and *inference subscore* (0-3 based on answers to the inference question for each of the 3 passages). Group means were calculated and are presented in Table 2. Repeated Measures ANOVAs, with trial/time as the within-subjects variable and condition as the between-subjects variable, were run respectively for total score and visualizing and inference subscores. Across these three analyses, there were no significant main or interaction effects related to condition.

Table 2

Group Means for Pre- and Post-test Total Score, Inference Score, and Visualizing Score

Test Type	Experimental Group	Comparison Group
	"Reading Rangers"	"Making Meaning"
	<i>M (SD)</i>	<i>M (SD)</i>
Pre-test Total Score (out of 15)	11.8 (2.4)	11.9 (2.5)
Post-test Total Score (out of 15)	11.0 (2.0)	11.8 (2.8)
Pre-test Inference Score (out of 3)	2.5 (0.6)	2.3 (0.7)
Post-test Inference Score (out of 3)	2.0 (0.9)	2.2 (1.0)
Pre-test Visualizing Score (out of 3)	2.1 (0.7)	2.2 (0.8)
Post-test Visualizing Score (out of 3)	1.4 (0.7)	1.9 (1.1)

Visualizing Test

Group means for visualizing fiction and non-fiction sentences were calculated. The univariate ANOVA on total visualizing score showed a main effect of condition, $F(1, 44) = 21.23, p < .001$. Students in the RR curriculum group produced more correct total visualizations ($M = 4.24, SD = 1.09$) than those in the comparison group ($M = 2.57, SD = 1.25$). In addition, the students in the RR curriculum group had more correct visualizations for fiction sentences ($M = 2.43, SD = .75$) than did the comparison group ($M = 1.67, SD = .97$), [$F(1, 44) = 8.18, p < .01$]. The students in the RR curriculum group also had more correct visualizations for nonfiction sentences ($M = 1.81$) than did the comparison group ($M = .90, SD = .62$), [$F(1, 44) = 20.17, p < .001$]. See Figure 4. Separate paired sample t-tests showed more correct visualizations for fiction sentences than non-fiction sentences for both the RR curriculum group [$(M = 2.43, SD = .75)$ for fiction and ($M = 1.81, SD = .68$) for non-fiction, $t(23) = 3.08, p < .01$] and comparison group [$(M = 1.67, SD = .97)$ for fiction and ($M = .91, SD = .63$) for non-fiction, $t(22) = 3.34, p < .01$].

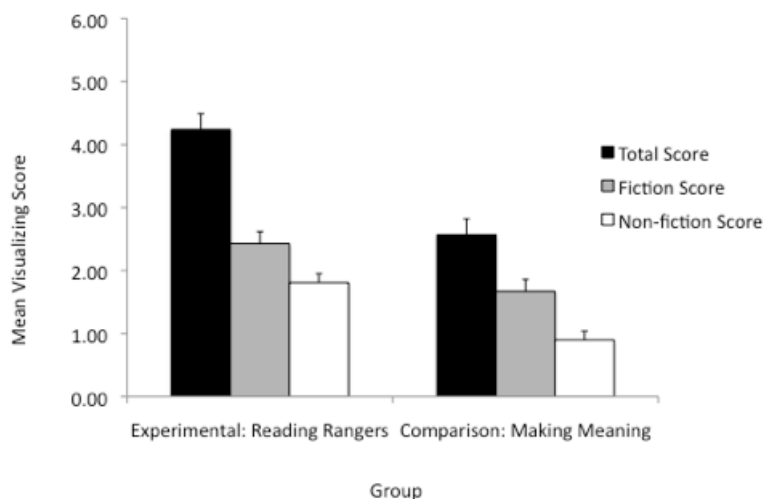


Figure 4. Mean visualizing scores as a function of group and type of literature.

Making Inferences Test

Inference test questions were grouped into those that required only recognition (multiple-choice questions) versus production (open-ended questions). A 2×2 repeated measures ANOVA was run with inference test item type (recognition, production) as the within subjects factor and participant group (experimental, comparison) as the between subjects factor. A significant interaction between inference test item type and participant group was found, $F(1, 44) = 17.51, p < .001$. Post hoc analyses

revealed a significant group difference on those items that required production, with the experimental RR group producing more correct inferences ($M = 2.61$, $SD = .94$) than the comparison MM group ($M = 1.47$, $SD = .90$). See Figure 5.

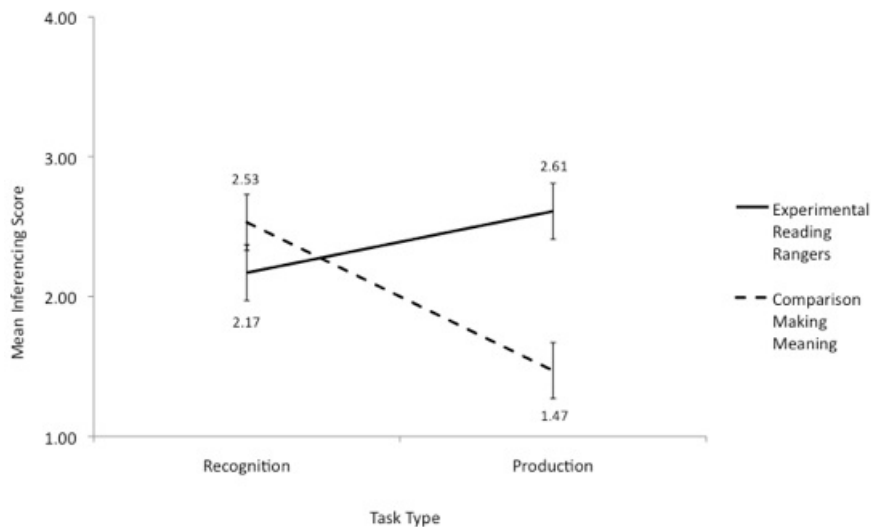


Figure 5. Mean inference scores as a function of group and task type.

DISCUSSION

An innovative reading comprehension curriculum that recruits social cognition in the teaching of visualizing, making inferences, and literature concepts was created, thereby achieving the first aim of the research. The Reading Rangers program was based on three research-based learning principles that were relied on in converting reading comprehension to a social domain. The RR curriculum was designed to capitalize on the social reasoning strengths of low-income children that have been identified in the cognitive-developmental literature.

The second research aim entailed implementing the Reading Rangers curriculum within a low-income urban school and comparing its effectiveness to an established reading comprehension curriculum already being used in the district. The overall multiple-choice reading comprehension test did not appear sufficiently sensitive or challenging to reveal RR curricular effects of any kind. No differences were found between the pre- and post-test scores of the Reading Rangers and Making Meaning groups, either within or across groups. Both groups performed reasonably well on this test, with approximately 73%-80% total correct responding. Perhaps, a more challenging test might have revealed group differences.

Indeed, more challenging assessments consisting of production measures (open-ended, non-multiple choice test formats) did reveal RR curricular effects. They showed the Reading Rangers curriculum to be more effective at improving the use of reading comprehension strategies than the comparison Making Meaning district curriculum. With respect to visualizing, the results of the visualizing test revealed that the Reading Rangers group showed significantly better production of accurate and comprehensive visualizations compared to the Making Meaning group on both fiction and non-fiction texts. In addition, on the "making inferences" test, the Reading Rangers group was more successful at producing correct inferences than the Making Meaning group.

The finding that the Reading Rangers curriculum was more effective than the district program in facilitating students' use/production of strategies is particularly noteworthy, as production is considered a higher-level cognitive skill than recognition (Glover, 1989; McDaniel & Mason, 1985). This result is even more striking when considering the short duration of instruction, which was just twelve days.

Both the Reading Rangers and Making Meaning groups did better on visualizing fiction than non-fiction. Fiction is inherently more social than non-fiction because of its greater emphasis on social interaction as a topic. This finding, along with the literature documenting the social cognitive skills of young children (e.g., Bruner & Lucariello, 1989; Dunn, 2002; Lucariello, 1990) suggests that social cognition may be a general cognitive strength in children that educational practice should seek to recruit.

There are a few limitations of this work which could be addressed in future research. First, the duration of the curriculum may be too short to impact student performance on an externally valid standardized reading test. We plan to increase the duration of the third grade RR curriculum by adding instruction on the reading comprehension strategies of *using story structure* and *comprehension monitoring*. Including four strategies may yield a more robust indication of the curriculum's effects on students' reading comprehension skills. In addition, once these supplementary curricula are created and tested, it will be necessary to study the relative importance of each strategy and how different students may actually invoke a mixture of skills to maximize comprehension. It would also be interesting to examine whether transfer of visualizing and making inferences strategies can be observed in other subject areas (e.g., math or science) or even outside of the school context, such as with independent reading at home. Another limitation of this work is that it targets only third graders; however, NAEP results show that the income-achievement gap in reading is already well established by grade four (NCES, 2011). Therefore, we plan to develop a Reading Rangers curriculum for kindergarteners to reach students earlier in their reading education. Finally, it would be useful to implement the Reading Rangers curriculum with a sample of middle-income children/schools to see if its social cognitive basis yields improved strategy use among middle-income students, as well.

It is encouraging that the Reading Rangers curriculum proved to be effective in teaching reading comprehension strategy use to urban, low-income children. The current findings are consistent with other research that has shown positive effects on learning from educational practices that build upon children's social cognitive strengths (Lo Cicero, De La Cruz, & Fuson, 1999; Palincsar & Magnusson, 2001). Given the persistence of the income-achievement gap and the preliminary success of this curriculum, building on social cognitive strengths in urban classrooms may be a promising approach for boosting low-income students' reading achievement.

TABLES AND FIGURES

For all Tables and Figures, please see the attached document below.

APPENDIX A

Visualizing Test (Fiction)

Directions: Read each sentence. Visualize each sentence. Draw a picture of what you visualized in the box. Please use pencil.

1. The princess was inside the castle.
2. The beard on the wizard looked like cotton candy.
3. The wind blew off Frosty the Snowman's hat.

APPENDIX B

Visualizing Test (Non-Fiction)

Directions: Read each sentence. Visualize each sentence. Draw a picture of what you visualized in the box. Please use pencil.

1. A dinosaur's tooth is the size of a banana.
2. A bird lays eggs in a nest.
3. A crab walks at the bottom of the ocean.

APPENDIX C

Making Inferences Test

PART I. Read each paragraph below and then fill in the blank.

1. The sun was low in the sky. Cinderella's body ached. Blisters had formed on her hands. She lay the broom down on the big pile of dirt and dust.

You can infer from this passage that Cinderella _____.

2. These incredible areas cover only 6% of the Earth's surface, but at least 30 million species of plants and animals live in them. Some of the animals that live in these areas are monkeys, toucans, macaws, and tropical frogs. You can also find many exotic and beautiful tropical flowers there. The climate in these areas is very hot and humid, but almost nine feet of rain falls each year! Unfortunately, these beautiful areas are in danger of being destroyed.

The place being described above is a _____.

3. Before the Civil Rights Movement, black people had to sit in the back of city buses and stand if a white person needed a seat. In 1955, a black woman named Rosa Parks refused to give up her seat to a white man. She was arrested. This led blacks to boycott, or not use, Montgomery buses until the unjust law was changed. Rosa Parks has been called the "mother of the civil rights movement."

You can infer from this passage that Rosa Parks _____.

4. A frog was hopping around the stables when it decided to investigate the barn. The frog was careless, and he ended up falling into a pail half-filled with fresh cow's milk. As he swam around nervously, he tried to reach the edge of the pail so he could climb out. He tried to stretch his back legs to push off the bottom of the pail, but the milk was too deep. But the frog was very determined and didn't give up. He kicked and squirmed and squirmed and kicked for hours, until at last the milk turned into butter! All of his hard work finally paid off. The frog was able to step on the solid butter and climb out of the pail. "Hooray!" cheered the cow and the pig as the frog jumped out of the pail.

The place described in the passage is a _____.

PART II: Circle the best answer for each item below.

1. A red ant went to the river to get a drink, fell in, and was carried along in the stream. A Dove saw the ant and felt sorry for it, so threw a stick into the river. The red ant climbed onto the stick and rode it safely to the shore. Afterwards, the ant saw a man, frowning and red in the face, aiming a gun at the dove. The ant crawled onto the man's foot and stung him sharply, which made him move his gun and caused the bullet to miss the Dove.

You can infer from this passage that:

A The man doesn't like it when doves fly by.

B The man was frowning.

C The man lives in Kansas.

D The man is young.

2. A man and a woman gave away their child named Rapunzel. Rapunzel grew into a beautiful girl. When she was twelve years old, her keeper shut her into a tall, skinny building in a forest, that had neither stairs nor a door, but at the very top was a little window. From the window, one could see all of the forest below. When the keeper wanted to go in, she stood beneath the window and cried loudly up to Rapunzel, "Rapunzel, Rapunzel, let down your hair to me." Rapunzel would toss down her long hair and the keeper would climb up. You can infer from this passage that: A Rapunzel is in a hotel. B Rapunzel is in a tower. C Rapunzel is in a tree. D Rapunzel is in a skyscraper.

3. A class planted two identical plants. They watered one plant with salty water everyday. They watered the other plant with fresh water every day. Three weeks later, the plant watered with salty water was shorter than the plant watered with fresh water.

You can infer from this passage that:

A The class planted two identical plants.

B The class is a second grade class.

C Salt water is less healthy for the plant than fresh water.

D Plants need food to grow.

4. Abraham Lincoln was born on February 12, 1809 in a one-room log cabin in Kentucky. Most days the family needed Abraham to work on the family farm to help them make enough money to feed everyone. Only occasionally, was Abraham allowed to go to school. He would walk two miles to a schoolhouse, where he learned the basics of reading, writing, and math. School required money and Lincoln could rarely get away from his chores, so he couldn't go very often. However, Abraham was very motivated to learn to read on his own.

You can infer from this passage that:

A Abraham Lincoln had a beard when he was president.

B Abraham Lincoln's family was poor.

C Abraham Lincoln was born in February.

D Abraham Lincoln was good at math.

ABOUT THE AUTHORS

Dr. Joan Lucariello is a Professor of Psychology and Educational Psychology at the Graduate Center of the City University of New York (CUNY) and is also University Dean of Education at CUNY. Her research and publications focus on cognitive development and learning, narrative thinking, and educational applications, such as the development of curriculum and diagnostic tests for teacher use in the classroom. In her role as University Dean, Dr. Lucariello works with the CUNY colleges

and the NYS and NYC Education Departments on issues including teacher preparation and college readiness. She is a Fellow of the American Psychological Association (APA), the Association for Psychological Science (APS), and the American Education Research Association (AERA).

Dr. Allison Butler is an Assistant Professor of Applied Psychology at Bryant University. She was a fifth grade teacher before earning her M.Ed. in Educational Psychology from the University of Virginia. Her Ph.D. is in Applied Developmental & Educational Psychology from Boston College. Her research and publications focus on children's learning and cognition, contemporary educational policy, and higher education pedagogy aimed at maximizing student learning and engagement. She currently teaches courses in educational psychology, testing and assessment, introductory psychology, and child development.

Dr. Michele Tine is an Assistant Professor in the Department of Education at Dartmouth College. Her research program focuses on identifying social and contextual influences that impact cognitive processes that underlie the income-achievement gap. She has published research in the *Journal of Educational Psychology*, *Autism Research and Treatment*, *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *Journal of Neurophysiology*, *Cerebral Cortex*, and in N. Stein (Ed.) *Developmental Science Goes to School*. Dr. Tine has taught a wide range of courses, many of which approach education from an interdisciplinary Mind, Brain, and Education perspective.

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