

This article was downloaded by: [EBSCOHost EJS Content Distribution]

On: 11 June 2009

Access details: Access Details: [subscription number 911724993]

Publisher Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954 Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



## Journal of Literacy Research

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t775648132>

### The Effects of Three Instructional Methods on the Reading Comprehension and Content Acquisition of Novice Readers

Katherine A. Dougherty Stahl<sup>a</sup>

<sup>a</sup> New York University,

Online Publication Date: 01 July 2008

**To cite this Article** Dougherty Stahl, Katherine A.(2008)'The Effects of Three Instructional Methods on the Reading Comprehension and Content Acquisition of Novice Readers',*Journal of Literacy Research*,40:3,359 — 393

**To link to this Article:** DOI: 10.1080/10862960802520594

**URL:** <http://dx.doi.org/10.1080/10862960802520594>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.informaworld.com/terms-and-conditions-of-access.pdf>

This article may be used for research, teaching and private study purposes. Any substantial or systematic reproduction, re-distribution, re-selling, loan or sub-licensing, systematic supply or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

# The Effects of Three Instructional Methods on the Reading Comprehension and Content Acquisition of Novice Readers

Katherine A. Dougherty Stahl  
*New York University*

This study explores the effects of 3 instructional methods: Picture Walks (Clay, 1991; Fountas & Pinnell, 1996), KWL (Ogle, 1986), and the Directed Reading–Thinking Activity (Stauffer, 1969) on the reading comprehension and science content acquisition of novice readers. The participants were 31 second-graders with an instructional reading level that was approaching grade level. A replicated Latin Square, within-subjects repeated measures design was employed that examined 4 treatments: 3 intervention groups (PW, KWL, DRTA) and a control group. The primary analysis evaluated treatment effects by conducting one-way repeated measures analyses of variance (ANOVA) on all measures, using the group as the unit of analysis. Results indicated that the picture walk and DRTA yielded statistically significant effects on reading growth as measured by a timed maze task. Analysis of Cued Recall indicated that the DRTA yielded statistically significant effects in reading comprehension and science content acquisition. KWL did not yield significant effects on measures of comprehension or content acquisition. Student interviews provided evidence that the participants possessed declarative, procedural, and conditional knowledge of the strategic processes that are the foundation for the 3 interventions, activation of prior knowledge, and prediction. However, the likelihood of the participants putting that knowledge to effective use

---

Correspondence should be addressed to Katherine A. Dougherty Stahl, The Steinhardt School of Education, New York University, 82 Washington Square, Pless Hall, 7th Floor, New York, NY 10003. E-mail: kay.stahl@nyu.edu

seemed to be dependent upon the amount of teacher scaffolding provided by the instructional procedure.

#### Resumen

Este estudio explora los efectos de 3 métodos de instrucción: Vistazo de ilustraciones (Picture Walks-PW) (Clay, 1991; Fountas & Pinnell, 1996), KWL (lo que sé, lo que quiero saber, lo que aprendí) (Ogle, 1986), y la Actividad Dirigida de Lectura-pensamiento (Directed Reading-Thinking Activity-DRTA) (Stauffer, 1969) en la comprensión lectora y la adquisición de contenido de ciencia entre lectores principiantes. Los participantes fueron 31 niños de segundo grado con un nivel de lectura aproximado al nivel de grado. Un diseño de cuadrado latino replicado se utilizó para examinar 4 tratamientos: 3 grupos de intervenciones (PW, KWL, DRTA) y un grupo control. El análisis primario evaluó efectos de tratamiento por medio del análisis de varianza de una vía (ANOVA) aplicado a todas las medidas, usando el grupo como unidad de análisis. Los resultados indicaron que el vistazo de ilustraciones (PW) y la actividad dirigida de lectura-pensamiento (DRTA) arrojaron efectos estadísticos significativos en el crecimiento de la lectura, demostrado por el *maze task*—una actividad donde el lector completa los espacios en blanco de un texto. El análisis de los datos de la actividad de recuento con pista (cued recall) indicaron que la DRTA arrojó efectos estadísticamente significativos en comprensión lectora y adquisición de contenido de ciencias. El KWL no mostró efectos significativos en las medidas de comprensión de lectura o de adquisición de contenidos. Las entrevistas mostraron que los participantes poseían conocimiento declarativo, procedimental y condicional de los procesos estratégicos que constituyeron la base para las tres intervenciones—activación de conocimiento previo y predicciones. Sin embargo, el que los participantes pusieran este conocimiento en práctica pareció depender de la cantidad de apoyo dado por el profesor durante la instrucción.

#### 三种阅读教学法对新手阅读理解和内容获取的影响研究

##### 摘要

本研究分析了PW、KWL和DRTA这三种阅读教学法对新手阅读理解和科学内容获取的影响。研究对象是31位达到指导阅读水平的小学二年级学生。采用重复拉丁方，组内重复测量设计的研究方法，对四个组进行处理：3个干预组（PW、KWL和DRTA）和1个控制组。首先，以组为单位，对重复测量的单向方差分析结果进行评估。结果显示PW阅读法和DRTA阅读法对于定时任务测试中阅读水平的提高具有重要意义。线索回忆的分析报告显示DRTA阅读法在阅读理解和科学内容获取中具有重要意义，而KWL阅读法在阅读理解或内容获取测验中没有显示出明显的影响。学生访谈的结果证明研究对象应具备阅读策略过程的陈述性、程序性和条件性知识，这是3项干预措施和激发已有知识及进行预测的基础。然而，研究对象能否有效利用这些知识可能要看教学程序能否提供足够的支架式教师师资力量。

## Résumé

Cette étude explore les effets de 3 méthodes instructionnelles: survol des images ("Picture Walks") (Clay, 1991; Fountas & Pinnell, 1996), l'organigramme des choses connues, des question posées, et des choses apprises ("KWL") (Ogle, 1986), et l'activité dirigée de réflexion-lecture ("Directed Reading-Thinking Activity") (Stauffer, 1969) sur la compréhension de lecture et l'apprentissage de contenu scientifique des débutants en lecture. Les participants de l'étude étaient 31 élèves de deuxième année avec une instruction approchant le niveau approprié en lecture. Un dessin de carré latin répliqué a été utilisé pour examiner 4 approches: 3 groupes d'interventions (Picture Walk, KWL, Directed Reading-Thinking Activity) et un groupe de contrôle. L'analyse principale a évalué les effets du traitement en utilisant les mesures uni-directionnelles de l'analyse des variances (ANOVA) sur toutes les mesures, utilisant le format de groupe pour l'analyse. Les résultats indiquent que le survol des images (Picture Walk) et l'activité dirigée de réflexion-lecture (DR-TA) ont montré les effets significatifs sur les progrès en lecture mesurés par un test qui mesure l'aisance de l'élève pendant la lecture silencieuse ("timed maze task"). L'analyse de rappel assisté ("cued recall") a indiqué que l'activité dirigée de réflexion-lecture a montré des effets significatifs sur la compréhension de lecture et sur l'acquisition du contenu en cours de sciences. L'organigramme des choses connues, des question posées, et des choses apprises (KWL) n'a donné aucun effet significatif sur les mesures de compréhension ou l'acquisition du contenu des sciences. Des interviews d'élèves ont prouvé que les participants possédaient les connaissances déclaratives, procédurales, et conditionnelles des processus stratégiques qui sont la base des 3 interventions, le rappel des connaissances précédentes (prior knowledge), et des prédictions. Cependant, la possibilité que les participants utiliseraient ces connaissances de manière effective semblait dépendre de l'intensité du soutien fourni par le processus instructionnel.

## THEORETICAL FRAMEWORK

In the lives of young children, concept development and representations are formed as the result of experience, social interaction, and language development (Nelson, 1996; Vygotsky, 1978). Nelson's experiential theory emphasizes the reciprocity of vocabulary, or language development, and the formation of representational models. Knowledge of the physical world is embedded within socio-cultural knowledge, and the latter mediates and guides the former. Particularly after beginning school, and continuing throughout one's lifetime, comprehension of written text plays an increasingly important role in the formation of concepts and mental representations (Kintsch, 1998; Stanovich & Cunningham, 1993). Vicarious experiences and explanations in text replace real-world life experiences as vehicles for building representational models. Recent research has provided explicit evidence of the ways in which a reader's prior knowledge, purposes for

reading, and beliefs about text comprehension influence long-term knowledge structures and concept development (Kendeou & van den Broek, 2005; van den Broek et al., 2005). However, this work has been done with adults and “developed” readers. Little research has investigated the instructional methods that support novice readers in building representations based on text.

When considering comprehension with regard to novice readers, attention must also be given to fluency. Research on reading development seems to indicate that fluency and comprehension are dependent early in the process of reading acquisition, but they become independent in the intermediate grades after high levels of reading fluency are achieved (Paris, 2005; Paris et al., 2005). Empirical evidence is needed to determine the effectiveness of instructional structures that teachers might apply to support novice readers using informational text to extend representations of science concepts as they continue to develop automatic word recognition and cognitive flexibility.

### Construction of Meaning and Concept Development with Informational Texts

Cognitively, comprehension of informational texts requires accessing accurate, relevant knowledge, managing mental processes (both top-down and bottom-up) during reading within the confines of a limited working memory, and constructing a coherent mental representation through pruning and organizational processes (Anderson & Pearson, 1984; Black, 1985; Kintsch, 1998; van den Broek et al., 2005). Good instruction should facilitate these processes with students and provide the explicit instruction and guided social mediation that enables students to adopt cognitive behaviors that are invisible or performed tacitly by skilled readers. Over the years, research has indicated that both explicit cognitive strategy instruction and high level social interaction around text are important keys to improving text comprehension and concept development (Dole & Sinatra, 1998; Guthrie & Cox, 1998; National Institute of Child Health and Human Development [NICHD], 2000; Palincsar, 1986; Taylor et al., 2006).

The evidence currently indicates that young children rely heavily on background knowledge in their interactions with text (Jetton et al., 1995; Willson & Rupley, 1997). Mediation that prompts young readers to activate relevant background information is an important support, but teachers must be sensitive to dialogue indicating that children may be relying on inaccurate or irrelevant prior knowledge. McKeown and Beck’s (2003) work with interactive read-alouds in kindergarten and first grade determined that extensive discussions around the students’ experiences led to inaccurate or limited recollection of the text. As a result, their “Text Talk” read-aloud procedure calls for a focused discussion of the text.

Vosniadou (2003) found that naive beliefs are common and difficult to change because true scientific concepts are abstract and frequently counterintuitive to daily experiences. Naive beliefs tend to be narrow but internally consistent explanations that attempt to explain and organize sensory, lived experiences. Teaching students to “think like a scientist” demands an intentional examination and discussion of previously held ideas and hypotheses in direct relationship to the scientific concepts found in texts. Vosniadou, Ioannides, Dimitrakopoulou, and Papademetriou (2002) determined that high level questioning by the teacher, self-explanation and explanations to peers by students, and negotiation of meaning were the necessary components of discussions surrounding science concepts with older readers.

Ideally, instruction should help children learn to use their prior knowledge of both content and genre to effectively make specific connections to text. Discussion plays a critical role in exposing inadequate or inaccurate prior knowledge and in scaffolding the meaning construction process of novice readers.

## INSTRUCTIONAL METHODS

I chose to study these three methods because of their applicability to the primary grade small group instructional setting and to informational text. All three approaches are structured, teacher-facilitated social interactions, focused on increasing students’ comprehension of text. All three approaches engage students in generating purposeful predictions based on prior knowledge and informational text features, such as pictures, tables of contents, and headings.

### Picture Walk

The picture walk (PW) is a term I use to identify the prereading conversation that is based on Clay’s descriptions of effective book introductions for novice readers (Clay, 1991, 1993). Fountas and Pinnell (1996) elaborated this work. The PW is commonly used with *leveled text*—small paperbacks that have been leveled, using a narrow gradient readability scale based on qualitative text features. The conversations typically occur as the teacher and students preview each page or few pages of a new book, before reading. The pictures are used as a catalyst for a discussion of what the book is likely to be about. Two or three vocabulary words are explicitly introduced during the PW. Aimed at promoting fluency and comprehension, the PW is used flexibly and in response to students’ needs and the challenges of a particular text. The extensiveness of the introduction depends on the teacher’s anticipation of challenges for the readers caused by content complexity or text readability. The PW does not adhere to a script or a generic verbal frame. However, it does adhere to a clearly defined protocol

designed to yield student-generated discussion and predictions about a text. Furthermore, children are always left with opportunities for problem-solving, both at the level of word attack and meaning construction, during their first independent reading. Fountas and Pinnell (1996, p. 7) recommend discussing the text after the students' independent reading.

Although picture walks are widely used to introduce new texts, I was unable to locate any research, quantitative or qualitative, evaluating their effectiveness or teacher adaptations for differentiating instruction with a range of readers and types of text.

### Know-Want to Learn-Learn

The Know-Want to Learn-Learn (KWL) technique was originally developed by Ogle (1986) to enable teachers to access the prior knowledge of students and to help students develop their own purposes for reading expository text. KWL is a process during which the teacher generates a discussion about a text topic and uses a chart or worksheet to record students' statements about what they know (K), want to learn (W), and, after reading, what they learned (L). Ogle and others have added modifications to this basic KWL procedure (Bryan, 1998; Carr & Ogle, 1987; Shelley et al., 1997; Van Sledright, 1992). Ogle recommended using KWL with informational text at any grade level and in any content area. She also found it adaptable to the reading group or content area setting. The simplicity of the procedure has made it popular with teachers.

In spite of its ubiquity, there is a paucity of research investigating KWL procedures, especially in elementary school. Five studies (Cantrell, Fusara, & Dougherty, 2000; McLain, 1990; Piper, 1992; Shelley et al., 1997; Van Sledright, 1992) appear in the Educational Resources Information Center (ERIC) or are cited as references in articles on KWL. McLain (1990) was unable to find any significant effects of KWL for comprehension as measured by a standardized comprehension test or on a metacognitive awareness index with third- and fifth-grade subjects, the youngest participants in any of the studies.

### Directed Reading-Thinking Activity

Directed Reading-Thinking Activity (DRTA) is an instructional framework that views reading as a problem-solving process best accomplished in a social context (Stauffer, 1969). The teacher's role is to select an instructional level text, divide the text into meaningful sections, and facilitate discussion of each section of text. Students are responsible for establishing their own purposes for reading, generating predictions, justifying those predictions, independently reading the text, and verifying or revising predictions based on evaluations of information in

the text during the teacher-led discussion of each section. Stauffer recommended using DRTA with narrative or non-narrative text at all grade levels.

More research has been conducted on the effectiveness of DRTA than the other two instructional methods (see Davidson & Wilkerson, 1988). First- and third-grade Title I DRTA participants were able to recall more story elements than groups that listened to a narrative text without discussion, at a level of statistical significance (Biskin, Hoskisson, & Modlin, 1976). A longitudinal study by Stauffer, Hammond, Oehlkers, and Houseman (1976) found that DRTA participants made statistically significant higher achievement gains in reading comprehension and word study on the Stanford Achievement Test in first and second grade when compared to the control group.

Two studies which were primarily interested in newer techniques, found secondarily, that DRTA was effective in promoting students' reading comprehension. Reutzel and Hollingsworth (1991) found that there was no significant difference between first graders in the DL/RTA (Directed Listening/Reading-Thinking Activity) group and those in a literature webbing group (the object of the study) with regard to answering comprehension questions about the story. There was a large effect size favoring both intervention groups over the control group. Baumann, Seifert-Kessell, and Jones (1992) reported that an experimental group of fourth graders engaging in DRTA outperformed a think-aloud group and the control group on general comprehension measures and an error detection measure. The effectiveness of DRTA in earlier studies makes it important to test its relevance and effectiveness in today's primary classrooms.

### In the End, Are There Any Differences?

All three instructional methods are based on three common theoretical principles that are viewed as necessary to the meaning-making process. These commonalities are (a) an emphasis on reader engagement and social mediation, (b) activation of relevant prior knowledge, and (c) anticipation (or purposeful prediction) of what information might be likely to be included in a text. The premise is that children who activate prior knowledge and make purposeful predictions are likely to understand and recall more of what they read (Clay, 1991; Ogle, 1986; Paris, Lipson, & Wixson, 1983; Stauffer, 1969). Particularly in interactions with informational text, these strategies can be tools for pruning, assimilation, refinement, and use of content. It is assumed that as children practice these strategies in a group setting, they will habituate them and transfer them to other appropriate settings independently (Pearson & Gallagher, 1983; Gaskins et al., 1994; Palincsar, 1986).

Since all three approaches share these theoretical commonalities, any task outcome differences seem likely to be the result of procedural differences that have the potential to influence young students' meaning construction (see Table 1).



The PW format calls for students to preview the entire text before reading with a page-by-page discussion of predictions. The teacher may provide prompts to encourage and scaffold students' discussion. This is the only procedure of the three that calls for the teacher to explicitly preselect and preteach important vocabulary that is found in the text.

The KWL discussion is more open-ended than the other two procedures, which are more tightly tied to the text. KWL invites students to share whatever they know about a topic, opening the door for a discussion with more breadth and depth of student knowledge than the other two approaches allow. However, this openness may result in student discussion drifting far from the focus of the text or sharing inaccuracies. DRTA does not include the extensive buildup before reading that is a part of both KWL and PW. After a brief preliminary discussion and student predictions with justifications, students read sections of text and discuss the text intermittently, section by section. These intermittent conversations provide unique opportunities to make personal connections, clarifications, and a

TABLE 1  
Comprehension Process Instruction by Method: Before, During, and After Reading

<i>Process</i>	<i>PW</i>	<i>KWL</i>	<i>DRTA</i>	<i>NC</i>
General format	Text-bound discussion	Open-ended discussion, writing	Text-bound discussion	Limited discussion, writing, illustrating
Activate prior knowledge	Before	Before	BeforeDuring	Before
Generate predictions	Before	Before	Before During	—
Justify predictions	—	Before	Before During	—
Verify predictions	After	After	During	—
Organize information	Before	Before	Before During	—
Vocabulary development	Before (explicit)	Before or After (embedded)	During (embedded)	—
Summarizing	After	After	During	After
Integrating text and prior knowledge	—	After	During	—

means to synthesize new learning. Do these differences in instructional approach influence a novice reader's ability to read text fluently, understand conceptual vocabulary, and build a scientifically accurate representational model? As we move informational texts into the primary grades, it seems to be an opportune time to investigate how each of these methods can help teachers support novice readers.

### RATIONALE AND RESEARCH QUESTIONS

We must take into account developmental factors in considering comprehension instruction of novice readers. Recent research on reading development seems to indicate that fluency and comprehension may be interdependent early in the process of reading acquisition, but they become independent after students achieve high levels of reading fluency (Paris, 2005; Paris et al., 2005). It is important to determine whether in interactions with informational text children are acquiring the content knowledge that is in the text or clinging to naive beliefs (McKeown & Beck, 2003; Vosniadou, 2003).

The purpose of this study was to explore how the PW, KWL, and DRTA might influence developmental reading abilities and content acquisition when used with informational text in the primary reading group context. The focus of the investigation was on the ways the differences in instructional approaches influenced the construction of meaning by novice readers. I anticipated that procedural differences between the three approaches would result in some variation in comprehension outcomes with novice readers, who are more likely to rely upon and respond to scaffolding provided by the teacher than are older readers who have internalized strategic processes.

Three research questions were posed:

1. What are the effects of the PW, KWL, DRTA, and control procedures on the reading growth of novice readers?
2. What are the effects of the PW, KWL, DRTA, and control procedures on the comprehension of informational text and science content acquisition?
3. How does each set of instructional procedures facilitate the transition from an experience-based representational system to a text-based representational system?

### METHOD

#### Participants

The participants were 31 second-grade students in two demographically similar schools, in the same school district, in a midsize Midwest city. Originally, there

were eight groups of four students participating in the study—four groups in each of two cycles of instruction (see Table 2). The cycles were conducted consecutively during the first half of the academic year with a three-week break between the cycles. One child from School A moved early in the study.

For the most part, students from the same homeroom were placed in the same intervention group to accommodate the complexities of each school's schedule. In School A (first intervention cycle), three groups were formed from the students in each of three homerooms. Group 4 was formed with one student from each of two homerooms and two students from the third homeroom. The students in Group 4 were the students who had scheduling conflicts during the time their homeroom group met (e.g., speech class, America Reads tutoring). In School B (second intervention cycle), Group 5 and Group 8 were formed from one homeroom, and Group 6 and Group 7 were formed from the other homeroom. Students were not assigned to groups randomly, but the sequence of intervention for each group was assigned randomly (Maxwell & Delaney, 2000). Table 2 displays the randomly selected schedule of interventions for each school. All students were proficient in English. There were 25 African-Americans, 3 European-Americans, 1 Latino, and 2 Asian/Pacific Islanders. Of the participants, there were 16 boys and 15 girls.

Teachers recommended students from their classes who had an instructional reading level three to six months below grade level (Reading Recovery Levels 12 to 16 or Guided Reading Levels G to I). Classroom teachers reported that reading and comprehending informational texts was challenging for these students. The teachers used the Rigby Assessment System and weekly running records to determine each student's reading level. I confirmed student reading levels by taking running records of each child reading two informational texts (one level G

TABLE 2  
Randomly Assigned Schedule of Interventions

<i>Group</i>	<i>Week 1 Spiders</i>	<i>Week 2 The Moon</i>	<i>Week 3 Water</i>	<i>Week 4 Insects</i>
Cycle 1 (School A)				
1	KWL	DRTA	Control	PW
2	PW	Control	DRTA	KWL
3	DRTA	PW	KWL	Control
4	Control	KWL	PW	DRTA
Cycle 2 (School B)				
5	KWL	PW	Control	DRTA
6	PW	KWL	DRTA	Control
7	DRTA	Control	PW	KWL
8	Control	DRTA	KWL	PW

and one level H) one week before the treatments began. All students had instructional reading levels of G or H, and weekly vocabulary pretests for each topic did not reveal statistically significant group differences. The participating schools viewed this project as an early intervention for those students who were reading slightly below grade level in second grade. Struggling readers were selected for the study because they were not likely to have internalized strategic comprehension processes, and, as a result, they would be likely to benefit from instruction in comprehension strategies used tacitly by more skilled readers. The verbal mediation of the small group provided them with opportunities to use academic science language and also made visible the process of using text to expand and refine representational models for previously taught, but not yet mastered, science concepts (Duke, 2002; Guthrie & Cox, 1998; Nelson, 1996; Palincsar, 2002).

### Texts

For each lesson, I selected informational texts on topics that were likely to be familiar to second-grade students (see Appendix A). The texts addressed science topics that had been taught to the students in their first- or second-grade science curriculum as part of the state science content standards. The specific sequence of topics for each group during both cycles was: spiders, the moon, how water changes form, and insects. Each week, I used a set of three different informational texts containing common information about the same topic, resulting in a total of 12 texts or leveled little books during the study.

To minimize the possible effects of different text structures, all texts came from the descriptive subgenre, also referred to as list, attribution, or definition and example. Descriptive texts are organized around a series of main ideas that are followed by an explanation of each main idea or examples of the main ideas. All texts ranged from Reading Recovery Level 11 to Reading Recovery Level 16 (Peterson, 1991) or Guided Reading Level G to Level I (Fountas & Pinnell, 1996), the students' instructional reading levels.

### Design and Overview of the Study

The purpose of the study was to investigate the effects of three different instructional approaches on novice readers engaging with informational texts. In order for each group of students to receive each of four treatments (three interventions, PW, KWL, DRTA, and a Control), I employed a replicated Latin Square within-subjects repeated measures design. I applied a random order of treatment for each group based on procedures outlined by Maxwell and Delaney (2000, p. 486). Cycle 2's replication of the Latin Square, using a different order of treatment,

increased the validity of the design by increasing the number of groups and minimizing the chance for differential crossover (see Table 2).

This design is suited to the research questions because a within-subjects design provided a lens to view whether different instructional procedures that prompted the same strategic processes on the same groups of children yielded similar or dissimilar task outcomes. I did not choose between-subjects design because this was not an investigation of a particular treatment's long-term effect on strategy use by a particular group of children. For example, it would not be appropriate to use KWL every day. Rather, the intervention conditions might be viewed as a menu of treatments to be selected by teachers as part of a long-term strategy program. The design enabled testing intervention differences on the repeated measures of general reading, vocabulary, and comprehension.

I gathered data over 10 weeks, conducting two four-week periods of intervention within that time frame. Groups 1 through 4 from School A received the intervention during the first cycle, and Groups 5 through 8 from School B received the intervention during the second four-week cycle. Following two days of individual pre-experimental screening to ensure that readers shared a common instructional level, I conducted a 45-minute orientation session with each group. There were 12 days of intervention in each cycle (three consecutive days for each of four consecutive weeks). Each group received each treatment for three days, with data being collected only on the third day. On the day following the conclusion of the intervention cycle, I interviewed students about the comprehension strategies and instructional preferences.

### Procedures

The study was designed to replicate, as much as possible, the small group reading instruction that approaching-grade-level readers typically experience. I conducted all interventions and data collection in each group. All lessons were recorded on audiotape. In School A, sessions were held at a table in a hallway. In School B, sessions were held at a table in the school's kitchen or at a table in a partitioned room shared with other teachers working with small groups of children.

### Preintervention Orientation Session

One day after screening, but before interventions, a 45-minute orientation session was held with each group. This orientation was conducted to practice logistical routines such as management procedures, scheduling confirmation, and assessment tasks. I presented a brief introduction to an informational text. Children were taught to *mumble read* and to ask for help if they needed it. Mumble reading is independent reading with a soft voice. After reading they had an

opportunity to write about and illustrate information in the book that they wanted to share with a friend. Each child shared his or her product with the group. An abbreviated round of assessments was introduced, conducted and discussed to help the children understand how to perform each assessment task.

### General Intervention Procedures

Each day, I introduced the same new book to all of the children for a total of 12 text selections during the intervention (see Appendix A). I conducted assessments only on Day 3, so the treatments were tested using four different texts.

On Day 1, all groups began their sessions with a brief introduction to the topic for the week (i.e., spiders, moon, water's changes, or insects). Then they completed the Vocabulary Recognition Task (VRT), a yes/no vocabulary measure (see Appendix B). After they completed the VRT, I provided explicit strategy instruction to all four groups that addressed declarative, procedural, and conditional knowledge related to the activation of prior knowledge and generation of purposeful predictions (Baumann & Schmitt, 1986; Duffy, 1993; Paris et al., 1983). This explicit strategy instruction component was held constant for all three interventions and the control group. On Day 2 and Day 3, I led the students in a brief discussion of declarative, conditional, and procedural strategy knowledge immediately before reading the text.

On Day 1 and Day 2, we read a new text following the prescribed procedures for the assigned intervention. Aside from the VRT administered on Day 1, no other assessments were administered on Day 1 and Day 2. (During week 1, the children in all groups practiced a collective retelling after reading the first two texts, so that students would have a common understanding of the retelling assessment task.) A primary purpose of these first two sessions was to familiarize the children with the procedures. They also minimized the risk of contamination across conditions. These sessions lasted 20–30 minutes, depending on book length and method; KWL often took five to ten minutes longer than the other three methods.

On Day 3, each group read the same new book, adhering to their designated treatment. After concluding the instructional procedures, I administered a series of assessments. These sessions lasted 50–60 minutes, depending on the length of student recalls and instructional procedures. KWL sessions tended to take more time than the other three methods. Logistically, it was necessary to administer the assessments in the same order each week. That order was (a) maze, (b) VRT, (c) vocabulary web, (d) free recall, and (e) cued recall. All of the students completed an independent, unanalyzed written recall of topic information to share with their homeroom, while individual children presented their free verbal recall and cued recall with me in a conference format.

### Specific Intervention Procedures

*Picture walk.* During the picture walk, I followed the guidelines recommended by Clay (1991) and Fountas and Pinnell (1996) for books at this level. Before reading, I presented a brief overview of the text (Fountas & Pinnell, pp. 137–148). We engaged in an interactive discussion about the book as we worked through the book page-by-page, talking about the pictures, the text structure, and the student's prior knowledge, and formulating predictions based on that information. Topic headings were addressed, when available. To generate a discussion of the pages, I frequently said to the children, "What words would you use to describe what you see happening on this page?" or "What do you think the writer is going to be teaching us about on this page?"

This method was the only method that specifically introduced new vocabulary before reading the text. I drew attention to two to four new content vocabulary words that were on the VRT. Students were taught the meaning of the selected vocabulary, and they were coached in decoding strategies, perhaps chunking or using a common rime.

After the PW, the children mumble read the text independently. After reading, we discussed whether our predictions were verified and collectively summarized the information from the text (Fountas & Pinnell, 1996, p. 7).

*KWL.* On Day 1 and Day 3, we made a group KWL chart interactively. After I introduced the topic, the children discussed the topic. Their input was written on the chart in the Know column. On Day 2 and Day 3, each child wrote what he or she knew on a personal KWL chart before it was shared and written on our large group chart. Next, the children categorized the recorded information. Although Ogle (1986, p. 566) suggests that the children generate categories of information likely to be included in the text based on the brainstormed list, these children struggled to do this. In the interest of time, I prompted the children to categorize their information using the Web assessment categories (e.g., see Appendix C).

The next step was for the children to generate questions about the topic. Before generating questions that were placed in the "What I Want to Learn" column, I provided the same brief overview of the book that the other groups received before reading. The table of contents of the book was discussed, when available, so that the students would be more likely to anticipate the content and generate questions that could actually be answered in each book. I wrote their questions and "want to learn" statements on the group chart each day. I consider this anticipatory work parallel to making predictions about information that is likely to be found in the text. I guided discussions to help the children generate questions based on the table of contents or text headings and that would likely be answered from reading each text.

After our prereading discussion, the children mumble read the entire text. After reading, we began our post-reading discussion by considering whether the text had provided answers to any student questions. If so, I recorded the information in the “What I Learned” column. Then we discussed other new learning and recorded it on the group chart. On Day 1, I modeled this process. On Day 2 and Day 3, the children had an opportunity to record their new learning on their personal KWL chart before we shared and recorded the new learning on our group chart.

*DRTA.* Before reading, the students formulated and justified predictions about the text based on the title, cover, prior knowledge, and if available, table of contents. Students predicted for a two-page or three-page section of text. Then they mumble read that section of text. After reading each section of text, a brief discussion was held to verify predictions, summarize the information in the text, and generate new predictions for the next section of text based on the discussion about the text, pictures, and headings, if available. At the conclusion of the entire text, discussion was minimal about the overall text.

*Noninstructional control condition.* A noninstructional control condition (NC) was used to compare the effects of providing reading opportunities in informational text versus providing a social context for the activation of prior knowledge, setting personal purposes for reading, and generating and verifying predictions for a text. The children had an opportunity to read the same informational texts that were read in the intervention conditions. Before reading I presented the same brief overview of the text that had been provided to the treatment groups. Then the children independently mumble read the new text. Independent reading was always followed by drawing a picture and/or writing about something they would like to share with the group based on the text.

## MEASURES AND SCORING

### Vocabulary Recognition Task (VRT)

A large body of evidence indicates that there is a strong relationship between vocabulary and reading comprehension (Anderson & Freebody, 1983). In light of the important role that vocabulary plays in understanding content texts, it seemed important to evaluate entry level vocabulary, whether vocabulary gains were occurring, and whether any of the treatments was superior in helping children become familiar with the content vocabulary. In addition, vocabulary knowledge can affect a novice reader’s ability to read text accurately (Adams, 1990).



The VRT (group-administered on Day 1 and Day 3) is an experimenter-constructed yes/no task used to estimate vocabulary recognition in a content area and to confirm that groups had similar levels of prior knowledge of the topic (see Appendix B). The task consisted of a list of 25 words; 18 of the words were related to the content in the informational texts and 7 words were unrelated foils. Students circled the words that they both were able to read and related to the topic. After the children selected words on the VRT on Day 3, they additionally categorized those words under provided headings on a concept web (see Appendix C).

Anderson & Freebody (1983) determined that the yes/no task is a reliable and valid measure of vocabulary assessment. Based on student interviews and correlations with other vocabulary tasks, they determined that it provides a better measure of whether students know the meanings of words than a multiple-choice task, especially for younger students. Anderson and Freebody's (1983) correction formula was applied to obtain a score that adjusts for possible guessing. A student scored a "hit" (H) when the word was circled correctly or a "false alarm" (FA) if an unrelated word was incorrectly circled. The proportion of words truly known, P (K), was determined with the following formula:

$$P(K) = P(H) - P(FA) / 1 - P(FA)$$

Webs received two scores (a) the total number of words correctly sorted by category and (b) the percentage of words correctly selected on the VRT, correctly sorted by category.

### Maze

The maze task was a multiple-choice cloze modification. It was a timed (three-minutes), group-administered task. The original text read by the students was reprinted after the deletion of 10 content words. The score on the maze task was the number of correct responses. All maze texts ranged from 254 to 267 words. The use of the complete text provided the students with a familiar, cohesive passage. There was always a three to five sentence lead-in without omissions. I used the guidelines established by Parker and Hasbrouck (1992) in constructing four options for each item. They recommend that test designers choose

distractors that are (a) the same part of speech as the deleted word, (b) meaningful and plausible within one sentence, (c) related in content to the passage (when possible), (d) as familiar to the reader as the deleted word, and (e) either clearly wrong or less appropriate, given broader passage content. (p. 216)

Shin, Deno, and Espin (2000) conducted the investigation of maze as a valid, reliable, and sensitive assessment of younger students. The minimal demand

placed on working memory is advantageous for younger students. While most of the other assessments in this study were used to measure awareness of text macrostructures, maze provided insight into micro-level processing, general reading, and monitoring for meaning. The statistically significant higher scores on the first five items than the second five items seems to indicate that the maze tasks used in this study may also reflect the fluency of these novice readers. In the Fall of second grade, an ability to read an un instructed text at a rate of 51 words correct per minute places children in the 50th percentile of their grade cohort (Hasbrouck & Tindal, 2006). Approaching-grade-level, second graders would be unlikely to complete passages of this length within three minutes. For children at this level, score differences reflect general reading and the quantity of text the children were able to read within three minutes. Reliability analysis yielded a Cronbach's alpha of .912 for the maze task.

### Free Recall

Individually each child provided a free recall of the day's text. Students responded to the prompt, "Please tell me everything you can remember about the book. Also tell me anything the book made you think of." Two raters parsed the texts into clausal units, developed tree diagrams to determine ideational hierarchies, and placed these ordered clausal units on coding sheets. Student retellings were then analyzed using coding sheets (see Appendix D). Importations (text-related information that is not explicitly stated in the text) and intrusions (errors or unrelated information) were written on the code sheet and scored. A graduate student who currently teaches second grade also scored approximately 20% of the free recall transcriptions. There was a .95 inter-rater reliability on this measure.

### Cued Recall

After the free recall, each child was asked to answer three explicit and three implicit questions based on that day's text. First, the items were scored as correct or incorrect (Cued Recall Correct) as a measure of general comprehension. Both correct and partially correct items were scored as correct. Next, a four point scale (adapted from Hansen, 1981, p. 405) was used to produce weighted scores for each answer (Cued Recall Points).

- 3-The student provides a correct, complete answer with justification.
- 2-Correct answer: The student's answer is partially correct. (For example, there are three criteria in determining if a creature is an insect; the students received one point for each criterion listed. A student who only listed two characteristics of insects received two points.)

- 2-Incorrect answer: Although the answer was not correct, the student's response was related to the topic and some logical justification was provided for the answer.
- 1-The student's answer was partially correct (e. g., listed one insect body part) or the student provided an incorrect answer without a logical justification.
- 0-No response.

The graduate student described earlier scored 20% of the cued recall transcriptions. Based on an item-by-item analysis of the cued recall task, there was .96 agreement on cued recall correct and .87 interrater agreement for point designation (Cued Recall Points). Cronbach's alpha reliability coefficient was .615 for cued recall correct and .833 for cued recall points.

### Post-intervention Interview

At the conclusion of each research cycle, I conducted individual strategy interviews with the students in that cycle. Interviews were recorded on audiotape and transcribed. I adapted the interview developed by Duffy (1993) to determine if students gained knowledge of the two common strategies, activation of prior knowledge and prediction. The questions surveyed three types of strategy knowledge (a) declarative (what the strategies were), (b) procedural (how to perform the strategies) and (c) conditional knowledge (when and why the strategies are useful) (Paris et al., 1983). The children were able to refer to a new informational text that I provided as a means of making the discussion less abstract. The final two questions related to the instructional methods. After a poster-aided review of the four instructional methods, I asked students to reflect on their preferred approach for enjoyment and helpfulness. Finally, I performed descriptive analysis of information gathered in the interviews.

## RESULTS

### Analysis Overview

One-way repeated measures analysis of variance (ANOVA), using the reading group as the unit of analysis, were conducted on all measures. The reading group was chosen because children within each intervention interacted as a group in a defined, socially, mediated context and could not be considered independent of each other. Using the group as unit of analysis makes analyses more conservative than using individuals because the degrees of freedom are lowered dramatically, but group analysis is essential to reflect the social nature of this learning.

The primary analysis investigated the effect of treatment, with each of the four interventions acting as levels. The secondary analysis involved possible effects of

text, with each of the four test texts as levels. Finally, I used a series of repeated measures pair-wise contrasts to analyze specific differences for treatments and texts. I employed a Bonferroni adjustment for multiple comparisons to family-wise contrasts that compared treatment effects or text effects. Only contrasts that were found to be statistically significant are reported. An alpha level of .05 was used for all statistical tests. In a repeated measures analysis, one tests an assumption of sphericity by Mauchley's test (Huck, 2000). When this assumption was not satisfied, adjustments were made to the ANOVA results using the Huynh-Feldt correction as indicated (Huck, 2000).

Effect sizes are reported using the eta squared ( $\eta^2$ ) index for main effects. *Eta squared* is defined as the proportion of variance in the dependent variable that is explained by the study's independent variable (Cohen, 1988). The criteria recommended by Cohen for interpreting eta squared are as follows: .01 is considered a small effect, .059 is a medium effect size, and .138 is a large effect size. Cohen's *d* effect sizes are reported for pair-wise comparisons. Traditionally, .2 is considered a small effect, .5 is a medium effect and .8 is considered a large effect size in the interpretation of Cohen's *d*.

### Treatment Effects

Results for treatment effects are presented for each of the three research questions. Because particular dependent measures informed each research question, results for only certain dependent measures are presented for each question.

*Research Question 1: What are the effects of the interventions on the reading growth of novice readers?*

**Vocabulary Recognition Task (VRT).** None of the treatment main effect ANOVAs for the VRT attained statistical significance. As expected, groups of students did not differ significantly on their pretest VRT scores by treatment. Likewise there were no statistically significant main effects for the VRT gains. Although all groups achieved content vocabulary growth as indicated by gains on the VRT, the gains did not differ by treatment (see Table 3 and Table 4).

**Maze.** The one-way repeated measures ANOVA found a significant effect for treatment on maze ( $p = .042$ ). Pair-wise contrasts indicated that both the PW treatment and DRTA treatment yielded scores that were significantly higher on the maze task than the scores of students in the control group (see Table 5).

*Research Question 2: What are the effects of the interventions on the comprehension of informational text and science content acquisition?*

TABLE 3  
Treatment Means and Standard Deviations

	<i>Treatment</i>							
	<i>DRTA</i>		<i>KWL</i>		<i>PW</i>		<i>NC</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
VRT gain	.35	.26	.33	.32	.45	.27	.37	.27
Web number	6.73	1.66	6.5	2.01	6.87	2.75	5.18	2.32
Web percent	68.38	19.13	66.68	17.28	61.65	22.99	57.13	20.63
Maze	5.88	1.71	4.93	1.50	5.98	1.88	4.66	1.21
Cued Recall Total	4.95	.55	3.54	.76	4.18	.79	3.33	1.08
Cued Recall Points	15.02	1.64	11.56	1.86	13.36	1.59	11.21	2.13
Free Recall Total	13.72	5.64	10.06	2.55	9.39	2.95	10.39	4.37

PW = Picture Walk; KWL = Know-Want to Learn-Learn; DRTA = Directed Reading-Thinking Activity; NC = Non-instructional Control.

*Vocabulary web.* Organizing information categorically was a new and difficult task for these novice readers. The web yielded neither a main effect for treatment in the total numbers of words correctly sorted into the correct category nor a main effect for percent of words correctly sorted in the analysis.

*Cued Recall (Correct).* Two variables were derived from the Cued Recall. Cued Recall Correct is simply an indicator of the number of questions that were answered correctly. This score reflects an accurate understanding of the information in the text or general comprehension. Treatment main effects were

TABLE 4  
Analysis of Variance for Treatment Main Effects

	<i>F</i> (3,21)	$\eta^2$	<i>P</i>
VRT gain	.281	.012	.839
Web number	1.065	.132	.385
Web percent	.413	.056	.745
Maze	3.254*	.317	.042
Cued Recall Total	5.971*	.460	.004
Cued Recall Points	7.107*	.504	.002
Free Recall Total	3.372 <sup>a</sup>	.509	.070

<sup>a</sup>Huynh Feldt adjustment to degrees of freedom.

\*  $p < .05$ .

TABLE 5  
Summary of Significant Treatment Effects

	<i>Pair-wise Contrasts</i>	<i>d</i>	<i>P</i>
Maze	PW > NC	.84	.026
	DRTA > NC	.82	.048
Cued Recall Correct	DRTA > NC	1.89	.012
	DRTA > KWL	2.13	.042
Cued Recall Points	DRTA > NC	2.00	.004
	DRTA > KWL	1.97	.042

All nonsignificant pair-wise contrasts were omitted.

PW = Picture Walk; KWL = Know-Want to Learn-Learn; DRTA = Directed Reading-Thinking Activity; NC = Non-instructional Control.

found for Cued Recall Correct ( $p = .004$ ). Pair-wise contrasts indicated a significant difference between DRTA and KWL and DRTA and the control condition on the Cued Recall Correct (see Table 5).

*Cued Recall (Points).* Cued Recall Points reflect the depth of knowledge and level of scientific explanation that a child was able to provide in response to a question whether the answer was correct or incorrect. There were significant treatment effects for Cued Recall Points ( $p = .002$ ). Pair-wise contrasts did not support the expectation that KWL discussions would promote broader and deeper knowledge of science content than the text-driven methods of DRTA and PW. The contrasts revealed statistically significant effects for DRTA over KWL and for DRTA over the control condition (see Table 5).

*Research question 3: How does each set of instructional procedures facilitate the transition from an experience-based representational system to a text-based representational system?*

The free recall measures provide a window to observe this transition. The free oral recall of the text enabled each child to emphasize what he or she remembered and viewed as important without the external structure of the cued recall. The coding sheet and the analysis of the retellings provided the means to observe the degree to which the retelling was experience-based or text-based (see Appendix D).

Four variables were derived from the oral retelling. They are Total Free Recall (Sum of Text Free Recall and Importations), and the three subscale variables: (a) Text-Free Recall (statements that were directly stated in the text), (b) Im-

portations (other related statements, such as inferences or prior knowledge), and (c) Intrusions (erroneous or unrelated information).

*Free Recall.* There were no significant treatment effects for Total Free Recall. Both informal analysis of the free recalls and consideration of the Standard Deviations reflect wide individual differences in the retelling ability of these novice readers.

### Text Effects

The primary goal of this study was to evaluate the effects of instructional method on students' reading comprehension and content acquisition. It was the objective to have Text be a fixed factor and be as consistent as possible. To achieve this goal the texts fell within a narrow range of readability and were all organized with the same text structure. All topics were previously taught in the students' science curriculum.

Results of pair-wise contrasts between texts, indicate that the concepts presented in *Water: Liquid, Solid, Gas* seemed to be more challenging than the more familiar life science concepts presented in *Spinning a Web* and *Looking at Bugs*. The exception was the VRT, where the children did recognize familiar vocabulary associated with the changes in water (e.g., ice, fog, rain, mist, freeze) despite the conceptual challenges of the content. The Latin Square design enabled these text differences to be equally distributed among groups and treatments, so they did not influence task outcomes (see Table 2).

### Summary of Post-intervention Interview

During all three interventions, the students received explicit strategy instruction and practiced activating prior knowledge and generating predictions. The participants' responses to the interview questions demonstrated declarative, procedural, and conditional knowledge of these two comprehension strategies. Their responses provided evidence that novice approaching-grade-level readers can successfully engage in metacognitive talk—talk about cognitive reading processes. Although some of the responses did focus on lower level processes, these were distributed among all the children in the study. Each child made some metacognitive statements, suggesting that all children gained metacognitive insights. Students also made clear discriminations between which interventions they liked and which interventions were most supportive. KWL was the most enjoyable method for 40% of the children; 68% of the students reported that the PW or DRTA helped them to read more fluently and remember more text information.

## DISCUSSION

### Reading Growth

All intervention groups made vocabulary gains. This finding demonstrates that the use of informational texts with novice readers does extend their vocabularies. It seemed likely that the picture walk would yield greater vocabulary gains than the other methods because two to four tested words were explicitly taught before reading each text. However, students in all interventions made similar gains. Two important implications can be drawn from these findings. The small group setting seemed to be essential for these approaching-grade-level students to develop content area vocabulary that had previously been taught as part of the district's science curriculum. And all three instructional approaches worked equally well.

Both the PW and DRTA yielded statistically significant effects on the maze. A comparison of effect sizes suggests that a slightly larger proportion of variance is explained by PW than DRTA. Both procedures were more effective than KWL or the control procedures in facilitating fluent reading and micro-level comprehension. The results of the present study substantiate the claims of Clay (1991, 1993) and Fountas and Pinnell (1996) that a conversational social interaction around the text with the introduction of difficult vocabulary and text structure does facilitate fluent, accurate reading. The page-by-page walk-through of the text either before reading, as in the PW, or during reading, as in DRTA, seemed to promote a close reading that enabled students to identify words automatically and to facilitate higher scores on the timed maze task. Although all choices on the multiple-choice task were topic-related vocabulary, the DRTA and PW treatments resulted in students being more likely to select the most sensible word choices for the most sentences within the three minutes allocated to the maze task. While we know that fluency yields comprehension, the PW and DRTA seem to fall into a category of meaning-propelled instructional techniques that create a synergy of fluency and comprehension for novice readers. These outcomes are consistent with the studies of Fluency-Oriented Reading Instruction and its Wide Reading modification (Stahl & Heubach, 2005; Schwanenflugel et al., 2006), where the meaning is used as a scaffold to bootstrap fluent reading, which, in turn, yields increased comprehension.

### Comprehension and Acquisition of Informational Content

The students participating in the DRTA intervention were more successful at statistically significant levels than students engaged in KWL and the control procedures at correctly answering questions about the texts (Cued Recall Correct). The results of this study are also consistent with earlier studies that provided



evidence of the success of DRTA on general comprehension measures, including error detection and answering comprehension questions (Baumann, et al., 1992; Reutzel & Hollingsworth, 1991). This may be the result of the close reading facilitated by this instructional approach. Although the students in all four groups were monitored during mumble reading to be sure that they could read the text and were, in fact, reading the text, teacher guidance during the DRTA tended to direct the children's attention to the important ideas and assist with difficult text concepts in a way that was not provided for in the other interventions.

The students' ability to provide detailed responses or logical justifications to questions (Cued Recall Points) was a primary means of assessing content acquisition and the ability to create a scientifically accurate mental representation. It would seem that the rich KWL discussions would have led to the deepest and broadest topic knowledge. In fact, DRTA yielded the strongest effects on Cued Recall Points. The scaffolded interactions *during* reading, actively justifying and verifying predictions, integrating text-based information with prior knowledge, and having an immediate opportunity to discuss new concepts seemed to help these novice readers when they were called on to respond to questions about the text. They were able to provide more information and more sensible justifications for their answers, even if they were not completely correct. For example, when a DRTA student was asked why the female spider might be likely to be larger than the male, he responded, "They have to do a lot more stuff, like protect the eggs."

This finding supports and extends the earlier research that indicated that DRTA is effective in promoting inferential and evaluative responses to text (see Davidson & Wilkerson, 1988). DRTA has several features that recent studies have associated with higher levels of achievement. DRTA procedures tended to demand higher levels of thinking by the students than did the other three procedures by requiring justification and verification of predictions (NICHD, 2000; Snow, 2002; Taylor et al., 2005). Both the students and the teacher initiated the conversations (Gaskins et al., 1993; Gaskins et al., 1994; Guthrie & Cox, 1998; Palincsar, 1986; Palincsar et al., 2001). Tangential information rarely entered the conversations, because the conversations occurred immediately before or after reading a section of text (McKeown & Beck, 2003). The immediate interaction around the text also helped promote consistent engagement, clarify confusions, and provide a vehicle for creating an accurate representation of text as well as assimilation with prior knowledge (Gaskins et al., 1993, 1994; Guthrie & Cox, 1998; Palincsar, 1986; Palincsar et al., 2001; Smolkin & Donovan, 2001; Vosniadou et al., 2002). Social interactions enrich the comprehension processes of mature readers, but for novice readers they seem to be essential to mediate children's interactions with complex texts that contribute to the formulation of science concepts.

The importance of similar teacher mediation was addressed in Smolkin and Donovan's (2001) study of informational text teacher read-alouds in Donovan's first-grade classroom. Donovan used direct instruction, modeling, and scaffolding to increase her students' understanding of the concepts in informational texts during read-alouds. Smolkin and Donovan found these moves to be essential to the meaning-making process due to the density and complexity of ideas presented in informational texts. While young children enjoyed the teacher read-alouds of informational text, particular teacher moves and social interaction (often initiated by the children) were essential for building accurate representational models of science concepts.

Although in this study the children demonstrated an ability to read instructional-leveled texts and to discuss the strategies in an interview, the ability to apply prior knowledge and purposeful predictions to promote comprehension seemed to require teacher mediation in direct relationship to the text. This seems to indicate that novice readers rely on intentional discussions and inquiry for the construction-integration process to occur in a way that facilitates conceptual development (Dole & Sinatra, 1998; Kintsch, 1998; Vosniadou, 2003). Novice readers had a difficult time simultaneously accessing accurate, relevant knowledge, managing mental processes, and constructing a coherent mental representation through pruning and organizational processes, without the ongoing coaching of the teacher during the reading process (Black, 1985; Kintsch, 1998; van den Broek et al., 2005).

The ability to organize and reorganize information in a way that is meaningful, retrievable, and supports understanding is an important benchmark in reading comprehension and the construction of a representation based on text (Kintsch, 1998). The concept web is a fairly simple, concrete means of organizing words or ideas. The difficulty that the children had with this task provided some evidence that they were unaccustomed to organizing information by category, heading, or main idea and is consistent with Nelson's (1996) work on the development of category formation by young children. Novice readers seem to require explicit teacher modeling and scaffolding to make organizational structures visible and useful. The difficulty that these students encountered in categorizing information on the concept web and in their retellings could have implications for children's comprehension and memory of informational texts that have categorical or hierarchical structures.

#### Transition from an Experience-based to a Text-based Representational System

A free recall of the text allows the reader to reconstruct the text in a way that demonstrates each reader's integration of the text with prior knowledge, what

is valued as important, and even socio-cultural influences (Gambrell, Koskinen, & Kapinus, 1991; Narvaez, 2002). In this study, there were striking individual differences in the students' ability to freely recall the information from the texts. However, it was surprising that the retellings varied very little by intervention. The differences in instruction did not yield significant differences in the quantity or quality of the students' oral retellings. It was expected that KWL, an intervention that encourages, documents, and honors students' experiences, would yield retellings that included more content or broader content than a text-based intervention such as the DRTA or the PW. The coding sheets indicate more similarity by individuals across interventions than by intervention. All oral retellings were placed on a coding sheet to indicate the sequence of the retelling, as well as the hierarchy of ideas (see Appendix D). Analyses did not reveal any significant differences by intervention for the number of total ideas recalled or differences in importations of outside information.

Consistent with performance on the vocabulary concept web, lack of cognitive organization seemed to be an inhibitory factor in the students' ability to create a retelling in response to the prompt, "Tell me everything you can remember from the book. Also, tell me anything the book made you think of." A few students consistently used one or two main ideas from the text to organize their retelling. Bea's (pseudonym) retelling of *Spinning a Web* demonstrates the effective use of organization as an aid to retrieval. Her retellings were consistently well organized. However, the DRTA treatment, the life science topic, and her application of temporal and causal events in the first section all may have contributed to making this her most detailed retelling

How the spider lays eggs . . . . The male sees the female spider. They get married and the female has babies. She has an egg sac. It's like a ball with eggs in it. Little baby spiders are in it. After a few days the baby spiders go out to be on their own. Then they find their own houses. They might be a boy or girl.

[There are] Different kinds of spiders like: wolf spider, tarantula, trap-door spider, blue and black back spider.

Some spiders live . . . . The wolf spider lives in a hole. The black widow lives where it is dark. Some spiders live underground. Some spiders live in a garden. Some spiders live in a house.

Ideas were more consistently told in a random fashion, like the retelling below. Jay (pseudonym) had received the KWL treatment. However, as stated

earlier, the retellings varied more by individual than by treatment in organization and comprehensiveness.

Lots of spiders spin webs. Some eat fish. The trapdoor spider has a tunnel. Spiders eat insects. The web helps catch insects. Some spiders have eight legs and eight eyes. The sheet web . . . . Some spiders can jump. The orb web . . . . Some spiders can swim.

An important key to success in dealing with exposition is the ability to organize information, so retrieval is possible (Kintsch, 1998; Nelson, 1996). This need to develop a system of organization is one of the major differences between learning from experiences and learning from most informational texts. Some nonnarrative genres, such as life cycle, possess a sequential order that aids the memory, but more often, exposition is organized hierarchically, like the texts chosen for this study. To maximize what novice readers can remember from informational text, more instruction and guided practice may be needed on how to use main ideas or superordinate concepts, including headings in texts, as an aid to organize and retrieve information. To that end, the use of graphic organizers to make organizational structures of expository texts explicit seems promising as a scaffold for novice readers.

### Limitations

First, to enhance experimental control, I conducted all interventions. As a result, this was not a blind study. It remains to be determined whether classroom teachers, who are unaware of the research questions and use more flexibility in adhering to the procedures, would replicate the results. I tried to be vigilant in adhering to the instructional procedures as described by the originators. In many classrooms, there may not be such a rigid adherence to the procedure. For example, rarely do I see the categorization step of KWL implemented in classrooms.

The participants of this study were all proficient in English. The results of this study and its implications are also limited to novice readers—readers for whom automaticity and reading fluency have not yet achieved levels of asymptote (Paris, 2005; Paris et al., 2005). These readers are still learning about the alphabetic and orthographic system. There may be differences in outcome and implications for readers in later developmental stages. For example, KWL could be more effective with older children who do not need the reading support provided by PWs and DRTAs (Cantrell et al., 2000). In spite of the limitations, the present study provides insights into the efficacy of three popular instructional procedures implemented with novice readers reading informational texts.

## LOOKING TO THE FUTURE

Historically, early reading instruction has focused on decoding and fluency, rather than aggressively approaching comprehension and reading to learn. Stage models have typically been situated such that learning to read precedes reading to learn (Chall, 1996). Both explicit comprehension instruction and the use of informational texts in the primary grades have become more common in recent years (Duke, 2000; Duke, 2002; NICHD, 2000). The introduction of informational texts increases the demands on young readers and their teachers. In today's age of information, text experiences provide the essential window to the world for even our youngest readers.

As researchers, we need to explore the unique cognitive processing characteristics of novice readers. Most of the comprehension processing research has been conducted with more sophisticated readers. How do new readers with little experience orchestrate word recognition and comprehension, particularly of unfamiliar content? Some studies have investigated young students' recall of narrative text, but additional studies need to investigate how novice readers use informational text to build and expand conceptual representations. Then, research is needed that explores the development of multidisciplinary comprehension curricula for primary classrooms. Longitudinal studies that examine comprehension instruction occurring across a developmental curriculum should be a research priority as well.

The challenge faced by these novice readers in organizing text information had implications for vocabulary development and comprehension of science concepts. We need additional research that investigates developmentally appropriate techniques that instruct and scaffold novice readers in strategies to organize the content knowledge that is presented in nonnarrative informational texts. Only then will these readers be able to assimilate the information, retrieve it, and apply it, thus becoming active participants in our world of information.

## REFERENCES

- Adams, M. J. (1990). *Beginning to read: Thinking and learning about print*. Cambridge, MA: The MIT Press.
- Anderson, R. C., & Freebody, P. (1983). Reading comprehension and the assessment and acquisition of word knowledge. *Advances in Reading/Language Research*, 2, 231–256.
- Anderson, R. C., & Pearson, P. D. (1984). A schema-theoretic view of basic processes in reading. In P. D. Pearson (Ed.), *Handbook of reading research* (pp. 255–292). White Plains, NY: Longman.
- Baumann, J. F., & Schmitt, M. C. (1986). The what, why, how, and when of comprehension instruction. *Reading Teacher*, 39(7), 640–646.
- Baumann, J. F., Seifert-Kessell, N., & Jones, L. A. (1992). Effect of think-aloud instruction on elementary students' comprehension monitoring abilities. *Journal of Reading Behavior*, 24, 143–172.

- Biskin, D. S., Hoskisson, K., & Modlin, M. (1976). Prediction, reflection, and comprehension. *Elementary School Journal*, 77, 131–139.
- Black, J. B. (1985). An exposition on understanding expository text. In B. Britton & J. B. Black (Eds.), *Understanding expository text: A theoretical and practical handbook for analyzing expository text* (pp. 249–267). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Bryan, J. (1998). K-W-W-L: Questioning the known. *The Reading Teacher*, 51(7), 618–620.
- Cantrell, R. J., Fusaro, J., & Dougherty, E. A. (2000). Exploring the effectiveness of journal writing on learning social studies: A comparative study. *Reading Psychology*, 21, 1–11.
- Carr, E., & Ogle, D. M. (1987). KWL plus: A strategy for comprehension and summarization. *Journal of Reading*, 30, 626–631.
- Chall, J. S. (1996). *Stages of reading development* (2nd ed.). Fort Worth, TX: Harcourt-Brace.
- Clay, M. M. (1991). Introducing a new storybook to young readers. *The Reading Teacher*, 45, 264–273.
- Clay, M. M. (1993). *Reading recovery: A guidebook for teachers in training*. Portsmouth, NH: Heinemann.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Davidson, J. L., & Wilkerson, B. C. (1988). *Directed Reading-Thinking Activities*. Monroe, NY: Trillium Press.
- Dole, J. A., & Sinatra, G. M. (1998). Reconceptualizing change in the cognitive construction of knowledge. *Educational Psychologist*, 33, 109–128.
- Duffy, G. (1993). Rethinking strategy instruction: Four teachers' development and their low achievers' understanding. *The Elementary School Journal*, 93, 231–247.
- Duke, N. K. (2000). 3.6 minutes per day: The scarcity of informational texts in first grade. *Reading Research Quarterly*, 35, 202–224.
- Duke, N. K. (2002, July). *Improving comprehension of informational text*. Paper presented at the Third Annual CIERA Summer Institute, Ann Arbor, MI.
- Fountas, I. C., & Pinnell, G. S. (1996). *Guided reading: Good first teaching for all children*. Portsmouth, NH: Heinemann.
- Gambrell, L. B., Koskinen, P. S., & Kapinus, B. A. (1991). Retelling and the reading comprehension of proficient and less-proficient readers. *Journal of Educational Research*, 84, 356–362.
- Gaskins, I. W., Anderson, R. C., Pressley, M., Cunicelli, E., & Satlow, E. (1993). Six teachers' dialogue during cognitive process instruction. *The Elementary School Journal*, 93, 277–304.
- Gaskins, I., Guthrie, J. T., Satlow, E., Ostertag, F., Six, L., Byrne, J., & Conner, B. (1994). Integrating instruction of science and reading, and writing: Goals, teacher development, and assessment. *Journal of Research in Science Teaching*, 31, 1039–1056.
- Guthrie, J. T., & Cox, K. (1998). Portrait of an engaging classroom: Principles of Concept-Oriented Reading Instruction for diverse students. In K. Harris (Ed.), *Teaching every child every day: Learning in diverse schools and classrooms* (pp. 70–130). Cambridge, MA: Brookline.
- Guzzetti, B. J., Snyder, T. E., Glass, G. V., & Gamas, W. S. (1993). Promoting conceptual change in science: A comparative meta-analysis of instructional interventions from reading education and science education. *Reading Research Quarterly*, 28, 116–159.
- Hansen, J. (1981). The effects of inference training and practice on young children's reading comprehension. *Reading Research Quarterly*, 16, 391–417.
- Hasbrouck, J., & Tindal, G. A. (2006). Oral reading fluency norms: A valuable assessment tool for reading teachers. *The Reading Teacher*, 59(7), 636–644.
- Huck, S. W. (2000). *Reading statistics and research*. New York: Longman.
- Jetton, T., Rupley, W. H., & Willson, V. L. (1995). Comprehension of narrative and expository texts: The role of content, topic, discourse, and strategy knowledge. In K. A. Hinchman, D. J. Leu, &

- C. K. Kinzer (Eds.), *Perspectives on literacy research and practice, 44th Yearbook of the National Reading Conference* (pp. 197–204). Chicago: National Reading Conference.
- Kendeou, P., & van den Broek, P. (2005). The effects of readers' misconceptions on comprehension of scientific text. *Journal of Educational Psychology, 97*, 235–245.
- Kintsch, W. (1998). *Comprehension: A paradigm for cognition*. Cambridge, UK: Cambridge University Press.
- Kucan, L., & Beck, I. L. (1996). Four fourth graders thinking aloud: An investigation of genre effects. *Journal of Literacy Research, 28*, 259–287.
- Maxwell, S. E., & Delaney, H. D. (2000). *Designing experiments and analyzing data*. Mahwah, NJ: Lawrence Erlbaum Associates.
- McKeown, M. G., & Beck, I. L. (2003). Taking advantage of read-alouds to help children make sense of decontextualized language. In A. van Kleeck, S. A. Stahl, & E. B. Bauer (Eds.), *On reading books to children* (pp. 159–176). Mahwah, NJ: Lawrence Erlbaum Associates.
- McLain, K. V. M. (1990, December). *Effects of two comprehension monitoring strategies on the metacognitive awareness and reading achievement of third and fifth grade students*. Paper presented at the National Reading Conference, Miami, FL.
- Narvaez, D. (2002). Individual differences that influence reading comprehension. In C. C. Block & M. Pressley (Eds.), *Comprehension instruction: Research-based practices* (pp. 158–175). New York: The Guilford Press.
- National Institute of Child Health and Human Development (NICHD). (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. Available: <http://www.nationalreadingpanel.org>
- Nelson, K. (1996). *Language in cognitive development: Emergence of the mediated mind*. New York: Cambridge University Press.
- Ogle, D. M. (1986). KWL: A teaching model that develops active reading of expository text. *Reading Teacher, 39*(6), 564–570.
- Palincsar, A. S. (1986). The role of dialogue in providing scaffolded instruction. *Educational Psychologist, 21*, 73–98.
- Palincsar, A. S. (2002, July). *Reciprocal teaching: Twenty years later*. Paper presented at the Third Annual CIERA Summer Institute, Ann Arbor, MI.
- Palincsar, A. S., Magnusson, S. J., Collins, K. M., & Cutter, J. (2001). Making science accessible to all: Results of a design experiment in inclusive classrooms. *Learning Disability Quarterly, 21*, 15–32.
- Paris, S. G. (2005). Re-interpreting the development of reading skills. *Reading Research Quarterly, 40*, 184–202.
- Paris, S. G., Carpenter, R. D., Paris, A. H., & Hamilton, E. E. (2005). Spurious and genuine correlates of children's reading comprehension. In S. G. Paris & S. A. Stahl (Eds.), *Children's reading comprehension and assessment* (pp. 131–160). Mahwah, NJ: Lawrence Erlbaum Associates.
- Paris, S. G., Lipson, M. Y., & Wixson, K. K. (1983). Becoming a strategic reader. *Contemporary Educational Psychology, 8*, 293–316.
- Parker, R. I., & Hasbrouck, J. E. (1992). The maze as a classroom-based reading measure: Construction methods, reliability, and validity. *The Journal of Special Education, 26*, 195–218.
- Pearson, P. D., & Gallagher, M. C. (1983). The instruction of reading comprehension. *Contemporary Educational Psychology, 8*, 317–344.
- Peterson, B. (1991). Selecting books for beginning readers. In D. E. DeFord, C. A. Lyons, & G. S. Pinnell (Eds.), *Bridges to literacy: Learning from Reading Recovery* (pp. 119–147). Portsmouth, NH: Heinemann.

- Piper, S. G. (1992). *A metacognitive skills/reading comprehension intervention program for sixth grade social studies students*. Unpublished dissertation, Nova University.
- Reutzel, D. R., & Hollingsworth, P. M. (1991). Using literature webbing for books with predictable narrative: Improving young readers' prediction, comprehension and story structure knowledge. *Reading Psychology: An International Quarterly*, 12, 319–333.
- Schwanenflugel, P. J., Meisinger, E. B., Wisenbaker, J. M., Kuhn, M. R., Strauss, G. P., & Morris, R. D. (2006). Becoming a fluent and automatic reader in the early elementary school years. *Reading Research Quarterly*, 41, 496–522.
- Shelley, A. C., Bridwell, B., Hyder, L., Ledford, N., & Patterson, P. (1997). Revisiting the KWL: What we knew; what we wanted to know; what we learned. *Reading Horizons*, 37, 233–242.
- Shin, J., Deno, S. L., & Espin, C. (2000). Technical adequacy of the maze task for curriculum-based measurement of reading growth. *The Journal of Special Education*, 34, 164–172.
- Smolkin, L. B., & Donovan, C. (2001). The contexts of comprehension: The information book read-aloud, comprehension acquisition, and comprehension instruction in a first-grade classroom. *The Elementary School Journal*, 102, 97–122.
- Snow, C. (2002). *Reading for understanding: Toward an R & D program in reading comprehension*. Washington, DC: Rand Corporation.
- Stahl, S. A., & Heubach, K. M. (2005). Fluency-oriented reading instruction. *Journal of Literacy Research*, 37, 25–60.
- Stanovich, K. E., & Cunningham, A. E. (1993). Where does knowledge come from? Specific associations between print exposure and information acquisition. *Journal of Educational Psychology*, 85, 211–229.
- Stauffer, R. G. (1969). *Directing reading maturity as a cognitive process*. New York: Harper and Row.
- Stauffer, R. G., Hammond, W. D., Oehlkers, W. J., & Houseman, A. (1976). Effectiveness of a language-arts and basic reader approach to first grade reading instruction—extended into sixth grade. In R. G. Stauffer (Ed.), *Action research in L. E. A. instructional procedures* (pp. 166–203). Newark, DE: University of Delaware.
- Taylor, B. M., Pearson, P. D., Garcia, G. E., Stahl, K. A. D., & Bauer, E. B. (2006). Improving students' reading comprehension. In K. A. D. Stahl & M. C. McKenna (Eds.), *Reading research at work: Foundations of effective practice* (pp. 303–315). New York: The Guilford Press.
- Taylor, B. M., Pearson, P. D., Peterson, D. S., & Rodriguez, M. C. (2005). The CIERA school change framework: An evidence-based approach to professional development and school reading improvement. *Reading Research Quarterly*, 40, 40–69.
- van den Broek, P., Rapp, D. N., & Kendeou, P. (2005). Integrating memory-based and constructionist processes in accounts of reading comprehension. *Discourse Processes*, 39, 299–316.
- VanSledright, B. A. (1992). *Teaching about the American Revolution: The case of Sara Atkinson* (Elementary Subjects Series No. 69): Center for the Learning and Teaching of Elementary Subjects, Office of Educational Research and Improvement.
- Vosniadou, S. (2003). Exploring the relationships between conceptual change and intentional learning. In G. M. Sinatra & P. R. Pintrich (Eds.), *Intentional conceptual change*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Vosniadou, S., Ioannides, C., Dimitrakopoulou, A., & Papademetriou, F. (2002). *Designing learning environments to promote conceptual change in science*. Retrieved January 25, 2006, from <http://www.cs.phs.uoa.gr/en/staff/vosniadou.html>
- Vygotsky, L. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.
- Willson, V. L., & Rupley, W. H. (1997). A structural equation model for reading comprehension based on background, phonemic and strategy knowledge. *Scientific Studies of Reading*, 1, 45–64.



## APPENDIX A: CHILDREN'S INFORMATIONAL TEXTS

- Anton, W. (1999). *Where does the water go?* New York: Newbridge Educational Publishing.
- Berger, M. (1996). *Amazing water.* New York: Newbridge Educational Publishing.
- Bernard, R. (1999). *Insects.* Washington, DC: National Geographic Society.
- Crewe, S. (1998). *The spider.* Austin, TX: Raintree Steck-Vaughn Publishers.
- Driscoll, L. (2001). *Looking at bugs.* New York: Grossett & Dunlap.
- Eaton, D. (2000). *The moon.* Bothell, WA: Wright Group Publishing.
- Frantz, J. (2002). *Looking at the sky.* New York: Grossett & Dunlap.
- Gibbons, G. (1990). *Weather words and what they mean.* New York: Holiday House.
- Robinson, F. (1996). *Mighty spiders.* New York: Scholastic, Inc.
- Robinson, F. (2000). *Water: Liquid, solid, gas.* Bothell, WA: Wright Group Publishing.
- Trumbauer, L. (1996). *Spinning a web.* New York: Newbridge Educational Publishing.
- Yusof, F. (2001). *On the moon.* Washington, DC: National Geographic Society.

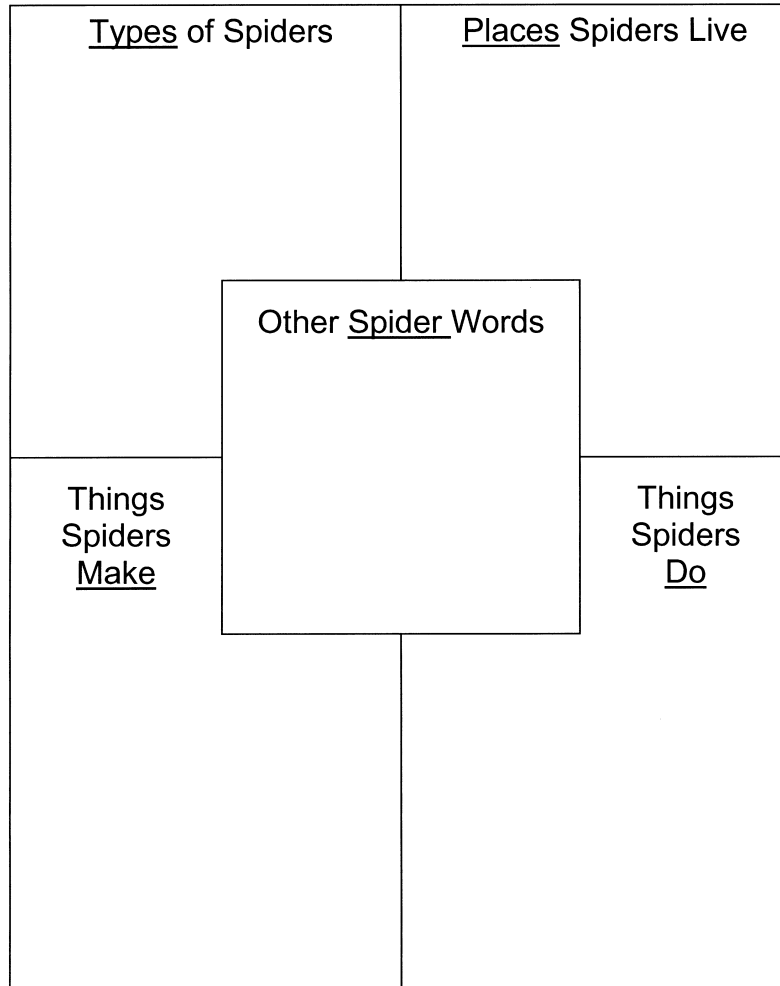
<i>Both Cycles</i>	<i>Day 1</i>	<i>Day 2</i>	<i>Day 3</i>
Week 1	The Spider	Mighty Spiders	Spinning A Web
Week 2	On the Moon	“The Moon” in Looking at the Sky	The Moon
Week 3	Amazing Water	Where Does the Water Go?	Water: Liquid, Solid, Gas
Week 4	Insects	Looking at Bugs (Ants, Cockroaches)	Looking at Bugs (Introduction)

## APPENDIX B: VRT-SPIDERS

This week we will be reading books about spiders. Below you see a list of words. Put a circle around the words that you are able to read and are sure have something to do with spiders. Do not guess, because wrong answers will lower your score.

swim	sheet web	egg sac
arachnid	buzz	tunnels
triangle web	black widow	spiderling
sand	thread	bones
blue-back spider	spin	funnel web
silk	acorn	wolf spider
hide	spinneret	orb web
trees	tarantula	sea
	hop	

APPENDIX C: VRT WEB



APPENDIX D: *SPINNING A WEB CODING SHEET*  
(TRUMBAUER, 1996)

	#	MI	HiS	Sub	Sub
Spiders are strange-looking creatures!			*		
(An example is a) golden orb spider				*	PC
A spider isn't an insect.		*			
It's an arachnid.		*			
It has 2 body parts.				*	
It has 8 legs.				*	
Some spiders even have 8 eyes. (P)				*	
Ex=tarantula					PC
Ex=wolf spider					PC
Some spiders live in holes. (P)			*		
Ex=wolf spider				*	PC
Or (some spiders live in) burrows. (P)			*		
Ex=wolf spider				*	PC
Some spiders live in the water. (P)			*		
Ex=water spider				*	PC
And some spiders live in tunnels			*		
Like this trap-door spider				*	
Can you see the trapdoor at the top? (P)					
Example=trap-door spider	R				PC
Some spiders can jump. (P)			*		
Ex=jumping spider				*	PC
And some can swim.			*		
Ex=fishing spider				*	PC
Lots of spiders spin webs.		*			
They make their webs			*		
From silk				*	
That comes from inside their bodies. (P)					*
Ex=black widow spider					* PC
You can find webs in lots of places. (P)				*	
Spiders spin many different kinds of webs.				*	
Example=orb web					* PC
Example=funnel web					* PC
Example=bowl and doily web					* PC
Example=sheet web					* PC
The spider uses its web to catch insects (P)				*	
(The insects are) for food.					*
The male spider is a lot smaller than the female. (P)				*	
Ex=banded argiope spider					* PC
He visits the females web			*		
(He visits) to mate.				*	
Ex=orb weaver spider					* PC
The female spider then spins an egg sac (P)			*		

(continued)

APPENDIX D (Continued)

	#	MI	HiS	Sub	Sub	
In which the baby spiders grow.				*		
Ex=black widow spider	R				*	PC
After a few days, the baby spiders are ready to leave the egg sac. (P)			*			
The baby spiders are called spiderlings.				*		
Soon the growing spiderlings are ready to swing from their own silky threads. (P)			*			
(Soon the spiderlings swing away) to make homes of their very own. (P)			*			
<i>Importations</i>	<i>Dis</i>	<i>Pic</i>	<i>Inf</i>	<i>Tex</i>	<i>PK</i>	<i>Er</i>

MI-Main idea, HiS-High Subordinate, Sub-Subordinate, P-text is accompanied by picture, PC-Picture and caption, R-Repetition  
 Sources of importations: Dis-discussion, Pic-Picture, Inf-inference, Tex-another text read this week, PK-Prior knowledge, Er-Erroneous

*Katherine A. Dougherty Stahl* is an assistant professor of Literacy at New York University. Dr. Stahl's research focuses on reading acquisition. She has examined reading instruction and assessment practices related to young and striving readers. She can be contacted at New York University, 82 Washington Square East, 773 Pless Hall, New York, NY 10003. E-mail: kay.stahl@nyu.edu