JOURNAL OF RESEARCH IN CHILDHOOD EDUCATION
2016, VOL. 30, NO. 2, 211–225
http://dx.doi.org/10.1080/02568543.2016.1143894

Routledge
Taylor & Francis Group

# Empowering Young Children in Poverty by Improving Their Home Literacy Environments

Walter Evans[a], Paulette Harris[a], Sankara Sethuraman[a], Dharma Thiruvaiyaru[a], Elizabeth Pendergraft[a], Karen Cliett[b], and Valerie Cato[a]

[a]Augusta University, Augusta, Georgia; [b]Richmond County School System, Georgia

**ABSTRACT**

An innovative DVD of classic nursery rhymes and stories empowered at-risk kindergarten children to control in the home when and how much they listen, promoting better listening, reading, and overall literacy comprehension skills. Coupled with modest teacher training, and limited use in the classroom, the DVD generated dramatic vocabulary growth in nine months and remarkably higher reading scores three years later. Funded by a Georgia Improving Teacher Quality grant, the study was conducted in 33 kindergarten classrooms in 31 Title I schools, each of which normally produced significantly below average test scores in reading. The study documents 459 kindergarten students' mean improvement from the 27th to the 47th percentile on the Peabody Picture Vocabulary Test (PPVT-III). The 303 students who remained in the system as 3rd graders and took Georgia's statewide Criterion Referenced Competency Test in reading failed to meet standards less than half as often (7.6% vs. 16.13%) as their system peers, and scored in the highest range 35% more often (39.6% vs. 27.02%). Forty thousand DVDs have since been distributed and the DVD's ten hours of audio, text, and pictures are now freely available online at hearatale.org.

**ARTICLE HISTORY**
Received 19 May 2014
Accepted 30 August 2014

**KEYWORDS**
Family literacy; literacy; nursery rhymes; technology

Kindergarten and preschool programs have become increasingly important factors in national education policies, particularly for the enormous numbers of underachieving students whose low-income homes, overburdened parents, and verbally impoverished backgrounds seem to effectively doom many of them to failure before they even begin school. In the past half-century, the rise of sensually stimulating, image-oriented media has paralleled a decline in opportunities for children to hear, memorize, or read the sorts of verbally rich texts that had been created over the years to help children nourish and develop their verbal skills. Predictably, decades of declining reading scores have paralleled children's declining experience with those texts. Past generations of children have taught adults which stories and rhymes children prefer, and teachers were able to build on the diverse literacy skills (phonological awareness, vocabulary, comprehension, etc.) children develop through repeated experiences with nursery rhymes, fables, folktales, and fairy tales. In the past few decades, however, our culture has abandoned this successful model, with disastrous consequences for reading skills.

Virtually all educators agree that preschool children who frequently hear rhymes and stories at home are much better prepared for literacy and for school, and that far too few of the children who begin school with limited early literacy skills ever manage to catch up to children who have stronger early literacy skills. Projects designed to significantly alter the behavior of teachers and parents tend to be expensive and difficult to implement; to date, few, if any, inexpensive, simple, easy, workable,

**CONTACT** Walter Evans wevans1@augusta.edu English and Foreign Languages, Augusta University, 1120 15th Street, Augusta, GA 30912.

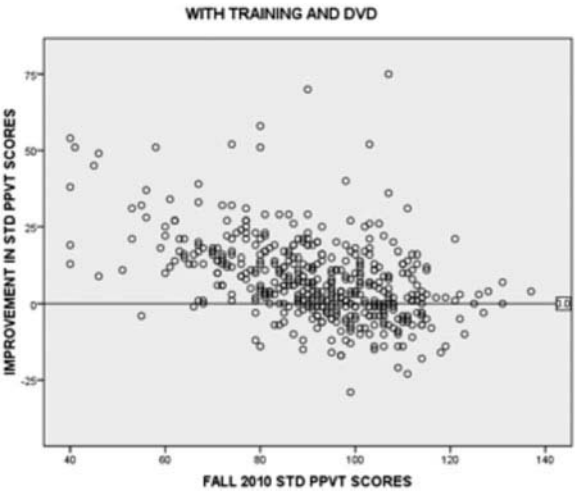


**Figure 1.** Scatter plot of improvement in standard Peabody Picture and Vocabulary Test (III) scores of students with DVD intervention. *Note*. PPVT = Peabody Picture Vocabulary Test; STD = Student.

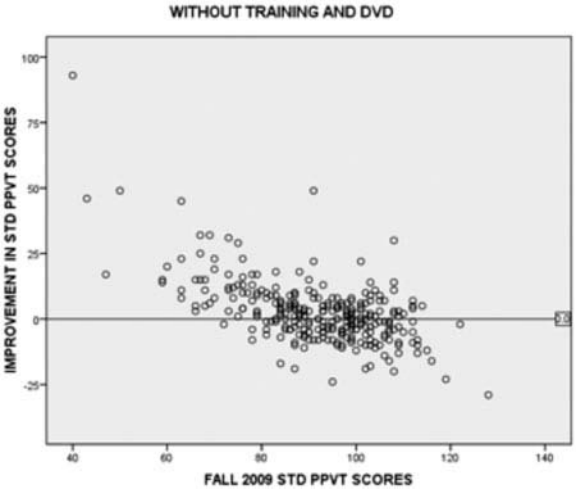


**Figure 2.** Scatter plot of improvement in standard Peabody Picture and Vocabulary Test (III) scores of students without DVD intervention. *Note*. PPVT = Peabody Picture Vocabulary Test; STD = Student.

proven solutions have surfaced. We developed an approach that is radically conservative, using classic rhymes and stories that have succeeded for centuries, and radically innovative, allowing the children themselves to take a major role in solving the problem. Certainly, no one, quick fix will ever resolve all child literacy challenges, but if an ideal solution existed it would be inexpensive; simple to implement; require a minimum of teacher retraining; work relatively quickly; produce strongly positive, verifiable results; and be easy to scale up nationally. We do not claim our proposal is perfect, but it does meet each of these vital criteria.

## Review of previous research

Education research is virtually unanimous on the importance of enriched home literacy environments and high-quality early care environments for children's language and literacy development. Unfortunately, too many children suffer from impoverished environments and experiences (Dickinson, 2001; Hart & Risley, 1995; Justice, Mashburn, Hamre, & Pianta, 2008; Serpell, Sonnenschein, Baker, & Ganapathy, 2001). Although considerable research documents how increasing parents' and teachers' language and literacy activities with young children can increase the children's learning, these approaches normally require expensive investments in materials and time-consuming retraining of teachers, while too often producing only limited gains (Jackson et al., 2007).

Children's early literacy performance in preschool is one of the most important early predictors of subsequent school successes. Unfortunately, children from low-income homes seldom experience the high-quality language and literacy environments and stimulation available to children from more advantaged backgrounds (Hart & Risley, 1995; Neuman & Celano, 2001; Wells, 1986). Children entering school with limited early literacy skills often fail to catch up to children entering with stronger skills (Alexander & Entwhisle, 1988; Juel, 1988; National Early Literacy Panel, 2008). The home literacy environment plays a significant role in predicting children's reading abilities in kindergarten (Hammer, Farkas, & Maczuga, 2010) and later schooling (Sénéchal, 2006). Opportunities for interactions with books and parent teaching significantly contribute to children's early literacy development (Sénéchal & LeFevre, 2002; Sénéchal, LeFevre, Thomas, & Daley, 1998).

Unfortunately, abundant recent research unambiguously documents that deficiencies in children's early literacy skills during preschool and kindergarten tend to persist or increase through the elementary years and beyond (Alexander, Entwhisle, & Olsen, 2001; Burkham, Ready, Lee, & LoGerfo, 2004; Cabell et al., 2011; Hirsch, 2003; Snow, Burns, & Griffin, 1998). Especially in low-income homes, the absence of books and the lack of a verbally rich atmosphere have a crippling effect on children's essential language and literacy skills. Wells (1986) reported that children in low-income homes often experienced language deficits as a result of parents who placed little value on literacy, demonstrated poor literacy skills, and had few or no books. Research has repeatedly and consistently demonstrated how important it is for children, prereaders or developing readers, to hear stories and rhymes. "The single most important activity for building the knowledge required for eventual success in reading is reading aloud to children" (Anderson, Hiebert, Scott, & Wilkinson, 1985, p. 23). Reading storybooks aloud helps teach children meanings of unfamiliar words (Robbins & Ehri, 1994). Younger children significantly improved new expressive vocabulary from a single oral reading of a book (Sénéchal & Cornell, 1993). "Students become more fluent readers when provided with models of fluent reading" (Armbruster, Lehr, & Osborne, 2001). Findings published in *The National Reading Panel Report* (National Institute of Child Health and Human Development, 2000) indicate the kind of effective vocabulary instruction supported by research emphasizes multimedia aspects of learning, richness of context in which words are to be learned, and increased exposures to words. Research also suggests that nursery rhymes can help develop positive attitudes toward reading and learning in general. Baleghizadeh and Dargahi (2010) advise that children can develop a desire for continuing their education through adequate exposure to reading stories aloud. Children can also potentially improve their reading skills by reading and listening to nursery rhymes that stress different components of phonetics, such as sound and proper accent placement (Baleghizadeh & Dargahi, 2010).

In an influential series of classic longitudinal studies focused on "dialogic reading," Whitehurst and colleagues (Whitehurst et al., 1994; Whitehurst & Lonigan, 1998; Whitehurst et al., 1999) raised children's normative Peabody Picture Vocabulary Test (PPVT-III) scores from the 12th percentile at Head Start entry to the 17th percentile at Head Start exit/kindergarten entry and up to the 30th percentile at kindergarten exit (approximately 30 months), at a material cost of approximately $5,000 per center (mostly for books; eight centers served a total of 280 children), a mean increase of 18 percentile points at about $142 per child—a relatively inexpensive intervention. In only nine months,

our 2010 to 2011 study raised the normative PPVT scores of 459 kindergarten students from the 27th to the 47th percentile (an increase of 20 percentile points) at a material cost of less than $1 per child. Three years later, children in the intervention failed the statewide Criterion Referenced Competency Test (CRCT) in reading less than half as often as system peers who had not experienced the intervention (7.6% vs. 16.13%), and scored in the highest of three ranges 35% more often (39.6% vs. 27.02%).

## Initial study

One primary question controlled our initial study: Can kindergarten teachers using a specially created rhymes and stories DVD empower students themselves to significantly raise their mean PPVT vocabulary scores? We created a DVD with 10 hours of audio, full printed text, hundreds of pictures, and a child-friendly picture menu, and we designed a professional development intervention to (1) enhance 33 kindergarten teachers' understanding of the background, nature, and value of traditional nursery rhymes, fables, folktales, and fairy tales; (2) outline pedagogical strategies, methods, procedures, and techniques for using these classic texts to help children develop their emerging literacy skills; and (3) train the teachers in technological resources, strategies, and techniques—requiring only modest parental involvement—they could use to improve their students' emerging literacy skills. Our initial study focused on measuring one primary emerging literacy component, receptive vocabulary, in kindergarten students.

## Method

### *Participants*

The study was conducted in 33 kindergarten classrooms in 31 elementary schools in the Richmond County (Georgia) School System (RCSS). Each elementary school principal was directed to recruit one kindergarten teacher. The selection criteria were (1) applicant's students showed growth on the Dynamic Indicators of Basic Early Literacy Skills (DIBELS); (2) each applicant taught kindergarten at the school in 2009 and 2010 and would return to teach kindergarten in 2010 and 2011; (3) each showed the ability and desire to serve as a teacher-mentor; (4) each preferably had administered the PPVT in 2009 and 2010 (we were able to recruit only three who met this requirement); and (5) each was willing to commit to the workshop and to follow-up activities. Each participant was offered a $300 stipend and credit for five Professional Learning Units. Five of the 36 principals were unable to identify teachers able to commit to the workshop training and two schools sent two teachers. A total of 33 teachers participated, all female. (A 34th teacher attended the workshop but was subsequently transferred to teach 1st grade and was not included as a participant.)

In 2010, the Augusta-Richmond County census recorded a predominantly urban population of 200,549. The RCSS serves primarily minority students (76% African American, 22% White), the vast majority of whom are poor, come from homes without fathers, live with adult caregivers who themselves suffered from substandard educations, and live in homes lacking books, computers, and other educational resources. All elementary schools in the RCSS were Title I schools. Not surprisingly, children in Richmond County schools left 1st grade significantly disadvantaged compared to other Georgia students. The Spring 2009 Criterion-Referenced Competency Tests in reading showed that a randomly selected 1st-grade student from anywhere in the state of Georgia was nearly 52% more likely to score at a higher level than a randomly selected Richmond County student (41% of students statewide, compared to only 27% of RCCS 1st-graders). Students at the other end of the spectrum faced even grimmer prospects: a randomly selected RCCS 1st-grader was 67% more likely to score below standard than his peers throughout the state (9% overall vs. 15% overall). The least disadvantaged school, C. T. Walker magnet school, had a National School Lunch Program participation rate of 37%, four schools rated from 41% to 53%, four from 63% to 68%, five scored in the 70th

percentile, nine in the 80th percentile, and 11 scored in the 90th. The system's 2010 Scholastic Aptitude Test (SAT) results were as follows: critical reading (442), critical math (443), critical writing (434). Demonstrably, these students, these teachers, and this system needed significant help.

## Intervention

### Workshop

The 8-day, 50-hour professional development workshop Using Nursery Rhymes and Fairy Tales to Promote Literacy and Pre-Literacy commenced on May 26 and ended on June 4, 2010. The goal was to improve teachers' (1) knowledge of the background, nature, and value of traditional children's rhymes and stories; (2) pedagogical skills, techniques, and strategies to develop their students' preliteracy skills; and (3) ability to use technological resources, including digital online resources and, most important, the specially designed DVD that contained 10 hours of rhymes and stories.

Most workshop sessions took place in "smart" classrooms in which the presenter projected onto wall screens material from document cameras, DVDs, thumb drives, online resources, and so on. Some sessions occurred in computer labs where participants researched online resources. All lecture sessions were digitally filmed and participants who missed sessions were required to watch the DVDs and write summaries of presentations. Sessions were conducted by 24 presenters. Seventeen were Augusta University professors (the institution was then named Augusta State University), four professors were from the College of Education, 13 were from the College of Arts and Sciences (including seven from English), and one each from anthropology, sociology, psychology, Spanish, art, and music. The seven off-campus consultants included two specialists in creating interest in reading, one public librarian, three RCSS media specialists, and one evaluation expert who trained the teachers to conduct the PPVT.

***Rhymes and stories DVD.*** Teachers learned strategies to exploit the rhymes and stories DVD; each initially received one disk and later received enough to provide one for every student to take home. Each DVD contains 10 hours of audio, 2 hours of hundreds of classic rhymes, and 8 hours of 50 classic stories, ranging from rhymes and simple stories that have proved appropriate for children ages 2 to 3, up to longer and more sophisticated stories appropriate for children ages 5 to 6 and even older. Few of the RCSS children had access to home computers, but each disk is designed to play in one or more devices we found to be available in almost every home, a DVD player or game systems such as PlayStation or Xbox.

***Rhymes.*** Our rhymes exist in a variety of formats, each rhyme synchronized with an onscreen page of text and pictures with skin tones adjusted to represent contemporary America; each separate "book" of rhymes and each individual rhyme is identified by a picture in the child-friendly menu pages. In one "book," Mother Goose converses and introduces dozens of rhymes; in another, she intersperses groups of rhymes with brief classic stories; Father Goose does the same with different rhymes (and stories); another Mother Goose, in a different voice, reads over 100 rhymes only (no conversation or stories) paired with text and pictures from the classic 1915 Volland edition of *Mother Goose* (edited by Eulalie Osgood Grover, illustrations by Frederick Richardson); in another "book," a dozen different voices speak more than 100 rhymes matched with text and pictures from the classic 1903 *The Big Book of Nursery Rhymes* (edited by Walter Jerrold, illustrations by Charles Robinson).

***Stories.*** Our 50 stories offer a wide range of voices and a variety of genres: fables and animal stories, folktales, fairy tales, and public domain stories such as "The Little Engine That Could" and "The Story of Peter Rabbit," all with classic pictures (with skin tones adjusted) on the left side of the page/screen and with full text on the right side. The menu, with each title keyed to a picture, organizes stories by length from the shortest to the longest. Shorter stories run about 2 to 4 minutes, tend to contain fewer words per sentence (16–18), and depend on less sophisticated grammatical structures;

the longest stories, ranging up to 22 minutes, contain more words per sentence (24–29) and more challenging vocabulary and grammatical patterns.

***Follow-up activities.*** At the beginning of the school year, teachers administered the PPVT to record initial receptive vocabulary scores for comparison with scores achieved after 9 months of instruction and experience of the DVDs. In their schools, media specialists and teachers conducted parent literacy events to teach parents how to use the literacy materials in their homes. Caregivers were directed toward two main options for sharing the stories with their children. First, parents could simply play the discs at home for their children or allow the children to explore the materials by themselves with adult scaffolding. Second, parents were encouraged to mute the volume and use the onscreen text to read rhymes and stories to their child. Although we were unable to verify how often parents actually did read the texts aloud, we are skeptical that they did so frequently enough to significantly affect children's language and literacy skills. Nevertheless, the DVD did allow children the opportunity to choose for themselves and control what they listened to, repeating familiar stories and rhymes or discovering new favorites. We are confident that children's use of these stories and rhymes in their homes was the key factor in increasing the children's language and literacy learning.

In the classroom, teachers made DVDs available to students during free time and played stories and rhymes from the DVDs before class began, as students readied to go home, and at other intervals during the day when the audio would not interfere with other activities. Teachers encouraged students to listen to the DVDs at home and praised students who could repeat rhymes or retell stories. In postseminar conferences in October 2010 and May 2011, participants documented their use of the seminar's instructional materials and reported on how they mentored other teachers by sharing their new knowledge and techniques. In May 2011, teachers again administered the PPVT to gauge students' progress in acquiring receptive vocabulary.

### Data collection

The Peabody Picture Vocabulary Test (PPVT-III), a receptive vocabulary test, requires 10 to 15 minutes to administer; children identify a spoken word by choosing from a set of pictures. The test is nationally normed from age 30 months through 90+ years, with age-based standard scores ($M$ = 100, SD = 15), percentiles, normal curve equivalents, stanines, age and grade equivalents, and Growth Scale Value. Teachers received workshop training in how to administer the test, and administered the test to their students in August/September 2010 and April/May 2011.

## Results

### Teachers' workshop evaluations

We are convinced our workshop significantly improved the teachers' knowledge and skill. A variety of experts conveyed comprehensive instruction and provided a depth and breadth of experiences that allowed teachers to easily absorb the content of the workshop. This finding is supported by the participants' evaluation of the workshop and its usefulness to classroom application. Each unit was assessed on five dimensions:

(1) The workshop session was useful to me as a teacher.
(2) The content was presented in an understandable manner.
(3) The objectives of the session were stated and met.
(4) Activities were appropriate.
(5) What I learned may lead to changes in my teaching practices.

These items were rated using the following key: 4 = *strongly agree*; 3 = *agree*; 2 = *disagree*; 1 = *strongly disagree*; 0 = *not applicable*

Overwhelmingly, teachers reported a positive experience, with only 10 of 135 items falling below the standard of *agree*. Three items were scored with a complete average of 4 indicating a standard of *strongly agree* awarded by every participant. Self-reporting and subjective responses on our post-seminar June 2010 questionnaires and end-of-project April 2011 questionnaires indicate that the teachers learned a great deal about the primary literary materials on which the course focused.

### *Summary of analysis of students' PPVT scores*

In Fall 2010 and again in Spring 2011, 33 kindergarten teachers from 31 schools gave the PPVT-III to 459 students. The first analysis below demonstrates that their scores showed a mean improvement of 7.82 raw points (from standard mean scores of 91.47 [a score of 91 is equivalent to the 27th percentile] to 99.48 [99 = 47th percentile]). We compared these scores to the only comparable PPVT scores available from five RCSS schools (with scores for 283 students) from the previous school year; these students showed a mean improvement of 2.74 points (from standard mean scores of 91.66 [92 = 30th percentile] to 94.21 [94 = 34th percentile]). Compared to the control group, the mean advantage gained by our students as a result of workshop-trained teachers and the DVDs is 5.08 points (7.82–2.74).

The second analysis below (a four-page report prepared by a different statistician) charts the only three teachers who gave the PPVT to one class in 2009 and 2010 and then to a second class in 2010 and 2011 (after benefit of the workshop and DVDs). In this much smaller sample of students who took both exams, the 45 students in 2009 and 2010 began Fall 2009 with mean scores of 95.69 points (96 = 39th percentile) and in Spring 2010 achieved mean scores of 95.82 (96 = 39th percentile), an almost invisible gain of only .13 points. We have only 36 scores for intervention students for these teachers the following year, after the workshop and DVDs. This subset of 36 students who experienced the intervention began with much weaker scores in Fall 2010, mean scores of 78.81 points (79 = 8th percentile), but for these students the effect of their teachers' workshop training and the DVDs seems to have been remarkable; their mean scores in Spring 2011 jumped 11.47 points to 90.28 (90 = 25th percentile). Data indicate that the teachers' workshop training and DVDs had an especially positive effect on students who tended to begin the year with lower scores.

### *Comparison of standard PPVT scores for the students of 33 teachers who participated in the training/DVD intervention to the scores of students from 5 teachers who did not have the training/DVDs*

#### *Objective: To investigate whether the training/DVD intervention program improves the standard PPVT scores of students*

Thirty-three kindergarten teachers from 31 RCSS schools participated in the training program in Summer 2010 and received DVDs for their students. The standard PPVT scores of their students at the beginning of the school year (Fall 2010) and at the end of the school year (Spring 2011) were then recorded; the scores of 459 students are available to us for analysis. These students were given the DVD. Prior to getting trained, the same teachers taught another set of students in the year 2009 to 2010. However, standard PPVT scores at the beginning of the school year (Fall 2009) and at the end of the school year (Spring 2010) were available to us for only 283 of these students.

A two-factor ANOVA procedure was conducted to analyze the effect of training/DVDs on standard PPVT scores. The two factors are (1) training status/DVDs (had training/DVDs or not) and (2) semester in which scores were recorded (Fall or Spring). Training status/DVDs is an independent factor because the students on whom standard PPVT scores were collected before the teachers received training/DVDs (2009–10 batch) are completely different from those on whom standard PPVT scores were collected after the teachers (2010–11 batch) received training/DVDs.

Semester is a repeated factor because standard PPVT scores were collected on the same set of students at the beginning of Fall and at the end of Spring in each school year. Interaction between the training/DVD status factor and the semester factor was also included in the analysis. The level of significance for the procedure was kept at the customary 5% or 0.05. The results of the ANOVA procedure are given in Tables 1 and 2.

The $p$ value of the interaction effect = 0.000 is less than the level of significance of 0.05, which means that the interaction between semester and training/DVD status is statistically significant. This means that the improvement from Fall to Spring in the standard PPVT scores is different for students of the school year 2009 to 2010 (teachers had not received training/DVDs) compared to the standard PPVT scores of students of the school year 2010 to 2011 (teachers had received training DVDs).

We then conducted further investigation of improvement in standard PPVT scores of 2009 to 2010 and 2010 to 2011 using a two-sample independent $t$ test unequal variance. The results of the t test are given in Tables 3 and 4.

The $p$ value of the $t$ test for the equality of means is 0.0000, and it is less than the level of significance of 0.05. Therefore, we conclude that improvement from Fall to Spring is much higher in 2010 to 2011 than in 2009 to 2010. Recall that teachers had not received training/DVDs in the year 2009 to 2010 but had received training/DVDs in 2010 to 2011. We can therefore conclude that the training/DVD intervention might have played a significant role in bringing about the higher improvement in the standard PPVT scores of students. The 95% confidence interval for the difference in improvement of student PPVT scores due to teacher training/DVDs is between 3.194 and 6.9863.

**Table 1.** Tests of within-subjects (semester) effects.

| Source | Type III Sum of Squares | *df* | Mean Square | *F* | Significance |
|---|---|---|---|---|---|
| Semester | 9752.672 | 1 | 9752.672 | 115.339 | .000 |
| Interaction between semester and training/DVD status | 2257.524 | 1 | 2257.524 | 26.698 | .000 |
| Error (semester) | 62571.639 | 740 | 84.556 | | |

*Note*. Measure: Standard Peabody Picture Vocabulary Test (PPVT-III) scores.

**Table 2.** Tests of between-subjects (training status) effects.

| Source | Type III Sum of Squares | *df* | Mean Square | *F* | Significance |
|---|---|---|---|---|---|
| Intercept | 12429203.158 | 1 | 12429203.158 | 33722.938 | .000 |
| Training/ DVD status | 2616.656 | 1 | 2616.656 | 7.100 | .008 |
| Error | 272740.479 | 740 | 368.568 | | |

**Table 3.** Descriptive statistics.

| | Training/DVD Status | *N* | *M* | *SD* |
|---|---|---|---|---|
| Improvement in PPVT scores | With | 459 | 7.82 | 13.480 |
| | Without | 283 | 2.74 | 12.192 |

*Note*. PPVT = Peabody Picture Vocabulary Test.

**Table 4.** Independent samples test for the comparison of improvement in 2009–2010 to that of 2010–2011.

| Levene's Test for Equality of Variances | | *t* Test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 95% Confidence Interval of the Difference | |
| *F* | Significance | *t* | *df* | Significance (1-tailed) | Mean Difference | Standard Error Difference | Lower | Upper |
| 8.091 | .005 | | | | | | | |
| | | 5.291 | 642.574 | .000 | 5.078 | .960 | 3.194 | 6.963 |

**Table 5.** Descriptive statistics for standard PPVT scores.

| | Training/DVD Status | Minimum | Maximum | *M* | *SD* | *N* = # of students |
|---|---|---|---|---|---|---|
| Fall 2009 | Without | 40 | 128 | 91.47 | 13.982 | 283 |
| Fall 2010 | With | 40 | 137 | 91.66 | 16.672 | 459 |
| Spring 2010 | Without | 64 | 140 | 94.21 | 11.862 | 283 |
| Spring 2011 | With | 51 | 182 | 99.48 | 15.722 | 459 |

*Note.* PPVT = Peabody Picture Vocabulary Test.

The average standard PPVT score (91.66) of the students in Fall 2010 (with a *SD* of 16.672) was almost the same as the average standard PPVT score (91.47) of the students in Fall 2009 (with a *SD* of 13.982), their improvement from Fall to Spring was significantly higher (99.48–91.66 = 7.82) than that of 2009 to 2010 (94.21–91.47 = 2.74) (see Figures 1 and 2). Hence, we conclude that training/DVD intervention has indeed brought about a substantial improvement in student learning. See Table 5 for detailed descriptive statistics.

## *Comparison of PPVT scores for the students who used DVDS and whose teachers gave the PPVT in 2009 and received training in 2010*

### *Objective: To investigate whether the NR/FT training program improves the PPVT scores of students*

Kindergarten teachers from Collins, Terrace Manor, and Wilkinson Gardens schools in Richmond County participated in the training program in Fall 2010. The PPVT scores of their students at the beginning of the school year (Fall 2010) and at the end of the school year (Spring 2011) were then recorded, of which only the scores of a total of 36 students are available to us for analysis. These students received the DVD. Prior to the study, the same teachers taught another set of students in the year 2009 to 2010, but PPVT scores at the beginning of the school year (Fall 2009) and at the end of the school year (Spring 2010) were available to us for only 171 of these students (see Tables 6 and 7).

The $p$ value of the interaction effect = 0.000 is less than the level of significance of 0.05, which means that the interaction between semester and training status is statistically significant. This means that the improvement from Fall to Spring in the PPVT scores is different for students of the school year 2009 to 2010 (teachers/students had not received training/DVDs) compared to the PPVT scores of students of the school year 2010 to 2011 (teachers/students had received training).

We then conducted further investigation of improvement in PPVT scores of 2009 to 10 and 2010 to 11 using a two-sample independent $t$ test. The results of the $t$ test are given in Tables 8 and 9.

The $p$ value of the $t$ test for the equality of means is 0.0005 and it is less than the level of significance of 0.05. Therefore, we conclude that improvement from Fall to Spring is much higher in 2010 to 2011 than in 2009 to 2010. Recall that teachers/students had not received training/DVDs in

**Table 6.** Tests of within-subjects (semester) effects.

| Source | Type III Sum of Squares | *df* | Mean Square | *F* | Significance |
|---|---|---|---|---|---|
| Semester | 2819.653 | 1 | 2819.653 | 44.251 | .000 |
| Interaction between semester and training status | 1251.450 | 1 | 1251.450 | 19.640 | .000 |
| Error (semester) | 13062.381 | 205 | 63.719 | | |

*Note.* Measure: Peabody Picture Vocabulary Test (PPVT-III) scores.

**Table 7.** Tests of between-subjects (training status) effects.

| Source | Type III Sum of Squares | *df* | Mean Square | *F* | Significance |
|---|---|---|---|---|---|
| Intercept | 1855783.527 | 1 | 1855783.527 | 6291.864 | .000 |
| Training status | 3394.744 | 1 | 3394.744 | 11.510 | .001 |
| Error | 60464.691 | 205 | 294.950 | | |

**Table 8.** Descriptive statistics.

| | Training Status | *n* | *M* | *SD* |
|---|---|---|---|---|
| Improvement in PPVT scores | Without | 171 | 2.30 | 10.294 |
| | With | 36 | 11.47 | 15.221 |

*Note.* PPVT = Peabody Picture Vocabulary Test.

**Table 9.** Independent samples test for the comparison of improvement in 2009–2010 to that of 2010–2011.

| Levene's Test for Equality of Variances | | *t* Test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 95% Confidence Interval of the Difference | |
| *F* | Significance | *t* | *df* | Significance (1-tailed) | Mean Difference | Standard Error Difference | Lower | Upper |
| 8.347 | 0.004 | 3.454 | 41.985 | .0005 | 9.17 | 2.656 | 3.813 | 14.534 |

**Table 10.** Descriptive statistics for PPVT scores.

| | Training DVDs | *M* | *SD* | *N* = # of Students |
|---|---|---|---|---|
| Fall 2009 | Without | 90.95 | 13.772 | 171 |
| Fall 2010 | With | 78.81 | 19.073 | 36 |
| Spring 2010 | Without | 93.25 | 11.347 | 171 |
| Spring 2011 | With | 90.28 | 13.800 | 36 |

*Note.* PPVT = Peabody Picture Vocabulary Test.

**Table 11.** Performance of 3rd-graders in Richmond County in reading part of Georgia's Criterion Referenced Competency Test.

| Number of Students | Below Standard | Met Standard | Exceeded Standard | Mean Score |
|---|---|---|---|---|
| 303 (DVD group) | 23 (7.6%) | 160 (52.8%) | 120 (39.6%) | 837.23 |
| 1,965 (non-DVD group) | 317 (16.13%) | 1,117 (56.84%) | 531 (27.02%) | 828.88 |
| 2,268 (Total) | 340 (14.99%) | 1,278 (56.35%) | 651 (28.70%) | 830 |
| 126,745 (State-wide) | (7.7%) | (46.5%) | (45.9%) | 843.30 |

the year 2009 to 2010 but had received training/DVDs in 2010 to 2011. We can therefore conclude that the training program and DVDs might have played a significant role in bringing about the higher improvement in the PPVT scores of students.

Even though the average PPVT score (78.81) of the students in Fall 2010 (with a *SD* of 19.073) was significantly less than the average PPVT score (90.95) of the students in Fall 2009 (with a *SD* of 13.772), their improvement from Fall to Spring was significantly higher (90.28–78.81 = 11.47) than that of 2009 to 2010 (93.25–90.95 = 2.30). Hence, we conclude that training and DVDs have indeed brought about a substantial improvement in students who began with lower scores. See Table 10 for detailed descriptive statistics. Also see Table 11.

## Discussion of initial study

The classic series of Whitehurst studies cost well over $1 million dollars, but in demonstrating the value of dialogic reading they have affected the training of countless teachers and the success of countless students. This approach, however, depends on extensive teacher retraining, extensive use of class time, expensive libraries of picture books, and approximately 30 months to raise young children's PPVT scores from the 12th to the 30th percentile at kindergarten exit—at a material cost of approximately $142 per child. Our pilot study in only 9 months raised the normative PPVT scores

for kindergarten students from the 27th to the 47th percentile at a material cost (for books and supplies) of less than $1 per child. It's hard to imagine more "reasonable" costs.

Because our proposal requires of educators only minimal demands for training or professional development, and because rather than seeking to remold teachers' classroom behavior we emphasize extending the school day by having preliterate students do "homework" with the disc, we prime educators for success. We expect all educators to achieve positive results with our disc and anticipate that future studies will repeat the pilot study's success with other kindergarten students and will document similar and potentially even more dramatic vocabulary gains for 3- and 4-year-old children. We believe that the ultimate positive impact is likely to be even higher for Head Start and Pre-K students than for kindergarten students.

Although the teachers' subjective responses, self-reporting, and the hard data show that the workshop succeeded in meeting its goals, we believe the main positive effect of the workshop was not in significantly altering teachers' behavior in the classroom, but rather in helping them understand the importance of encouraging their students to use the DVD outside the classroom.

The RCSS was so impressed with the intervention's results that they spent $9,600 to order 14,000 DVDs for current and future use in pre-K, kindergarten, and 1st grade. A subsequent donation from Potash Corp allowed us to distribute over 11,000 of the DVDs to children in Central Savannah River Area (CSRA) Head Start, and to students and grateful teachers in Burke, Jenkins, Warren, McDuffie, Columbia, Wilkes, and Jefferson County school systems, among others.

We were especially interested in the degree of actual classroom implementation, though not for traditional reasons. On the October 21, 2010, Grant Feedback questionnaire, 18 of the 23 reporting teachers indicated using the content during "morning time, nap time, transitional time, downtime." Other than references to center time, few responses included any direct reference to using the DVDs as an integral part of instruction. Similar comments were echoed in the May final report surveys. In a traditional intervention, such results should be considered quite negative, but our primary goal was not to positively affect the teachers' behavior but rather to positively affect the students' behavior. Our goal was, in effect, to allow the student-DVD collaboration to serve as a means of self-tutoring for the child outside the classroom. The extraordinarily positive results were recorded by 33 different teachers who, in effect, acknowledge their classroom behavior changed little, other than encouraging the students to "study" at home. The children themselves—by spending time with the classic rhymes and stories on the DVD instead of watching television or playing video games—dramatically improved their vocabulary scores. The intervention convincingly demonstrated that we don't need to devote enormous resources to dramatically alter teachers' behavior—or even parents' behavior. We don't even need to put relatively expensive books in children's homes. Remarkably, we can instead invest less than a dollar a child and empower the children themselves to significantly improve their vocabulary scores. Our subsequent longitudinal study dramatically demonstrated that kindergarten children's experience with the DVD positively affected crucial emerging literacy skills beyond vocabulary, specifically their reading skills as students exiting 3rd grade.

## *Follow-up longitudinal study*

Although the initial data on vocabulary improvement were enormously gratifying, that data provided no information on (1) whether the vocabulary improvement would correlate with actual improvement in reading scores or (2) whether the immediate positive effects would dissipate by 3rd grade, as occurs with so many initially promising interventions.

Georgia required no statewide reading tests for 1st- or 2nd-grade students in Spring 2012 or 2013 but did require testing of 3rd-graders in 2014. In Spring 2014, the RCSS found that of the 459 kindergarten students tested in the initial study, 126 had left the school system. Of the remaining 333 students, 30 had been retained in 1st or 2nd grade and did not take the statewide 3rd-grade CRCT in reading; another three were special education students who did not take the exam. Another five special education students were among the total of 303 intervention students who did take the exam.

These 303 students had experienced no subsequent intervention, and as 1st-, 2nd-, and 3rd-graders had been randomly distributed among schools and classrooms across the school system. A total of 1,965 RCSS 3rd-graders who did not participate in the kindergarten intervention also took the exam.

Our 303 intervention students scored remarkably well compared to their 1,965 peers. The state reported student results in three broad categories, Below Standard, Met Standard, Exceeded Standard. Compared to their peers in the system who had not experienced the DVD in kindergarten, the intervention students were less than half as likely to fail the standard (7.6% compared to 16.13% for their peers) and exceeded the standard at a 35% higher rate (39.6% compared to 27.02% for their peers). We're aware of no comparable interventions with such dramatically positive long-term results. Arguably, considering the simplicity, low cost, and minimal demands on educators and parents, no similar intervention has ever been attempted.

### *Statistical analysis of follow-up longitudinal study*

In Spring 2014, 2,268 3rd-graders from the RCSS took Georgia's CRCT in reading; statewide, 126,745 students took the exam. The mean CRCT score in reading for all RCSS 3rd-graders was 830. Out of the 2,268 students who took that CRCT exam, 303 students had participated three years earlier in the DVD intervention program. The mean score and the standard deviation of reading scores on the CRCT reading exam for these 303 students were 837.23 and 29.92, respectively. Our hypothesis is that the average CRCT score in reading for the students in the DVD intervention program will be higher than the system-wide average.

Using the one-sample $t$ test, we computed that for any random sample of 303 students from the RCSS the probability that the average CRCT score in reading will be 837.23 or more is 0.000017. That is, when the system-wide average is 830, it is incredibly unlikely that the average CRCT score for a sample of 303 students will be 837.23 or more. Because the average score of 303 students in the DVD intervention group was indeed 837.23, we have sufficient evidence to conclude that this superior performance of 303 students is due to the DVD intervention.

We can test the hypothesis that the distribution of rankings in CRCT scores of students belonging to the DVD intervention group is different from that of the students in the non-DVD group, throughout the RCSS. The chi-square test is applied to the above contingency table to test the hypothesis of homogeneity. The $p$ value is obtained to be less than 0.0001. This means that there is a significant difference in the distribution of rankings of CRCT scores between the DVD and non-DVD group. Further analysis indicates that the proportion of students who met or exceeded the CRCT standard in the DVD group is higher than that of students in the non-DVD group. Similarly, the proportion of students who were below the CRCT standard in the DVD group is lower than that of students in the non-DVD group.

### *Discussion of longitudinal study*

This study demonstrates that at a cost of less than $1 per child, with very little teacher retraining and very little change in current classroom behavior, at-risk kindergarten children's out-of-class use of the rhymes and stories DVD can significantly increase their receptive vocabulary scores and, with no subsequent intervention, achieve dramatic improvement in these students' 3rd-grade reading scores. We believe every pre-K and kindergarten child in America should have such a resource and every adult responsible for that child should encourage the child to listen as often as the child is comfortable doing so.

All our DVD material is freely available online at hearatale.com. Unfortunately, relatively few at-risk young children have online access at home, though some may be able to access the site through family cell phones, libraries, classrooms, or media centers. With the help of a third Georgia Improving Teacher Quality grant, we have upgraded the website adding 25 more stories; printable classroom charts for teachers to record which stories children have listened to; printable diplomas for children who listen to 20, 30, or 40 stories; 100 Home Experiences (simple homework assignments) teachers can assign; and other resources, including Spanish-language translations of 18

stories (we plan to soon add more stories in Spanish, as well as stories in Mandarin, Igbo, Ukrainian, and other languages). We believe hearing, and repeatedly rehearing, exactly the same text in a home language and then in English will help English language learners improve their skills at home, become more integrated in the classroom, and significantly increase the speed at which they achieve proficiency in English. While hearing and absorbing rich vocabulary and complex language patterns is essential, young children must in addition become more actively engaged with language. Our Rhyme A Zoo game, now available as a free app at the Apple store, is based on dialogic reading principles; children listen to 120 nursery rhymes and answer 480 questions (about one-third of these focused on phonics) to gain coins to purchase 24 basic and 6 bonus animals.

Countless millions of dollars have been spent in the past decade alone in efforts to encourage more parents to read at home to their children or to actively engage the children in more conversations. Unfortunately, these well-intentioned efforts to significantly alter adult behavior have on the whole faltered and—apart from modest, localized, and fleeting successes—provide very little real promise for the great mass of at-risk American children. If we give at-risk children appropriate resources and some encouragement, however, these children themselves can make remarkable, and remarkably rapid, progress.

Some might criticize our approach for encouraging children to spend more time at a digital screen. Teachers and parents we've worked with have reported absolutely no adverse effects. The question is not whether children at risk will spend significant time with media; the question is whether the media will continue to stunt their minds with primarily sensual stimulation that functions as the intellectual equivalent of junk food, or instead nourish their minds with challenging vocabulary, grammatical structures, sentence patterns, and, perhaps more crucially, exposure to fundamental age-appropriate cultural lessons fundamental to raising well-adjusted children in ages past: don't lie ("The Boy Who Cried Wolf"), work for what you want ("The Little Red Hen"), defer gratification ("The Three Little Pigs"), believe in yourself ("The Little Engine That Could"). The child's experience of imaginatively living through the consequences of good and bad choices will be far more consequential than adults lecturing and finger pointing.

Some might criticize our approach by insisting that children should hear stories and rhymes read aloud in person by a caring adult. We're in complete agreement, and adults who turn down the audio on the DVD will have at their disposal a digital library of rhymes and stories to share with the child. Unfortunately, though it is quite common in professional and middle-class homes for adults to read aloud to children, it is not as common in homes of children in working-class or impoverished families where such language experiences are most desperately needed. We do not serve the best interests of children who are at risk when we insist that their access to the most valuable of all preliteracy resources, rhymes and stories, must be mediated via an adult reader who, experience compels us to conclude, has been and will remain absent for most of these children.

Virtually no educator disputes the profound importance for preliterate children of hearing rhymes and stories read aloud. The problem is insisting on an idealized one-to-one adult delivery system. If we simply enable and encourage young children to listen to rhymes and stories via DVD, online, or otherwise, we could relatively quickly, easily, and inexpensively raise the median vocabulary and reading scores of at-risk children to national norms.

Anyone can visit our website, hearatale.com. Any educator or researcher who would like to receive a master copy of our DVD for noncommercial purposes may request a free DVD by sending an appropriately sized, stamped, self-addressed envelope. Any school system or school may make as many copies as they need for free distribution to children, whether through mass production or by reproducing copies one by one.

## *Implications and future directions*

Obviously, much research needs to be done and that which would be most valuable is, as always, hard to predict. However, some potential new research opportunities are obvious.

(1) We very much need to expand testing beyond receptive vocabulary, to test expressive vocabulary, phonological awareness, comprehension, grammar, fluency, length of spoken sentences, and so on.
(2) We need to know if these gains persist beyond 3rd grade.
(3) We are particularly interested in the DVD's potential to positively impact the emerging literacy skills of younger students, especially 3-year-old and 4-year-old Head Start and Pre-K students.
(4) Future studies should generate data that would allow us to study the DVD's effect on subpopulations of students, including English language learners, children with learning disabilities, children living in rural areas, and so on.
(5) Students in some classes scored significantly higher than students in other classes, and we very much need a study of best practices in the classroom.
(6) Case studies of individual teachers and students, including in-depth interviews, would allow for deeper and potentially very fruitful analysis.
(7) We very much need more information on students' actual use of the DVD in the home, including the amount of time spent listening, which material students listened to, how often material was repeated, and so on.
(8) We need to investigate the extent to which integrating Whitehurst's "dialogic reading" approach could further boost students' scores.

## References


Alexander, K. L., & Entwhisle, D. R. (1988). Achievement in the first 2 years of school: Patterns and processes. *Monographs of the Society for Child Development*, *53*(2), 1–157.

Alexander, K. L., Entwhisle, D. R., & Olsen, L. S. (2001). Schools, achievement and inequality: A seasonal perspective. *Educational Evaluation and Policy Analysis*, *23*, 171–191. doi:10.3102/01623737023002171

Anderson, R. C., Hiebert, E. H., Scott, J. A., & Wilkinson, I. A. G. (1985). *On becoming a nation of readers. The report of the Commission on Reading*. Washington, DC: National Institute of Education.

Armbruster, B. B., Lehr, F., & Osborne, J. H. (2001). *The research building blocks for teaching children to read*. Washington, DC: U.S. Department of Education, National Institute for Child Health and Human Development, Center for the Improvement of Early Reading Achievement: National Institute for Literacy.

Baleghizadeh, S., & Dargahi, Z. (2010). The effect of nursery rhymes on EFL children's reading ability. *New England Reading Association Journal*, *46*(1), 71–75.

Burkham, D. T., Ready, D. D., Lee, V. E., & LoGerfo, L. F. (2004). Social class differences in summer learning between kindergarten and first grade. *Sociology of Education*, *77*, 1–31. doi:10.1177/003804070407700101

Cabell, S. Q., Justice, L. M., Piasta, S. B., Curenton, S. M., Wiggins, A., Turnbull, K. P., & Petscher, Y. (2011). The impact of teacher responsivity education on preschoolers' language and literacy skills. *American Journal of Speech-Language Pathology*, *20*, 315–330. doi:10.1044/1058-0360(2011/10-0104)

Dickinson, D. K. (2001). Book reading in preschool classrooms: Is recommended practice common? In D. K. Dickinson & P. O. Tabors (Eds.), *Beginning literacy with language: Young children learning at home and school* (pp. 175–204). Baltimore, MD: Brookes.

Hammer, C. S., Farkas, G., & Maczuga, S. (2010). The language and literacy development of head start children: A study using the family and child experiences survey database. *Language, Speech, and Hearing Services in Schools*, *41*, 70–83. doi:10.1044/0161-1461(2009/08-0050)

Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children*. Baltimore, MD: Paul H. Brookes Publishing.

Hirsch, E. D. (2003). Reading comprehension requires knowledge—Of words and the world. *American Educator*, *27*, 10–45.

Jackson, R., McCoy, A., Pistorino, C., Wilkinson, A., Burghardt, J., Clark, M., & Swank, P. (2007). *National evaluation of early reading first: Final report to congress*. Washington, DC: U.S. Department of Education, Institute of Education Sciences.

Juel, C. (1988). Learning to read and write: A longitudinal study of 54 children from first through fourth grades. *Journal of Educational Psychology*, *80*(4), 437–447.

Justice, L. M., Mashburn, A., Hamre, B., & Pianta, R. (2008). Quality of language and literacy instruction in preschool classrooms serving at-risk pupils. *Early Childhood Research Quarterly*, *23*, 51–68. doi:10.1016/j.ecresq.2007.09.004

National Early Literacy Panel. (2008). *Developing early literacy: Report of the National Early Literacy Panel*. Jessup, MD: The National Institute for Literacy.

National Institute of Child Health and Human Development. (2000). *Report of the National Reading Panel. Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction* (NIH Publication No. 00-4769). Washington, DC: U.S. Government Printing Office.

Neuman, S. B., & Celano, D. (2001). Access to print in low-income and middle-income communities: An ecological study of four neighborhoods. *Reading Research Quarterly*, *36*, 8–26. doi:10.1598/RRQ.36.1.1

Robbins, C., & Ehri, L. (1994). Reading storybooks to kindergartners helps them learn new vocabulary words. *Journal of Educational Psychology*, *86*(1), 54–64. doi:10.1037/0022-0663.86.1.54

Sénéchal, M. (2006). Testing the home literacy model: Parent involvement in kindergarten is differentially related to grade 4 reading comprehension, fluency, spelling, and reading for pleasure. *Journal for the Scientific Study of Reading*, *10*, 59–87. doi:10.1207/s1532799xssr1001_4

Sénéchal, M., & Cornell, E. H. (1993). Vocabulary acquisition through shared reading experiences. *Reading Research Quarterly*, *28*(4), 360–374. doi:10.2307/747933

Sénéchal, M., & LeFevre, J. (2002). Parental involvement in the development of children's reading skill: A 5-year longitudinal study. *Child Development*, *73*, 445–460. doi:10.1111/1467-8624.00417

Sénéchal, M., LeFevre, J.-A., Thomas, E. M., & Daley, K. E. (1998). Differential effects of home literacy experiences on the development of oral and written language. *Reading Research Quarterly*, *33*, 96–116. doi:10.1598/RRQ.33.1.5

Serpell, R., Sonnenschein, S., Baker, L., & Ganapathy, H. (2001). Intimate culture of families in the early socialization of literacy. *Journal of Family Psychology*, *16*, 391–405. doi:10.1037/0893-3200.16.4.391

Snow, C. E., Burns, M. S., & Griffin, P. (Eds.). (1998). *Preventing reading difficulties in young children*. Washington, DC: National Academy Press.

Wells, G. (1986). *The meaning makers: Children learning language and using language to learn*. Portsmouth, NH: Heinemann.

Whitehurst, G. J., Arnold, D. H., Epstein, J. N., Angell, A. L., Smith, M., & Fischel, J. E. (1994). A picture book reading intervention in day care and home for children from low-income families. *Developmental Psychology*, *30*, 679–689. doi:10.1037/0012-1649.30.5.679

Whitehurst, G. J., & Lonigan, C. J. (1998). Child development and emergent literacy. *Child Development*, *69*, 848–872. doi:10.1111/cdev.1998.69.issue-3

Whitehurst, G. J., Zevenbergen, A. A., Crone, D. A., Schultz, M. D., Velting, O. N., & Fischel, J. E. (1999). Outcomes of an emergent literacy intervention from head start through second grade. *Journal of Educational Psychology*, *91*, 261–272. doi:10.1037/0022-0663.91.2.261