NONFICTION WRITING IN PREKINDERGARTEN: UNDERSTANDINGS OF INFORMATIONAL TEXT FEATURES AND USE OF SCIENCE JOURNALS

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DEDICATION

To my children, Henry, Eliza Jane and Sylvia,

and

To my husband, Michael

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CHAPTER I

INTRODUCTION & RESEARCH QUESTIONS

Research has shown that when young children are engaged in the actual practices of scientists, readers, and writers, they are able to authentically participate in the communities of science and literacy (Duschl, Schweingruber, & Shouse, 2007; Goodman, 1986; Harste, Woodward, & Burke, 1984; Lehrer & Schauble, 2008; Rowe, 2008b; Teale & Sulzby, 1986). When young children engage in authentic learning tasks, it fosters a sense that literacy and science serve incredibly important purposes in society.

Within the science-as-practice field (Duschl et al., 2007; Lehrer & Schauble, 2008), the actual work of scientists guides the instruction of science in the classroom. Teachers are able to guide children as they engage in sophisticated activities such as building conceptual knowledge, using metacognitive strategies, engaging in scientific talk and making efforts to represent their knowledge. The focus of instruction on practice engages children in authentic activities wherein they are asked to both construct knowledge and reflect upon how it came to be known.

Similarly, in emergent literacy, young children are seen as active constructors of knowledge who are in the process of becoming literate from birth (Teale & Sulzby, 1986). Emergent readers and writers exhibit signs of literacy that are guided by the same processes and cueing systems of more conventional readers and writers (Harste et al., 1984). When children are positioned as legitimate participants in literacy events, they can capably engage in such sophisticated literacy activities as writing and reading in the content areas with attention to genre features (Purcell-Gates, Duke, Martineau, 2007) and having discussions supported by technical vocabulary usage (Palincsar & Magnusson, 2000).

Content literacy learning is a promising approach for involving young children in the actual practices of science and literacy. In content literacy instruction, children are asked to read and write as the means of acquiring new content knowledge. Researchers have primarily attributed the "the fourth grade slump" to a lack of content literacy instruction, particularly with expository texts, in the primary grades (Chall, Jacobs, & Baldwin, 1990; Duke, 2000). Much emphasis in early childhood education has been placed on learning-to-read methods, rather than reading-to-learn methods such as content literacy instruction.

Recently, the National Institute for Early Childhood Education Research (NIEER, 2009) released a policy brief with recommendations for more and better developed science content literacy learning in preschool. They argued specifically for the creation of a curriculum that treats science as an "essential" component and not an "extra" (p. 1). In addition, NIEER (2009) recommended that "mathematics and science learning should be integrated with each other and with other content domains" (p. 1).

The combination of literacy and science makes sense as both practices share meaningful similarities. Fundamentally, both share the principle that children are active participants in knowledge construction. The learning processes in both domains entail hypothesis generation and testing by children. It is important that children are involved in the practice of doing science and doing literacy in authentic and meaningful activities. Often in a science-as-practice approach, learning activities result from questions children have about their environment. In an emergent literacy approach, learning activities often require children to communicate an intentional message with an authentic purpose. For example, a child might write a list of items that need to be purchased at the grocery store for a favorite recipe.

In science and literacy activities, children are asked to represent their understandings through the use of common tools. Two particular tools that I propose to study in further detail are science journals and informational texts. Both informational texts and science journals have unique features that mark them as a genre whose purpose is to provide information about the natural world. Purcell-Gates et al. (2007) asserted that the features of informational text may influence a child's comprehension of those texts. However, to date, no research in prekindergarten classrooms has looked at how children understand these genre features and how they use them in their own informational text writing.

The lack of content literacy learning research in prekindergarten led me to this research project. The research questions for this study were the following:

- What do a group of prekindergarten children understand about informational text features?
- How are children's science journals produced in social interaction when they are invited to use informational text features such as photographs, labels, headings, diagrams, and scale?
- What is the nature of prekindergarten children's science journals when they are invited to use informational text features?

In Chapter 2 of this paper, I discuss the relevant literature that situated the study and the theory that shaped the design. First, I present the sociocultural theories on teaching and learning that shaped the design and analyses. Then, I discuss the research literature describing three pertinent topics: content literacy learning in early childhood, the use of science journals, and the use of informational texts. In Chapter 3, I present the design of the study. In this section, I give details as to the procedures used in this research including information about site selection, field entry, participants and phases of inquiry. In addition, I discuss the credibility, transferability, dependability and confirmability of the design so as to document the trustworthiness of the research. I conclude Chapter 3 with a discussion of both the limitations and the strengths of the research. In Chapters 4, 5, and 6, I present the analyses and findings for each of the three research questions. Lastly, in Chapter 7 I end this paper with conclusions that can be drawn from these findings.

CHAPTER II

REVIEW OF RELEVANT RESEARCH

Sociocultural theories of teaching and learning shaped all phases of this study (Clay, 1967; Engestrom, 1987; Goodman, 1986; Kress, 1997; Teale & Sulzby, 1986; Van Leeuwen; 2005; Vygotsky, 1986). The design and analyses in this study were also shaped by the field's current understandings of informational text writing in prekindergarten, especially the research from three relevant areas: content literacy learning in early childhood, the use of science journals, and the use of informational texts. The research questions emerged from a synthesis of these findings and sociocultural theory shaped the manner in which these questions were asked.

Theoretical Framework

The study design and analyses of data were shaped by theories concerned with the teaching and learning of early literacy within a sociocultural context. In particular, I considered the theoretical implications of cultural–historical activity theory (Engestrom, 1987; Vygotsky, 1986), an emergent literacy perspective (Clay, 1967; Goodman, 1986; Teale & Sulzby, 1986) and social semiotics (Kress, 1997; Van Leeuwen; 2005).

Social Nature of Learning

A child's development and cultural environment are inextricably linked. According to Vygotsky's (1986) theory of cognition, a child develops biologically and culturally. Cultural development occurs through interactions with others and the environment. Biological and cultural development coalesces in the form of higher mental functioning during early childhood (Vygotsky, 1986). This coalescing means that development can be altered, either hindered or supported, by one's sociocultural space. As tool use plays a paramount role in the cultural environment, it has the potential to make a significant impact on cognitive development.

Reading and writing are necessarily situated within a social context that mediates the learner's activity (Heath, 1983; Vygotsky, 1986). In a literacy-practices perspective, one's literacy development is mediated by the local practices in one's environment (Barton & Hamilton, 2000; Heath, 1983; Street, 1985). These practices are mutually shaped and are ideological in nature. Ways of being literate are shaped by an assortment of cultural, historical, religious, and economic practices.

As these literacy practices are mutually shaped, adults—particularly teachers—have a significant role in the literacy development of young readers and writers (Dickinson & Smith, 1994; Heath, 1983; Roswell & Pahl, 2007; Rowe, 2008b). The demonstrations and invitations provided by adults have implications for how children are shaped into being literate. Furthermore, factors such as language use and positioning further mediate children's literacy learning.

In this study, in the design and data analyses I focused on informational text writing with prekindergarten children in a classroom context. Video and subsequent analyses captured the ways the journals and the journal writing process were shaped by the classroom, the participants and the tools being used. As the teacher, I scaffolded children's learning through the use of tools such as the science journal and the informational text. The support I provided for children had a significant role in the representations made in their journals. Understanding the dimensions of this role was essential to analyzing how children created their own science journals.

Cultural–historical activity theory (CHAT) (Engestrom, 1987) further supports my position on the significance of tool use in the classroom. CHAT is concerned with explaining the relationships among human beings, tools, and communities within systems of activity. Humans use tools to do work and to get new information as they act on the environment. In this way, the tools used mediate both the way work is done and how something comes to be known. The tools can both constrain or facilitate the work that is being done.

In this study, my analyses focused on how cultural tools such as genres, specifically informational text features, are taken up and transformed in local practices. The informational texts and science journals acted as tools, mediating the activity of the children. More specifically, the informational text features also acted as tools mediating the objects under study, children's representations in science journals. My analyses allowed me to describe the production of journals in social interaction and the nature of children's writing with informational text features.

Emergent Literacy Perspective

In an emergent literacy perspective, young children are active constructors of knowledge and meaning. The process of becoming literate begins with birth (Teale & Sulzby, 1986). The foundations of literacy are laid early in life as reading and writing become necessary to function in the world (Goodman, 1986). Children in early childhood exhibit signs of emergent literacy that are guided by the same processes and cueing systems of conventional readers and writers (Harste et al., 1984). From an emergent literacy perspective, children do not need to be taught a series of skills before they are ready to begin to read or write. There is no official starting point at which one is ready to read. Rather, children are constantly negotiating their understanding of the relationships between language and print. As such, there is no reason to believe that prekindergarten children cannot or should not benefit from developmentally appropriate literacy instruction (Clay, 1967; Goodman, 1986).

Seminal research in emergent literacy tells us that young children exhibit knowledge of how print works (Clay, 1967; Goodman, 1986). This knowledge is evident, for example, through young children demonstrating proper book handling techniques, reading environmental print, and understanding how print functions in our society. Harste et al. (1984) found that "when asked to write, young children make markings which reflect the written language of their culture" (p. 82). These markings required knowledge of our print system and how this system functioned. At first, children primarily attended to print features in their own name and then moved to more sophisticated organizations of print including lists, stories, maps and letters (Harste et al., 1984).

Metacognition is considered essential to the development of reading comprehension abilities (National Institute of Child Health and Human Development, 2000; Snow, Burns, & Griffin, 1998). Seminal research in emergent literacy reports that young children, to an extent, do monitor their own reading and writing (Goodman, 1986). Children as young as 4 are able to use metacognitive strategies to navigate print in their environment. For example, a 4-year-old child tells the difference in two similarly spelled words by attending to letters that are not in common.

In addition, research shows that young children exhibit strategic awareness of language and print when they are asked to reread stories they have previously dictated to an adult (Harste et al., 1984). Harste et al. found (1984) that

> data suggest that young children are cognizant of the fact that semantic constraints are very much a part of the "text world" created during reading. Access and reaccess to this "text world" and within it, the constraints which operate, allow them not only to both predict and generate a text which a reader might judge as quite successful, but to reap the generative and self-educative benefits of literacy. (p. 127)

Young children engage in metacognitive strategies to both create and monitor text on their own. Asking children to read their unconventional products gives teachers access to children's emergent understandings of how print functions.

The interaction between a child and a teacher is significant to a child's writing development and in the "testing of literacy hypotheses" (Rowe, 2008a, p. 15). Children use what they already know about writing whenever encountering new writing experiences (Ferreiro & Teberosky, 1982; Harste et al., 1984). If those new experiences do not fit into what they already know, the novel experiences become developmental pivots for the testing of new hypotheses. Young writers are active constructors of their understanding when they engage in authentic and functional opportunities to write. Children's initial marks, despite their unconventional nature, are significant (Harste et al., 1984). The analysis of these marks allows access to the emergent ways young children use conventional concepts of writing.

In this study, I positioned children as legitimate participants in literacy and science, despite the fact that they were not conventional writers. To encourage participation and mark-making, I invited children to engage in authentic writing activities. My instruction and analyses assumed that children learn by constructing hypotheses about genre features and how they work in texts. In each strand of analyses, I focused on children's emergent understandings of genre features.

Social Semiotics

Learning occurs in multiple modalities including writing, speech, drawing, and movement (Kress, 1997; Kress & Van Leeuwen, 1996; Van Leeuwen, 2005). In turn, each of these modes has a materiality to it as speech uses sound and writing uses ink or lead (Kress, 2004). Some of these modes inherently have different affordances. Speech, unlike writing, allows access to volume and intonation.

In educational research, a multimodal perspective attempts to account for the variety of ways young children learn literacy and science. In a simplistic view of textual comprehension, textual meaning is located predominately within the print. However, from a social semiotics perspective, reading involves interpreting images, not simply attending to print (Kress, 2004). Kress (2004) argued that the reader is not constrained by textual rules such as the order of processing information when looking at drawings.

In the social context, these modalities are combined as people attempt to make meaning in their communications with others (Van Leeuwen, 2005). The production of a child's science journal involves written text, drawings, and any talk associated with the representation. Meaningful messages are achieved through many different modes and combinations of modes. For example, children can convey their understanding of what a stem is through pointing at a stem, drawing a stem, labeling a stem, or naming a stem. In turn, a child may use two or more of these modes simultaneously to represent an idea.

The relationships between modes differs (Van Leeuwen, 2005) as an image may elaborate on print's message or it may extend the print's message in a more nuanced or developed manner. For example, a child may draw a diagram of a house. By coloring a square in that house yellow and labeling it *window*, the child elaborates on the house drawing and demonstrates an understanding of the physical properties of light.

The modes inherent in a text affect how meaning is made by the reader (Kress & Van Leeuwen, 1996). The order in which a reader processes different modes on the page is determined by "differential salience" (Van Leeuwen, 2005, p. 82). A reader processes the text by gazing at the most eye-catching images first. This processing of modes is particularly important to consider when reading informational texts that are often filled with interesting and unique visual images (Duke & Kays, 1998).

In this study I examined the multimodal nature of prekindergarten children's representations in science journals. I considered multiple modalities in my analysis of the children's representations. I analyzed children's journals for print and drawing. In addition, I analyzed the talk around the creation of the journal, particularly the child's reading of print, which I will call the *message*. A multimodal perspective allowed me to account for the many ways children expressed their understandings of informational texts and their productions of these texts when using genre features in science journals.

Related Research Literature

As the design and analyses in this study were shaped by theories of teaching and learning, they were also shaped by findings from relevant research literature. Three areas of research were particularly influential. First, I will report the findings from studies that explored early childhood literacy learning in the content area of science through integrated curricula. The integrated curricula often incorporated informational texts and writing opportunities within guided inquiry science. In order to better understand the use of texts and journaling as tools, in the next two sections of my review I specifically examine the use of informational texts and science journals. The findings from this review had direct implications for this study, and I will consider them after reporting the research.

Early Childhood Literacy Learning in the Content Area of Science

Thematic teaching is a pillar in the pedagogy of many early childhood teachers. The theme—be it plants, weather, or animals—serves as the touchstone for teachers as they plan their curriculum around science and literacy learning objectives for children. Typically, thematic teaching is also the primary manner science is taught in early childhood. (In this paper, early childhood is considered programs with children from birth to 8 years old and prekindergarten programs are those with children who average 4 years of age.) Thematic units may contain science investigations and also may contain a book or books related to the science content. However, as research has shown (Duke, 2000; Pentimonti, Zucker, Justice, & Kaderavek, 2010), it can safely be assumed that not many of those books are not informational texts.

The research in early childhood literacy learning in the content area of science has primarily focused on the creation of integrated curricula with meaningful opportunities to represent knowledge. Researchers have developed and tested the efficacy of various curricula attempting to connect science and literacy (Anderson, West, Beck, MacDonnell & Frisbie, 1997; Cervetti, Pearson, Bravo, & Barber, 2005; Guthrie, Anderson, Alao & Rinehart, 1999; Palincsar & Magnusson, 2000; Pappas, Varelas, Barry, & Rife, 2002; Purcell-Gates et al., 2007; Romance & Vitale, 1992; Stoddart, Pinal, Latske, & Canady, 2002). This work has usually been conducted with elementary age children with less emphasis given to kindergarten and first grade.

Overall, researchers working with elementary children have found that there are real benefits to integrating literacy and science through content area instruction. These benefits include increasing student excitement and motivation through integrating nonfiction reading and writing in science (Anderson et al., 1997). Children exposed to integrated curricula also see gains in conceptual understanding, vocabulary, and comprehension in science and literacy (Guthrie et al., 1999; Romance & Vitale, 1992; Stoddart et al., 2002). In addition, providing children with exposure to texts that are authentic to the practice of science has benefits to both reading comprehension, the writing of scientific genres (Purcell-Gates et al., 2007) and also to the academic discourse of children (Palincsar & Magnusson, 2000; Pappas et al., 2002). As very little of this work focuses on children below the third grade, we know much less about content area learning in science and literacy for children in prekindergarten through second grade. Therefore, the limited amount of research with those ages will be discussed in further detail.

Second grade. A large-scale, curricular study has been developed seeking to identify dynamic points of leverage between literacy and science. In a joint curriculum development and research project between the Lawrence Hall of Science and the University of California–Berkeley (2007), Pearson and colleagues have created 12 integrated science and literacy units for second through fifth grade titled *Seeds of Science/Roots of Reading*. In *Seeds of Science/Roots of Reading,* the units consist of science inquiry activities supported by informational texts. Children are also asked to participate in various representational activities around the unit topic while involved in primary and secondary investigations.

In an initial efficacy study, including a sample of 89 teachers from 21 states, Bravo, Tilson, Cervetti, Goss, and Jaynes, (2008) found promising results for the integrated curriculum. In second grade classrooms, the researchers compared treatment groups (science/literacy, science only, literacy only, no treatment). Using pre- and posttest assessments of science and literacy, the researchers measured science knowledge, science vocabulary and science text comprehension. They found that children in the integrated group outperformed all other groups on measures of science knowledge. In addition, the science/literacy group performed better than science only, and no treatment groups on text comprehension and similarly to literacy only groups. In this same sample, Bravo et al. (2008) also found that attitudes of children in the integrated science/literacy group were more positively disposed towards science in terms of affect, interest, efficacy and identity.

Kindergarten. In a smaller scale study with a sample of children from kindergarten through fifth grade, Magnusson and Palincsar (2005) have researched an approach to integrating science and literacy called Guided Inquiry Supporting Multiple Literacies. In this approach, kindergarten children were engaged in inquiry science activities supported by specially designed informational texts. Children engaged in primary investigations of actual phenomenon, such as the use of incline planes, and secondary investigations using a science notebook text. The text was designed to resemble the science notebook of a fictitious scientist who was also engaging in activities about motion. Used as an informational text by children, the notebook played an interesting role as children engaged in similar primary investigations of their own.

The researchers found that children used the text in a critical manner as they compared the investigations and findings of the fictitious scientist with their own. Magnusson and

Palinscar (2005) also found that conceptual knowledge of motion increased from pre- to posttest. In addition, when examining student writing samples they found evidence of increased student ability to use evidence to support claims and to organize findings in data tables. The text played a unique role in facilitating student representation particularly in increasing children's ability to explain scientific phenomenon, such as motion.

Prekindergarten. The research base for prekindergarten content literacy learning primarily focuses on oral language development through examining vocabulary outcomes. Recently, researchers have developed and tested curricula with the foundational belief that prekindergarten children are capable of demonstrating more sophisticated levels of explanatory talk when engaged in science content learning (French, 2004; Gelman & Brennneman, 2004). Gelman and Brenneman's (2004) project, Preschool Pathways to Science, is based on a developmental model that is domain specific. In this program, children are constructing knowledge through hands-on work. These researchers advocate for domain-specific instruction whereby concepts and vocabulary are conceptually linked.

In another study, Peterson and French (2008) investigated the way adult–child conversation in a Head Start classroom facilitated the use of explanatory language by children engaged in inquiry science. During a 5-week curricular unit on color mixing, the researchers observed and videotaped the teacher and children engaging in inquiry science investigations around the unit concepts. Peterson and French found that as teachers supported explanatory language in conversation, the abilities of children to use explanatory language improved over the course of the unit. The supports that teachers gave to children included modeling and eliciting desired language, engaging children in-group discussions and facilitating children's observations and predictions as a means of explanation. Significant increases in both content vocabulary and in the use of verbs and temporal words contributed overall to the evaluation that student's explanatory power had improved. Peterson and French attributed the positive findings to teachers' ability to use explanatory language in particular ways that "facilitate[d] children's ability to map their mental representations of the science concepts onto language" (p. 397).

Science Journals

Experts in the fields of literacy and science agree that children should be consistently invited to verbally and graphically represent their knowledge in the content areas. The National Science and Education Standards (National Research Council, 1996) argued that children should engage in the oral and written discourse of science. Prekindergarten classrooms are frequently assessed as to the quality of the classroom literacy environment. The ECERS-E (Sylvia, Siraj-Blatchford, & Taggert, 2006), a very common tool used to assess prekindergarten classrooms, has items that focus on the literacy and science environment of the classroom. For example, particular items on the ECERS-E ask if children are given opportunities to observe and/or draw natural objects and to question and record results (Sylvia et al., 2006). As an instructional tool, science journals allow children to represent their understandings while engaging in inquiry science.

Despite the promise of science journals to meet the learning standards of both literacy and science, researchers have found that they are being underutilized. In most elementary science curricula, teachers are asked to use science journals to simply record data or results from experiments (Watson, 1987). I could find no studies that examined the extent to which science journals are used in prekindergarten classrooms. I argue this could, in part, be attributed to the constrained views that many educators have regarding the unconventional abilities of 4-year-old children to successfully engage in science and writing.

For the past 10 years, reports in practitioner journals have advocated for the practical benefits of using science journals in the K–8 classroom (Ajello, 2000; Chesbro, 2006; Gilbert & Kotelman, 2005; Klentschy, 2005; Worth, Moriarty, & Winkour, 2004). Practitioners argue that journals should be used in classrooms to develop oral language, to develop content knowledge, and to monitor progress and assessment (Ajello, 2000; Chesbro, 2006; Gilbert & Kotelman, 2005; Klentschy, 2005; Worth, Moriarty, & Winkour, 2004). Teachers have looked to content literacy during inquiry science as a place for the use of science journals.

There is a limited amount of research that looks at the use of science journals in a prekindergarten classroom (Brenneman & Louro, 2008). This research offered insight into the use of journals and their benefits. However, these insights are preliminary as the research base consists of one study in one classroom. Therefore, the literature from science journal use in a kindergarten and first grade classroom is also included (Shepardson, 1997; Shepardson & Britsch, 2001).

The data reported in these studies emphasized a dialogic use of the journal wherein the teacher and the child co-created journal entries. In addition, children were given the opportunity to witness the practice of journal writing usually through a whole-group or small-group demonstration. Eventually, children were invited to participate using their own science journals in the context of guided inquiry. Science journals have been shown to support observational abilities (Brenneman & Louro, 2008) and the development of content knowledge in children (Shepardson, 1997; Shepardson & Britsch, 2001).

Initial research on the use of science journals in prekindergarten, kindergarten, and first grade classrooms has shown possible benefits to children and teachers alike. First, the journal serves as a platform through which the teacher and the child can engage in dialogic interaction (Brenneman & Louro, 2008; Shepardson, 1997). This interaction allows for both oral and written exchanges to occur. Participants engage in real conversations about ideas, which fosters both oral and written language development. These conversations may include the asking and answering of questions, making observations and claims, and using evidence to explain or support thinking.

Second, the science journal can provide a medium that encourages multimodal representation (Brenneman & Louro, 2008; Shepardson, 1997; Shepardson & Britsch, 2001). Using the journal as a touchstone, children may represent what they are thinking through the many sign systems at their disposal including talk and drawing. Through this multimodal activity, children are given many opportunities to represent the depth and breadth of their knowledge. Rather, than simply copying data from experiments, children are constructing personally meaningful representations.

Third, a dialogic perspective shows how science journals and student learning are mediated by the environment (Shepardson, 1997; Shepardson & Britsch, 2001). When the representations in the journal are made public, it allows a reader to consider how the child's marks and drawings are shaped by interactions with tools and others. In particular, the literature shows the significant role the teacher plays in helping children use the journal in the context of science inquiry (Shepardson, 1997; Shepardson & Britsch, 2001).

Fourth, in representing their knowledge with science journals, young children make their understandings visible (Brenneman & Louro, 2008; Shepardson, 1997). They provide a graphic record that can be discussed with others. This graphic record can serve as a memory marker for children (e.g., what a bean plant looked like on a given day) and help them make comparisons across data. In addition, when children's representations are made visible they can also serve as a monitoring tool for teachers, particularly if the students' progress is monitored across the course of time or a unit of study.

This literature offers positive, yet inconclusive, findings for science journal use with prekindergarten children. Although Brenneman and Louro's (2008) study was promising, it did not address how the use of science journals during guided inquiry science mediated content literacy learning for children. Rather, their analysis focused on science learning through documenting processes such as observation during science journal use.

Informational Texts

Informational texts are one of many types of nonfiction. The aim of the informational text genre is to "convey information about the natural or social world, typically from someone presumed to know that information to someone presumed not to, with particular linguistic features such as headings and technical vocabulary" (Duke & Bennett-Armistead, 2003, p. 16). The recently released Common Core State Standards advocate for the explicit reading and writing instruction of many types of informational texts, including social studies and science. These standards require students to be able to comprehend the features of these texts, including linguistic and graphic features, as they read and write them independently.

Literacy researchers have learned much about the affordances of informational text use in the elementary classroom. Research has shown that young children are very capable of working with and comprehending informational texts (Fingeret, 2008; Maduram, 2000; Moss, 1997; Pappas, 1993; Smolkin & Donovan, 2001; Williams et al., 2005). These texts tap into the innate curiosity of children in early childhood through interesting topics and content (Duke, 2003). If given a choice, young children often gravitate towards informational texts (Caswell & Duke, 1998; Mohr, 2006; Pappas, 1993). This ability to pique interest and participation is extremely important for all children, but especially so for those children who might be struggling with the use of traditional narrative texts in the classroom (Caswell & Duke, 1998). The authentic use of informational texts supports children in their understanding of reading for multiple purposes (Duke, 2003; Pappas, 1993). Lastly, informational text use particularly supports the development of vocabulary and world knowledge (Duke, 2003; Pappas, 1993).

Significantly, there has been little to no research on the use of informational texts in prekindergarten settings. In part, this lack of research could be attributed to the lack of informational text use in classrooms. In fact, very few science curricula for elementary classrooms include the use of informational texts (National Research Council, 1996) and research tells us that very few elementary school teachers use these books even when they are included in curricula (Shymansky, Yore, & Good, 1991). Yopp and Yopp (2006) asked 1,144 prekindergarten through third grade teachers to record the books they read to their classes that day. In prekindergarten classrooms, out of 167 books read by teachers 68% ($n = 113$) were identified as narrative, 5% ($n = 8$) as informational, 0% as mixed, and 28% ($n = 46$) as other. The youngest school children seem to be receiving the least amount of exposure to informational texts.

However, informational texts have become central to recent research that attempts to thoughtfully integrate the domains of science and literacy. In part, this centrality can be attributed to the call from both fields to thoughtfully integrate the two domains. In 1996, the

U.S. National Science Education Standards stated it was imperative that children “learn how to access scientific information from books…and evaluate and interpret the information they have acquired” (NRC, 1996, p. 45). Similarly, reading teachers expect children to know how to write and read a variety of genres for diverse audiences (National Council of Teachers of English & International Reading Association, 1996).

To answer the call for the thoughtful integration of literacy and science, research has been undertaken using informational texts during guided inquiry. This research tells us much about beneficial ways to use informational texts as a point of leverage for content literacy learning. Texts are primarily read in whole-group read-aloud sessions (Palincsar & Magnusson, 2001). Depending on the structure of the text, the book may have been read sequentially or topically. Research particularly argued for the use of a dialogic approach by the teacher that allowed for student participation (Palincsar & Magnusson, 2001; Pappas, Varelas, Barry & Rife, 2002). The reading of the books was usually situated within a science unit that also included inquiry activities (Palincsar & Magnusson, 2001). Various writing or representational activities, such as making science posters or maintaining a science journal, accompanied the reading of the informational text (Pappas & Varelas, 2009).

Research has shown promising benefits to children when using informational texts during inquiry science. The *Seeds of Science/Roots of Reading* team has identified informational text use as a high leverage practice in content literacy instruction (Cervetti, et al., 2005). The researchers argued that their work has shown how texts can be used to support scientific inquiry. First, texts provided a context for inquiry. Second, texts were able to deliver some of the content to children, particularly by providing other examples of the same phenomenon. Third, texts served as models of processes important to both domains such as explanation and observation. In addition, texts modeled the use of certain genre features. Lastly, texts helped young children make sense of the phenomenon they were witnessing or the data they were recording. Informational texts in guided inquiry science were used as a secondary support to the primary investigation (Palincsar & Magnusson, 2001).

Children were taught to utilize and recognize the informational text as a tool. This instruction was done through helping children "engage in the scientifically authentic practices of critical evaluation of text information, comparative analyses of text resources and building of explanations from multiple sources of evidence" (Ford, 2004, p. 286–287). Positioning children as scientists gave them the potential to understand how adult scientists used informational texts to reference the work of others during their own inquiry (Magnusson & Palincsar, 2005).

Using informational texts with elementary school age children during guided inquiry has facilitated multimodal representations. Research has shown that using texts in dialogic read alouds increased the amount of intertextual connections between informational texts and the other science inquiry activities in the classroom (Pappas, Varelas, Barry, & Rife, 2002). The teacher played a significant role in helping children make connections to these other texts.

Over time, using these texts in conjunction with scientific inquiry has been shown to promote the scientific talk of children (Ford, 2004; Smolkin, McTigue, Donovan, & Coleman, 2009). Children expressed their ideas in a manner that was more consistent with the discourse of science. Research has shown that the use of these texts can help children hone their ability to observe (Ford, 2004) and to use explanatory language (Smolkin et al., 2009).

Over the years, researchers have identified larger structures and more specific features of the genre through careful analysis of hundreds of informational texts, (Pappas, 1986; Smolkin & Donovan, 2005). In a seminal work, Pappas (1986) studied and coded over 100 informational texts looking for the genre elements that she found in all or most. In this work, she found there were certain macro-level genre features that all informational texts possess. With a central purpose of providing information, these features include presentation of topic, description of attributes and a listing of characteristic events.

Researchers have sought to understand how the genre features specific to informational texts may affect the reading and writing of those texts (Duke & Kays, 1998; Pappas, 1993; Pappas, 2006; Purcell-Gates et al., 2007). In these studies, researchers have focused on graphical as well as linguistic genre features. For example, Purcell-Gates et al. (2007) coded second and third grader's informational texts for such features as headings, labels and captions and graphical devices including diagrams.

In a seminal study, Pappas (1993) examined children's use of genre features when asked to read informational texts. This study was conducted with 20 kindergarten children in the suburban Midwest. The children were asked to read the same informational texts on three different occasions. The researchers first read the texts to the children and then audiotaped the children's readings.

Pappas (1993) found evidence of children's abilities to adopt the discourse of the informational text genre. In narratives, the main character retains emphasis throughout, whereas in informational texts, the subject holds the text together (co-classification). Pappas found that in their readings, students were able to maintain co-classification and their ability to do so increased over readings. In the second reading, the author's analysis focused on the students' abilities to use certain lexical information in their retellings. Over time, Pappas found that students were also able to use some of the technical vocabulary from the texts.

In a similar study with a classroom of kindergarten children, Duke and Kays (1998) asked the children to read the same informational and narrative texts on two separate occasions. In between elicitations, children were read 25 informational texts in whole-group scenarios. These texts were coded for significant linguistic features. Some of these linguistic features included timeless verb constructions, repetition of topical theme, and technical vocabulary. Afterwards, transcripts of children's readings of the informational texts were coded for those same linguistic features. The researchers found evidence of children's use of these features in both pre- and postreadings of informational texts. However, in the postreading, more children use these informational text linguistic features and with more frequency.

Donovan (2001) conducted another key study in this field looking at children's abilities to write informational texts using genre features. Donovan took Pappas's seminal work with genre features and applied it to the forms of elementary school students who wrote informational texts and narratives. Donovan found that children's informational text writing could be coded from forms such as words or phrases, statements, and attribute lists. She found that her youngest writers in kindergarten and first grade most often used words or phrases, statements, simple couplets or attribute lists in their writing.

Distinct visual features of informational texts engage the reader in multiple modes of meaning making (Pappas & Varelas, 2009; Smolkin & Donovan, 2005). Most informational texts contain images that contribute to and deepen the meaning of the print. Some of these images include photographs, drawings, tables, diagrams, or maps. Upon exploring six informational texts composed by students from first, second, and third grade classrooms, Pappas and Varelas (2009) commented on how the multimodal nature of the student-created informational texts reflected the use of scientific procedures and scientific dialogue. As participants in a curriculum titled Integrated Science Literacy Enactments (ISLE), students were exposed to numerous informational texts. The researchers found that these read-alouds played a key role in student representations particularly around the inclusion of visual genre elements. The read-alouds shaped comprehension as they "offered to children the language and images of the book, but were also major devices in which children and teacher were able to co-construct scientific ideas that informed and extended hands-on and other activities of the unit" (Pappas & Varelas, 2009, p. 203). When children were immersed in many rich experiences with the informational text genre, they produced powerful visual representations in their own work.

Implications for This Study

Researchers have identified informational text use as a high leverage tool in science content literacy instruction (Cervetti et al., 2005). When this research is synthesized, there are two major ways in which informational texts can be positioned as tools in the classroom. First, the use of informational texts has been shown to increase students' abilities to acquire the genre features specific to the discourse of science—both writing and speaking. Second, texts can help young children make sense of the phenomena they are witnessing during scientific inquiry. I will discuss the implications of these findings further in relation to this study.

With certain supports, informational texts can be used as tools to help students acquire certain features of discourse such as content vocabulary and world knowledge (Duke, 2003; Pappas, 1993). Texts also serve as models of processes important to both domains such as explanation and observation. In addition, texts model the use of certain genre features. Researchers have shown the use of informational texts can help children hone their ability to observe (Ford, 2004) and to use explanatory language (Smolkin et al., 2009).

The present study investigated how children used informational-text genre features in journals while participating in guided inquiry. These features served as anchors for discussion and representation—anchors upon which children could build their observations and support their claims and explanations. I invited children to use the discourse of informational texts as they completed their own journals. I invited them to use genre features and to make observations about phenomena. Over time children were expected to demonstrate emergent understandings of these genre features.

Another affordance of using informational texts is their ability to help young children make sense of the phenomena they are witnessing during scientific inquiry. Informational texts used during guided inquiry science serve as a secondary support to the primary investigation (Palincsar & Magnusson, 2001). I designed this study to have both primary and secondary investigations of the same phenomenon. In other words, children observed the features of real plants in the science center (primary investigation) and observed a diagram of a similar plant's features in an informational text (secondary investigation). These dual investigations served to encourage intertextual connections by children. I gave children multiple opportunities in different contexts to acquire the genre features and use them in different settings. The way I invited the children to use the features in these different settings shaped my interactions with them. My data collection was focused on the instances when children referenced or used the features in these multiple settings. For example, the children might have referred to a photograph of a flower in an informational text when making a comparison to a similar flower they were observing in the science center.

Researchers have also identified the science journal as a promising tool to use in content literacy instruction (Brenneman & Louro, 2008; Shepardson, 1997; Shepardson & Britsch, 2001). From these studies emerge two major ways in which journals can support learning in the classroom. First, the journal provides a stable externalized form of the child's thoughts that can be revisited. Second, the journal provides a media that allows for and encourages multimodal representation.

First, in science journal research, the journal provides a stable externalized form of the child's thinking that can be socially revisited (Brenneman & Louro, 2008; Shepardson, 1997). I designed this study to capture the process of journal writing with genre features so that I could provide an in-depth report of the emergent ways these genre features were used by children. The journals were treated as references for scientific inquiry and a more systematic way of documenting what children observed. I hypothesized that children's understandings of the selected genre features would develop over the study as they were consistently invited to use genre features that served useful and real purposes in their own journals.

I hypothesized that when children were exposed to the use of the texts and their features as tools, they would begin to similarly use these features in their journals. I was interested in how the use of these features shaped both the texts children produced and the talk used in the production. As such, I focused my data collection on instances in which children made efforts to use the selected genre features in their journals. For example, a child may have attempted to use a label in a journal entry when locating and identifying a shadow.

Second, research showed that science journals provide a medium that encourages multimodal representation (Brenneman & Louro, 2008; Shepardson, 1997; Shepardson & Britsch, 2001). Using a multimodal perspective is very important for capturing the different modes of scientific processes engaged in by children. Arguably, the multimodal perspective is especially important with the youngest writers as their emergent understandings about print are often not confined to pencil and paper. Due to the unconventional nature of the prekindergarten journal entries, my data collection included multiple modes of representation such as talk, writing, and drawing.

In this study, the multimodal nature of science journals was particularly important to consider as visual images are such significant features of the informational text genre. As discussed previously, others have examined older children's use of graphic genre features in children's informational texts (Pappas & Varelas, 2009; Purcell-Gates et al., 2007; Smolkin & Donovan, 2005). As unconventional writers of informational texts, children almost always included drawings or photographs in their journals. The analysis of the drawings and use of photographs was deeply connected to the messages provided by the children. As such, these images in children's journals were a focus of analysis.

Conclusions

The theory and research I reported in this chapter have led to the following three research questions:

First, what do a group of prekindergarten children understand about informational text features? Second, how are children's science journals produced in social interaction when they are invited to use informational text features such as photographs, labels, headings, diagrams and scale? Third, what is the nature of children's emerging representations in science journals when they are purposefully invited to use these informational text features?

The data and analyses of these questions provide an understanding of informational text writing in prekindergarten. In the ensuing chapters, data will show how prekindergarten children understand genre features, and how they use them when writing their own informational texts. These data contribute to the growing field of integrated literacy and science research and provide the field with new understandings of how emergent writers participate in this form of informational text writing.

CHAPTER III

RESEARCH DESIGN

As I discussed in Chapters 1 and 2, the research questions for this study are the following:

1. What do a group of prekindergarten children understand about informational text features?

2. How are children's science journals produced in social interaction when they are invited to use informational text features such as photographs, labels, headings, diagrams and scale?

3. What is the nature of children's emerging representations in science journals when they are purposefully invited to use these informational text features?

This was a 5-month constructivist study of prekindergarten children's literacy learning during guided inquiry science while supported by informational texts and science journals. During the instructional period, I led children in science and literacy activities in the classroom. These activities fell within two regular units taught by the classroom teacher: light and living things. The topics for the 4-week sequential units were based on the *Opening the World of Learning (OWL)* (Schickendanz & Dickinson, 2005) curriculum. The curriculum was supplemented to include more guided inquiry science activities and more opportunities for informational text and journal use. I taught the supplemented version of *OWL* and collected data 3 days per week while the units were being taught. During the course of the supplemented units, data were collected during whole-group time, book reading, small groups, and centers.

Videotaping of these times occurred throughout the unit on each day that I was in the classroom. Video was captured through the use of a free-standing camera in the classroom. In addition, I photographed all of the journal entries made by children during these units. When not directly teaching, I observed the classroom and assisted the teacher in her instruction.

Study Design

The aim of this study was to examine children's responses to guided inquiry science activities and invitations to compose science journals. Since instruction linking science and literacy activities is not common in prekindergarten settings, I took the role of teacher during the guided inquiry science activities, and taught two units on light and plants. Therefore, in this study I examined both teaching and learning in an innovative curriculum introduced to the classroom as part of this research.

The design for the study is based in Lincoln and Guba's (1985) framework for constructivist inquiry, and I used qualitative data collection methods such as field notes, observation and interviews to record both my teaching and the children's responses to curricular activities in the science units. As the teacher during data collection, I adopted the participant as observer role (Gold, 1958), which allowed me access to insider perspectives on teaching and the children's responses to activities. Following the constructivist research paradigm's (Lincoln & Guba, 2000) axiomatic assumptions about the relationship between researchers and their objects of study, I designed this study to analyze my role as teacher/participant as well as children's responses to the curriculum.

Within educational research, there is a rich methodological tradition of the researcher as teacher (Cobb & Steffe, 1983). In action research (Zeichner & Noffke, 2001), there is a history of practitioners implementing and researching change in their own classrooms. Although my research is similar, it is also markedly different as I was not the full time teacher in this classroom. Therefore, I was able to document and observe in greater detail than is usually possible when teachers are fully involved as teacher of record. In studies that seek to closely identify the processes of teaching and learning, the researcher-as-teacher role allows one to witness children's learning interactions over time and to informally ask questions that probe their understandings. This role was especially important as these 4-year-old children were emergent writers with unconventional form. In my teaching role, I had naturally occurring opportunities to further explore children's understandings about science concepts and the meanings they recorded through unconventional written forms.

In emergent writing research, other researchers have taken the participant as observer role as well (e.g., Rowe, 2008b; Dyson, 2003). Rowe (2008b), although not teaching a fully developed curriculum, engaged children in specific writing practices in the classroom and analyzed the processes and products of those interactions. Dyson (2003) questioned and discussed writing with children as they produced it in the classroom.

While the highly participatory roles I adopted in this study have advantages, it is also possible that working so closely with participants may have encouraged me to develop an overly positive view of the children's work. In addition, as the teacher, I was busy interacting with children and directing instruction. This meant that I was not able to always focus on any one individual child for extended periods of time. To mediate the potential challenges of my role as participant as observer, I included design features to support the validity of my findings. First, I collected video of all instruction and copies of all journals that were produced by participants and me. These were later reviewed at length to both cross check my findings and to identify data not initially observed due to my interactions with other children. Second, I debriefed my data and emerging hypotheses with a peer biweekly throughout the data collection period in order to confirm my interpretations of the data.

Site Selection and Field Entry

I conducted this research in one prekindergarten class located in a public elementary school in the mid-South of the United States. I selected the classroom because it served 4-year-olds and because the teacher was already involved in professional development activities related to theme-based instruction on science topics and on emergent literacy. Prior to the study, the children had not been asked to use emergent writing to support science activities. However, they had some experience with both guided inquiry science activities and with being asked to record their ideas using emergent writing. This instructional experience provided a rich context for the current study that focused on making explicit connections between science and literacy.

This research occurred in a classroom that was part of an Early Reading First funded project titled, Enhanced Language and Literacy Success (ELLS). ELLS was a collaborative between the Department of Teaching and Learning at Vanderbilt's Peabody College, the Peabody Research Institute, the Metropolitan Nashville Public Schools (MNPS), the YMCA of Middle Tennessee, and the Nashville Public Library. In Years 1–3, ELLS collaborated with MNPS to provide language, writing and literacy rich experiences to a total of 702 low-income, 4-year-old children enrolled in the 13 Title I prekindergarten classrooms in seven Reading First schools.

OWL (Schickendanz & Dickinson, 2005), the core curriculum, provided the foundation for the project. The *OWL* curriculum emphasized vocabulary and language development through repeated, interactive book reading, skills taught in the context of story and rhyme, and interactive learning centers that were connected to the unit theme. In addition to the teaching of the *OWL* curriculum, the ELLS program provided additional supports for the teaching of emergent writing, the use of conceptually driven instruction and the differentiation of instruction for English Language Learners.

As all of the classrooms in the ELLS project implemented the *OWL* curriculum, they had similar instructional environments. In particular, the curriculum emphasized oral language through specific attention to vocabulary development. Four of the six curricular units had science themes that were infused throughout the different instructional activities: centers, small groups, songs, word play and letters, let's find out about it, and read alouds. A foundational structure of the curriculum was the use of children's literary texts to teach language through repeated book readings. The classrooms had high-quality literacy environments with ample, appropriate books for children and fully stocked writing centers. In *OWL*, informational texts are not considered core texts for units. Rather, the texts are meant to supplement whole-group discussions around content.

In addition to the *OWL* curriculum, the ELLS project emphasized emergent writing instruction in the classroom. Teachers received multiple professional development sessions around emergent writing including writing development of young children and writing with young children. Most teachers implemented a whole-group interactive writing activity with children titled Morning Message. In addition, teachers were frequently encouraged to engage in individual and small group writing activities where they invited children to write their own messages.

Efforts to ensure high quality instruction included professional development delivered in large and small groups and literacy coaching. Each teacher in the project received the support of a literacy coach. The coaches modeled lessons for the teachers, observed the teachers' instruction, and helped the teacher set and achieve professional development goals.

Participants

Focal Classroom and Teacher

The prekindergarten classroom in this study was located in a public elementary school serving primarily low-income children from culturally diverse families. For the 2010–2011 school year, 379 students were enrolled in the school. The ethnic groups represented were 87.1% African American, 11.1% White, 1.5% Hispanic, and .3% Asian. Of all children, 91.9% of the school qualified to participate in the free/reduced-price lunch program.

I selected the teacher of the focal classroom, Ms. Crawford, from the pool of 13 teachers in the ELLS project. She had a bachelor's degree and a certified teaching credential. My selection of Ms. Crawford was guided by both her interest in the science portions of the curriculum and her willingness to work collaboratively with me during the research.

As a participating teacher in the ELLS project, Ms. Crawford adopted the *OWL* curriculum and tried most of the recommended strategies encouraged by her literacy coach. In a typical classroom day, she began with a whole-group, scaffolded writing experience. Then the educational assistant would lead the children in various whole-group songs, word play, and letter activities to encourage phonological awareness and letter knowledge. From there, the children would move to interactive learning centers of their choice. These centers varied depending on the unit of study but the children always had access to blocks, books, home living, and the writing centers. After centers, the children would typically participate in a whole-group read aloud, followed by lunch and recess. Most academic activities occurred before lunch. After rest, the children sometimes engaged in a whole-group discussion around the theme or participated in another whole-group read aloud. Then, they would be dismissed for the day.

The classroom's focus on writing and science activities was apparent from the display of work and the use of tools. Ms. Crawford had an easel with chart paper that always displayed a new, co-constructed text—Morning Message—written in a large-group writing activity with the children. The writing center was well supplied with a variety of writing tools such as multicolored paper, envelopes, markers, pens, and crayons. In addition, the children's drawings and, to a limited extent, mark-making efforts were sometimes displayed in the writing center. Ms. Crawford encouraged the children to copy her written marks but was also accepting of the children's unconventional writing.

There was a science center in Ms. Crawford's room that included interesting things to observe such as a water bottle filled with glitter and magnifying glasses and lab coats. The science center was typically used by the children only when teachers were present. Prior to the study, Ms. Crawford had not used science journals in her class. Typically, when reading texts aloud to whole groups of the children, she read narrative texts rather than informational ones. Ms. Crawford did complete many of the science activities suggested in *OWL* as small-group, teacher-led sessions.

Children

All the children in Ms. Crawford's class were invited to participate in the study. At the onset of the study, 19 children were enrolled in the classroom. Following consenting procedures as indicated in my application to the institutional review boards for both Nashville Metropolitan Schools and Vanderbilt University, I gained parental consent for the participation of 18 of those 19 children. One of the children withdrew from the class halfway through the study and so none of her data were analyzed. Seventeen children completed the study, and it is their data analyzed here.

The majority of the children were African American (n = 15). The remaining two children were White. One of the children came from a home where Spanish was spoken by one of her caregivers. No information on family income was collected for this study, but due to the nature of the entrance criteria for prekindergarten classes, all of the children were identified by the school district as coming from low-income families. In the beginning of the study, the average age of the children was 5 years and 1 month (n = 61 months).

Researcher

As I had served as the curriculum specialist for the ELLS grant for 2 years prior to the start of the study, I knew the site and the teacher. Ms. Crawford and I had met on numerous occasions over the first 2 years of the ELLS project. In my role as curriculum specialist, I provided teachers and literacy coaches with special support for implementing the *OWL* curriculum and for teaching science content and literacy. On some occasions, I went out to Ms. Crawford's room to observe and provide her with instructional support. On other occasions, she attended professional development that I provided to the entire cohort of teachers in the project.

As curriculum specialist for the grant, I attended weekly meetings with coaches and leadership team members to discuss child progress data and teacher practice. I also supported literacy coaches and teachers by observing classes and discussing videotapes of classroom instruction. As part of my graduate assistantship, I also acted as the literacy coach for Ms. Crawford's classroom for the spring semester that I collected my data. In this capacity, I carried on the responsibilities of the literacy coach, including modeling, planning and goal setting while I conducted my research.

In Ms. Crawford's classroom, I was as co-teacher and took the lead role in conducting the instructional activities for my study and collected data on children's responses. I managed the supplies and the texts and organized the children into groups for instruction. When I was not leading any of the instructional activities, I typically acted as an assistant, facilitating the activities Ms. Crawford planned and taught. On occasion, I would read narrative books to the entire class.

I was the principal investigator in this study and was the sole person responsible for collecting data. As a doctoral student, I have experience with data collection techniques through university coursework and two studies using similar methods. I completed all necessary transcribing of classroom and assessment video.

Instructional Units

The content literacy activities delivered in this study were part of two researcher-created instructional units (see Appendix C: Instructional Plans) designed to supplement the *OWL* curriculum. In large part, they were based on the *OWL* curriculum—maintaining the science content, the structure (centers, small groups, read aloud, and let's find out about it) and some of the recommended activities and texts. The science content and activities supplemented in the instructional units were based on science education research findings and other successful, early childhood science curricula (Chalufour & Worth, 2003; Massey & Roth, 2000). The infusion of informational text activities and the use of science journals to further promote literacy learning was predominately based on promising findings from elementary age content area literacy research (Brenneman & Louro, 2008; Cervetti et al., 2005; Shepardson, 1997; Shepardson & Britsch, 2001). The following sections provide a general description of the instruction and the three major components of the units: guided inquiry science, informational texts and science journals.

Description of Instruction

In this study, children participated in guided inquiry science activities that highlighted an active and hands-on approach to learning. Guided inquiry science activities included hands-on explorations of light and plants. Each of these units had particular science learning objectives and these objectives are discussed in the following section. In these investigations, children made observations about fundamental principles of light, such as that light travels in a straight line and shadows are created when light is blocked. For example, the children constructed their own block towers and used flashlights to create shadows of these structures. The children also made observations about fundamental principles of plants, such as the fact that there is great diversity and variation among living things. Living things are diverse as they need to adapt to their environments in order to survive. For example, the children compared the different structures, such as leaves and roots, of a Venus flytrap to moss.

In the guided inquiry science activities, the instructional unit also highlighted opportunities for the children to interact with informational texts and to write in science journals. Guided inquiry science investigations were supported by whole-group read alouds of informational texts that pertained to the topic under investigation. In addition, sections of informational texts were read during journal writing sessions. The children were exposed to whole-group writing instruction using science journals and also recorded observations about investigations in their own science journals.

Both of the instructional units shared similar content and organizational features. (For a day-by-day explanation for each unit, see Appendix C.) In each week, the children engaged in a guided inquiry science activity in learning centers. This guided inquiry activity was supported by weekly read alouds of portions of an informational text to the whole group, a whole-group interactive writing lesson with a science journal, and small-group journal writing sessions with children. Similarly, each week of the 4-week unit emphasized a different informational text genre feature. For example, the first week of each unit focused on the inclusion of photographs and captions in journals.

Guided Inquiry Science

The guided inquiry science activities in my instructional units were based on the major conceptual ideas around the domains of light and living things. I reviewed early childhood research in these domains in order to determine the big, conceptual ideas for the children. The focus of instruction in these activities was to engage the children in the actual practices of scientists (Duschl et al., 2007; Lehrer & Schauble, 2008) as they constructed knowledge and reflected upon how it came to be known. The children were invited to participate in hands-on science inquiry during learning centers. They were also engaged in teacher-led science inquiry during small groups and were witness to whole-group demonstrations of scientific phenomenon.

Journal writing became an essential piece of the guided inquiry science activity. Primarily, the children were encouraged to use the journals to record observations about their observations of light and plants. For example, in the plant unit the children dissected a pea plant seedling and used the journal to make observations about the structures of the plant. The journals were positioned and used in the service of the inquiry and the phenomenon under investigation.

Light. The guiding conceptual objectives for the light unit were shaped by research with early childhood and elementary school children (Brickhouse, 1994; Chen, 2009; Fehrer & Rice, 1988; Fetherstonhaugh & Treagust, 1992; Guesne, 1985; Massey, 2004; Massey & Roth, 2000). The activities all worked towards helping children understand the following concepts: (a) light is an entity that comes from different sources; (b) light travels in a straight line; and (c) light cannot travel or pass through everything. I designed the 4-week unit to help children develop each of these concepts.

The review of the research also yielded common misconceptions young children have about light. For instance, it is quite common for children of preschool age to equate the lamp as light or light with its light source (Brickhouse, 1994; Chen, 2009). Children with this understanding have no concept of light as an entity that travels in space. These journal entries acted as embedded measures for the way children participated in the science journal process. The use of embedded measures reflected the emergent design of the study as the children's conceptions influenced the way I interacted with them during journal writing.

Living Things: Plants. I based the guiding conceptual objectives for the plant unit on research with early childhood and elementary school children (Backsheider, Shatz, & Gelman, 1993; Gottfried & Gelman, 2004; Hickling & Gelman, 1995; Inagaki & Hatano, 1996; Massey & Gelman, 1988). These researchers have demonstrated that preschool children do know quite a bit about what it means to be living. They are able to distinguish living from nonliving in many ways including self-movement, growth, and healing. The activities in the plant unit all worked towards helping children understand the following concepts: (a) all living things grow, develop and reproduce; (b) in order to sustain life—to grow, develop, and reproduce—living things need water, food and proper living conditions; and (c) there is great diversity and variation amongst living things.

Informational Texts

OWL (Schickendanz & Dickinson, 2005) included teaching with informational texts in a curricular activity called "Let's Find Out About It." During this activity, children were given information about a concept such as shadows in whole-group settings. This instruction was done through the use of props to demonstrate phenomenon and the use of informational texts to impart information. Based on early childhood research with informational texts (e.g., Cervetti et al., 2005), my activities supplemented *OWL* (Schickendanz & Dickinson, 2005), and I emphasized the use of these texts as tools for the children to use during guided inquiry science. This was primarily done through the instruction of informational text features. The instruction focused on teaching of the following genre features: photographs, diagrams, headings, labels and scale.

The teaching of genre features primarily occurred during whole class read alouds of informational texts pertaining to light and living things (see Appendix B: Book List). However, I also encouraged the children to use the genre features of the texts while engaged in authentic scientific inquiry. I encouraged them by positioning the texts as resources to consult during inquiry activities and journal writing sessions. Through planned and spontaneous activities, the children were invited to use these genre features in their representations while working in their science journals.

I also gave instructional emphasis to how the informational text features functioned for scientists, specifically through drawing attention to scale in photographs and cross-section diagrams. Scale highlighted what was of scientific importance in images and how phenomena were made visible in a new way, either by making them bigger or showing things that were not naturally visible to the naked eye. In addition, I used cross-section diagrams to show the children how scientists can make something visible that is not normally so (e.g., the roots of a plant underground).

In addition to the focal texts used in the read alouds, I placed other informational texts about light and plants in the learning center and small-group areas. I selected all of the texts through consulting various reputable resources such as the National Science Teachers Association and the Horn Book. When selecting texts for the units, I paid particular attention to inclusion of targeted genre features. As most books were not read in their entirety, the reading level of the text was considered but not given the highest priority.

Science Journals

OWL (Schickendanz & Dickinson, 2005) encouraged student writing through specified activities to be completed in the Writing Center. For example, in the living things unit, the children were encouraged to make books documenting the progress and growth of plants or animals in the classroom. My instructional activities supplemented the OWL curriculum with the explicit teaching of the science journal genre. This addition was based on promising results from both research and practice (Brenneman & Louro, 2008; Shepardson, 1997; Shepardson & Britsch, 2001). The journals were used as tools for the children's representations during guided inquiry science activities. I encouraged the children to use the journals to help facilitate observation and explanation. In part, they used the journals through the incorporation of informational text features in their representations.

I positioned science journals as a means of documenting observations about the natural world. I introduced journals to the children as a way to record what they observed and what they knew. During guided inquiry science activities, I encouraged children to "draw what you see." The journals served as focal points for conversation. The talk in the journal writing sessions frequently revolved around the content of the children's journals or the process they used to make their observations. The children and I frequently commented on each other's journals before, during, and after they were produced.

I also positioned the journals as a means of informing others about our understandings. This positioning was evident in how I encouraged the children to make the most "accurate" representation they could. Discussions often revolved around the appropriate color or shape of something that they were planning on drawing. This goal of creating an accurate representation contributed to the children's understandings that journal entries were intended to show others what we knew. I often suggested to the children, "When Ms. Crawford reads this later, we want to make sure that she understands what you knew about plants." Occasionally, we revisited journals at a later time. When doing so, I reminded the children that we needed to make accurate observations so that they are meaningful and helpful when we look at them later in time. For example, it was important to accurately draw and label the parts of the plant bulb in order to track the change in the plant over time.

Phases of Inquiry

Inquiry for this study occurred in three phases (see Appendix A: Phases of Inquiry Chart). Prior to the official beginning of Phase 1, the study was accepted by the internal review boards of Vanderbilt and Nashville Metropolitan Public Schools. The study took place over 5 months (January to May) and I was in the classroom for 35 total days.

Phase 1

Phase 1 consisted of site entry and continued development. This phase lasted for a month and a half, and I was in the classroom for a total of 5 days. In January, I met with Ms. Crawford to present the scope of this study. She agreed to participate in the study, and we began to review the units of instruction to determine how instruction would occur in the classroom. At that time, a small change was made to the method of instruction to meet the needs of the classroom teacher and the children. Ms. Crawford did not complete small-group activities as suggested in the *OWL* curriculum. Instead, she incorporated those activities into her centers. To keep in line with her instructional patterns, I often incorporated the small-group instruction into interactive centers as well. However, we made no real substantive changes to the methodology of the study.

In addition, a key component of Phase 1 was establishing rapport with the classroom teacher and children. In January, I began making weekly visits to the classroom. I wanted to become familiar with children and to establish feelings of collegiality with the classroom teacher. At this time, I also introduced the freestanding video recorder into the classroom so children became desensitized to its presence. Videotaping was already a regular part of the day for teachers and children in the ELLS project as coaches frequently used video data with teachers to improve classroom quality.

During Phase 1, I also made initial notes about children's overall representational abilities. I made these notes by observing and interacting with the children within the scope of the normal classroom day. Also, I obtained parental permission to view data that had already been collected by the ELLS project to gain an overall sense of children's representational abilities. These tests included the Peabody Picture Vocabulary Test (PPVT) (Dunn & Dunn, 2007) and the WriteStart! Writing Assessment (Rowe & Neitzel, 2008). Although I looked at both data sets, I was particularly interested in the results from the WriteStart! Writing Assessment as this assessment provided information about children's writing abilities.

Phase 2

Phase 2 primarily consisted of the delivery of the instructional intervention and the collection of data. This phase lasted for 2.5 months, and I was in the classroom for a total of 30 days. Before delivery of the intervention, I assessed all the children using a measure I designed, the Informational Text Interview (ITI) (see Appendix D: Informational Text Interview Protocol). After the second instructional unit, I reassessed the children with the ITI.

Although this phase predominately consisted of instruction and data collection, I also developed initial hypotheses during my work in the classroom. I based these preliminary research hypotheses on my initial understandings of how the children represented knowledge during content literacy. Some initial data analysis of field notes and documents also occurred during this time.

While in the classroom, I acted as a co-teacher during the light and plant units. During particular parts of the day, I was the primary person providing guided inquiry science instruction to whole groups, small groups, and individual children. During these times, I taught the 4-week instructional units (see Appendix C: Instructional Plans) created for this study. My instructional role each week included leading the children in guided inquiry during centers, guiding the children through a science activity in small groups, reading informational texts aloud to the whole class, and leading whole class demonstrations around the science content. At other times of day, I supported the teacher in an assistant role. I planned with the teacher and discussed classroom instruction and student progress as necessary.

Phase 3

Phase 3 consisted of in-depth data analysis and the writing of the final report of findings. This phase lasted approximately one year. Each of the three research questions required a separate strand of qualitative analysis (for an in-depth discussion of analysis methods see Chapters 4, 5, and 6). Each strand used the constant comparative method (Strauss & Corbin,

1990) to analyze journal writing sessions, informational text interviews, and the children's science journal entries.

I continued data analysis through triangulation of these data with field notes from the classroom. To further refine my interpretation of the data, member checking and peer debriefing also occurred during this time. In my role as literacy coach, I had weekly meetings with the classroom teacher for the remainder of the academic school year. These meetings gave me ample opportunity to member check my working hypotheses and in-process analyses with the classroom teacher. In addition, I had biweekly meetings with the chair of my dissertation committee, during which I would bring sample journal entries and my field notes to discuss developing ideas.

I exited the field to write the final research report. During this time, I further refined my hypotheses and continued member checking with the teacher when needed. In addition, I verified the trustworthiness of the report using criteria based on Lincoln and Guba's framework (1985). I debriefed drafts of this paper with the chair of my committee and received her theoretical and structural feedback.

Data Collection

Data were collected before, during and after instruction. I discuss all of the collected data in detail in the following sections.

Preinstruction Assessment

Prior to the start of the light and plant units, I assessed the children as to their understandings of informational texts. Also, I requested from parents the overall language and writing assessment results collected by the ELLS project (these assessments were collected by an independent, outside evaluator). The overall language and writing assessment results included the PPVT (Dunn & Dunn, 2007) and the WriteStart! Writing Assessment (Rowe & Neitzel, 2008). The PPVT is a norm-referenced test of productive vocabulary. The WriteStart! Writing Assessment (Rowe and Neitzel, 2008) is not a normed test but is a standard task used in previous research projects and in the fall and spring of each year with the ELLS project. The WriteStart! Writing Assessment is used to assess forms that children use to record their messages, the match between the messages and the assessment tasks, and concepts about print. The experts who used it found it to be a good indicator of overall representational abilities (Rowe & Neitzel, 2008). I looked at the results of these data for all of the children to provide me with more information about overall language and writing abilities.

I designed the ITI for this study to measure both student knowledge of informational text features (photographs, diagrams, scale, labels and headings) and student comprehension of these features in a text (see Appendix D: Informational Text Interview Protocol). I based it in large part on informational text research and assessments being completed at the Literacy Achievement Research Center at Michigan State University (Billman et al., 2008; Duke et al., 2011; Hilden et al., 2008). This assessment took the form of an interview as I read aloud portions of an informational text titled *Caterpillar* (Hartley, Macro, & Taylor, 2006). A section of the book was removed as its absence did not affect the integrity of the text. In addition, those pages did not contain any additional genre features required for the assessment.

As I read the abbreviated text, I stopped at key points to ask questions through which I elicited children's knowledge about certain genre features (photograph, diagram, scale, labels and headings). I designed the assessment to be an expanded book reading event, in which adults ask the children questions about the text as they read together. The interviews lasted approximately 8–12 minutes per child. The questions and prompts were scripted to facilitate consistent administration. I video recorded the interviews and took field notes during the sessions.

The results of this assessment provided information that informed the implementation of the curriculum and created a snapshot of the children's understandings of informational text features. First, this information provided me with valuable information regarding the children's initial understandings of informational texts and their features. I used information from the ITI to flexibly adapt my instructional interactions and invitations based on the children's understandings. At the close of the study, I analyzed the ITI data for all children to describe children's emergent understandings of informational texts.

I established face validity for the ITI in two ways. The first was through including the use of an authentic text. Second, the assessment was subjected to expert review by two experienced researchers who examined items related to informational text features and science features. These experts provided feedback at two different points, in the development stages of the assessment and, more formally, through both oral and written feedback at my proposal defense.

In order to check construct validity, I gave the assessment to three experts in early childhood education and assessment. All the experts had experience with teaching and doctorate level research in early childhood. In addition, two of the three experts have their doctorates in education. After reading the protocol and looking at the text used in the interview, these experts assigned constructs to the items in the ITI. In addition, they provided comments about the validity of the assessment. The experts assigned constructs to each of the items in the

ITI. In the construct validity check, the experts' constructs matched mine 95% of the time, which led me to conclude that the questions on the ITI measured the suggested constructs.

I piloted the ITI on two separate occasions in a local prekindergarten. On the first day, I conducted the interview with four children. Based on the responses of children, I amended the interview for the next pilot session. On the second day, I conducted the interview with four more children. Based on their responses, I further amended the assessment. The scope of the changes varied from abbreviating the length of the assessment and material covered in the text to rewording the questions about genre features.

Ongoing Data Collection

In addition to ITI data collected prior to the beginning of instruction, I recorded data on children's participation in the instructional units through a variety of other techniques. Throughout the course of the units, I video recorded all instructional interactions and audio-recorded them with a remote microphone. Specifically, this recording included all instructional activities that I led or facilitated: whole-group read alouds, whole-group writing, small-group guided inquiry, and journal writing sessions. In addition, I photographed all graphic productions made by the children during these units. I maintained a field journal that included observational notes, theoretical notes, and personal notes.

Field journal. Throughout the study, I maintained a field journal to document four types of notes: methodological, theoretical, personal, and observational. The methodological notes included any thoughts concerning the design of the study. The theoretical notes included ideas about how theory might fit into any initial hypotheses I was developing in the field. Personal notes included any feelings or emotions I might have been experiencing on a daily basis as the study unfolded. Observational notes included observations of classroom interactions and documents produced. I kept the journal daily while in the field.

As the teacher, I had little time to write extensive observational field notes during the instructional day. I would, however, jot down key occurrences (e.g., “Andre drew his own label line for shadow”). I reviewed the observational notes daily during Phase 2 and always expanded these notes. In addition, I also reviewed video and journal entries to write extensive notes on how each child participated in a session on a given day.

Science journal: Embedded measure. Each week, all of the children participated in a small-group guided inquiry activity (see Appendix C: Instructional Plans). These groups typically contained five to six children. After or during the activity, I invited all children to make an entry in their science journal. Each week, I emphasized a different informational text genre feature to be used in the journals. I invited all children to use informational text features in their entries. As the teacher, I supported the children while they were composing their entries. Weekly journal entries served as an embedded measure as all the children were invited to participate in the same activity. I was able to work closely with the children and track how the journals were produced.

At the onset of the unit, I showed children how to use the journal in a whole-group demonstration. I gave all the children a notebook to use as their individual science journal throughout the study. The children date stamped all journal entries to document when the representation was made. The children were given access to various writing and drawing materials to create their entries, including markers, crayons, colored pencils, and scissors.

During instruction, I primarily used the journals as a tool to help children document their observations of scientific phenomenon. I also used the journal as a tool to elicit explanation about scientific phenomena and graphic representation. Depending on the child's needs, the journals were child produced or co-produced with me. Once completed, we used the journals in various settings and times throughout the school day. I planned some use to accompany instructional activities and other uses were spontaneously initiated by the children or by me. I photographed all pages of these journals for analysis.

Data Analysis Overview

In this section I provide an overview of the data analysis in this study. I conducted data analysis in three separate strands for each of the three research questions. Table 1 shows the relationship between the research questions, the data collected, and the analysis methods used.

Table 1

Data Analysis Overview

Research Question	Data Collected	Analysis Methods
Question A: What do prekindergarten children understand about informational text features?	ITI: Transcripts; coding documents	Constant comparative method
Question B: How are children's science journals produced in social interaction when they are invited to use informational text features such as photographs, labels, headings, diagrams and scale?	Video of journal writing sessions; children's journal entries; Flushman journal entries	Constant comparative method
Question C: What is the nature of children's emerging representations in science journals when they are purposefully invited to use these features?	Focal children data: video of journal writing sessions; children's journal entries; ITI Flushman journal entries	Constant comparative method

For an in-depth discussion of analysis steps and procedures, please refer to the analysis section of each specific research question in Chapters 4, 5, and 6.

Trustworthiness

I used Lincoln and Guba's (1985) criteria for establishing trustworthiness in qualitative research in order to support the rigor and overall quality of study design and findings. These criteria are a widely used set of standards that consider the credibility, the transferability, the dependability, and the confirmability of a study's design, analyses and findings.

Credibility

This study has many features with which I attempted to ensure that the children's perspectives were represented accurately. First, I was in the classroom for a prolonged period of time, beginning with periodic visits to establish trust and rapport. From mid-January through May, I was in the classroom 3 days per week providing me with extended opportunities to witness and observe student learning and the classroom environment. This prolonged engagement coupled with persistent observation allowed me to more accurately represent the perspectives of the children.

I collected and analyzed data using a triangulation of methods. During and after Phase 2, I triangulated or checked data sources against each other for credibility. For example, I compared transcripts of events captured on video to my observational notes and to preassessments to create a more complete profile of each child's understandings and use of genre features. In addition, I debriefed with a mentor throughout the implementation of the study and during the ongoing analysis to discuss my hypotheses.

Transferability

The constructivist paradigm requires in-depth description to allow readers to make decisions regarding transferability of findings. Through thick description of the participants and the practices and environment of the classroom, I provided a means of comparison between different settings. Thick description allows readers to determine how closely related this classroom is to other environments and, ultimately, how my findings may transfer or carry to other settings.

Dependability

Dependability is an assessment of the quality of data collection, analysis and the subsequent findings in a research study. To ensure the dependability of the findings, I provided a detailed and accurate natural history of the research methodology. I saved video to CDs and also transcribed portions of videos. In addition, I photographed, kept, and scanned student work as images and saved them CDs. I also kept a field notebook of observational, theoretical and personal notes throughout the course of the study. These overlapping methods of data collection add to the dependability of my findings.

Confirmability

Confirmability is the degree to which the findings are supported by the actual data that have been collected. As I have an existing relationship with the participating teacher, confirmability was a particularly significant issue to address in my work, and I took multiple steps to ensure that my findings were confirmable. First, through overlapping data collection, I was able to triangulate the data to determine if findings were accurate in different circumstances and on different occasions. Throughout the study, I kept a field journal with codes for personal notes. In these notes, I included feelings or emotions that I experienced throughout the course of the study. On an ongoing basis, I reviewed these personal notes so that I was aware of any of my own biases and how they might have affected my data collection or my analysis.

Second, I composed this report by providing a variety of examples from the data including samples of the children's work and verbatim transcripts from classroom interactions. I also used examples when checking with the classroom teacher for her perspectives and when debriefing my analysis and findings with a peer.

Strengths and Limitations

As this is a constructivist inquiry focusing on one classroom, these findings are limited to the context in which they were observed. They should not be generalized to all prekindergarten classrooms. This research design presented an optimal instructional sequence in which a highly trained teacher/researcher implemented the instruction. The classroom teacher was highly qualified and a participant in a federal grant that supplied her with numerous resources, a literacy coach, and enriching professional development.

However, this design did show the possibilities of informational text writing in prekindergarten under optimal settings. The length of the data collection period and the instructional units were a particular strength of this design. In addition, collecting data during two month-long units of study showed how journals were produced within two very different content domains, light and plants.

The in-process documentation of journal entry writing was another strength of this study's design. Collecting journals as they were produced allowed me to show the children's emergent uses of informational text features in their own informational text writing. Videotaping of the entire journal writing event allowed me to provide a detailed description of how science journals can be used with emergent writers.

The inclusion of a standard task used to measure the children's informational text feature knowledge strengthened this research. As all the children in the study completed the ITI, this allowed me to draw conclusions about the entire group's understandings of informational text features. I was able to look across the sample to discuss ways in which the children approached the identification and interpretation of these textual features.

In this study, I asked children to consider informational text features in two different contexts. In the ITI, I asked them to respond to textual features in a book reading event. In the journal entries, the children's knowledge of these features was elicited in their writing. These multiple layers of analysis allowed me to talk deeply about the children's informational text knowledge in this prekindergarten classroom.

CHAPTER IV

WHAT DO A GROUP OF PREKINDERGARTEN CHILDREN UNDERSTAND ABOUT INFORMATIONAL TEXT FEATURES?

This chapter presents findings related to the first research question in this study: What do a group of prekindergarten children understand about informational text features? Prior to the instructional portion of the study, I analyzed the ITIs I conducted with children to explore their emergent understandings about informational text features. These elements include photographs, use of scale or magnified images, labels, headings, cross-section diagrams, and surface diagrams.

In early childhood, children do not read informational texts with any great regularity (Pentimonti et al., 2010; Yopp & Yopp, 2006). Not only are children not reading these texts, but they are also infrequently asked to read or write informational texts. Duke (2000) found children in first grade classrooms spent only 3.6 minutes per day engaged in written language activities with informational texts. Not surprisingly, researchers (Chall et al., 1990; Duke, 2000) have attributed "the fourth grade slump" in reading achievement to a lack of informational text use and exposure. In fourth grade, students are asked to read to learn rather than learn to read. In other words, fourth graders are asked to read texts for the explicit purpose of gleaning content information. These texts often include photographs, captions, diagrams, and sophisticated uses of print (such as headings, bold vocabulary words, etc.). Teachers often assume that children, like adults, find these features self-evident. However, there is no research that addresses how prekindergarten children understand these texts and their genre features.

Researchers have demonstrated that informational texts are developmentally appropriate for young children; young children are able to read and/or retell informational texts (Duke & Kays, 1998; Pappas, 1993) with successful rates of comprehension (Moss, 1997). In a study with first graders, Moss (1997) found that children could retell informational texts using genre-specific linguistic features and could also comprehend those texts with success.

The ITI I used in this study is different from measures used in similar research. The ITI asks children to respond to visual and textual elements that have not been previously emphasized in research reports. These visual elements include diagrams, photographs, and the use of scale. Theory tells us that these visual elements are often the first attended to on readers' visual paths with the text (Kress & Van Leeuwen, 1996). The textual elements include headings and labels.

Unfortunately, the understanding of these visual genre elements has not been the focus of much research with young readers. However, young children know less about informational text as a genre than about narrative as a genre (Kamberelis, 1998). In a study with students in kindergarten, first grade, and second grade, Kamberelis (1998) found that children's knowledge of a specific genre was related to exposure. Children who had little experience with informational texts had little knowledge of these texts and how they worked as a genre.

Currently, a team of colleagues with the Literacy Achievement Research Center (LARC) at Michigan State University is working on three assessments that measure young children's abilities to comprehend the genre features of informational texts. The first two assessments are titled The Concepts of Comprehension Assessment (COCA) (Billman et al., 2008) and The Informational Strategic Cloze Assessment (ISCA) (Hilden et al., 2008). The COCA measures comprehension for children in Grades 1 and 2 and the ISCA for children in Grades 1–3. The third assessment (Duke et al., 2011) is a measurement of graphical device comprehension for children in grades pre-K–3 grade. These assessments are available to the public on the LARC website. The reports regarding the use of these assessments have yet to be published. I largely based the ITI I used in this study on these measures published at LARC.

The first goal of this study was to describe prekindergarten children's emergent understandings of specific visual and textual genre features. One anecdote, taken from the ITI, illustrates the importance of understanding the emergent and diverse ways children understand these features. In one of the photograph questions, I showed the children a photograph of a large silkworm moth sitting on a leaf surrounded by small, yellow eggs. I then asked the children, "What does this photograph show?" The responses I received included "beads," "eggs that you eat," "seeds," "a bird," "a momma laying down her eggs," "a butterfly," and "yellow eggs." Clearly, a child who listened to this book being read aloud and thought the eggs were "beads" comprehended this text differently than a child who identified them as "yellow eggs." In this chapter I report findings from the ITI demonstrating the range in prekindergarten children's emergent understandings of informational genre features with an emphasis on what seemed easy and difficult for the children.

Analysis

The data I used for this strand of analysis consisted of ITIs (n = 17) given before the instructional phase of the study. I chose preinstruction assessments for analysis in order to provide a description of prekindergarten children's emergent understandings of informational text features before they received instruction focusing on these features. In this way, the findings I present in this chapter describe children who initially had received little to no instruction around these informational text genre features, which is likely the situation encountered in most prekindergarten classrooms.

In fact, prior to the ITI, the children in Ms. Crawford's class had infrequent interactions with informational texts. In the *OWL* curriculum, informational texts are not listed as core texts for units. Rather, informational texts were used far more infrequently and considered as supplements to support whole group discussions around content.

The children were administered the ITI over the course of three days. The interviews ranged from 5 to 12 minutes in length. I made a transcript of each child's interview. I then blinded the transcripts and disaggregated the data by question. For each question, I inductively generated descriptive categories that encompassed the breadth of the varying responses provided by the children. I then used the final set of categories (see Appendix E: ITI Coding Document) to code each of the interviews.

In Questions 1 and 2, each response could be coded in multiple categories, and the responses were not listed in order of sophistication. For example, I would code a response such as "The caterpillar lives on the leaf" with a semantically accurate actor, "caterpillar," and a semantically accurate characteristic event, "lives on a leaf." However, with Questions 3 through 7, only the child's most sophisticated response, as ascertained by the ITI Coding Document, was counted. The coding document for these questions lists responses from left to right by increasing levels of conceptual sophistication.

In the following report of findings, I used the terms *semantically accurate*, *semantically related but not accurate*, and *semantically inaccurate* to describe the children's emergent responses to the informational text features. Semantically accurate responses were those in which the intended meaning in the text/photo corresponded with the meaning attributed by the child. In this case, often the children would respond with *caterpillar, butterfly, or moth.* I coded responses, particularly those in Questions 1 and 2, as semantically related but inaccurate. With this type of response, the meaning attributed by the child should be in the same semantic space or related to the intended meaning in the text. For example, if a child says that a photograph contains a "bug," but the more precise answer is "caterpillar," that answer is semantically related but still inaccurate. Semantically inaccurate responses were those that were neither correct nor semantically related but rather inaccurate. These were frequently not truly related to the intended meaning in the text. For example, for a picture with a caterpillar, I coded *ladybug* as semantically inaccurate. Although ladybugs and caterpillars are both insects, there is too much semantic distance between the two for them to be coded as semantically related.

To ensure that my coding of the interviews was reliable, I asked a colleague to double code a randomly selected portion of the interviews (n = 7). This colleague was an advanced doctoral student in the field of early childhood education. To train her, I created an ITI coding book that supported the training session. During that time, we also separately coded one of the transcripts and compared results.

To determine inter-rater reliability, I used a simple percentage method. Although Cohen's Kappa is the standard used in quantitative research, the nature of this data does not lend itself to this method of analysis. Each of the questions has a different scale, which makes it difficult to compare values across questions. In addition, as most of the questions have four or more possible codes, it is less likely that responders would code responses identically due to simple chance.

Therefore to give more power to my percentage calculation, I increased the percentage of double-coded interviews from the standard 20% to 40%. In the initial training, we were reliable on 15 of 16 items, yielding an acceptable inter-rater reliability rating of 94%. When calculating the remaining interviews, we reached a cumulative inter-rater reliability rating of 92%.

Findings

For the purposes of clarity in reporting, I have organized the findings by a discussion of the individual genre features. The genre features include photographs, scale in photographs, labels in diagrams, headings, cross-section diagrams, and surface diagrams. In this discussion I place emphasis on the emergent ways in which the children understood the features. The summaries look across all children's knowledge of a particular feature by cumulatively considering the way these children responded to all questions about a particular genre feature. When possible, I was able to analyze the data for each feature in aggregate. In these cases, I analyzed how many of the children responded positively to at least one of the three questions about the feature. This was particularly the case for the questions about labels and headings. In all analyses I highlighted what seemed easy or more difficult for the children to understand regarding particular genre features. Lastly, I provide a cross-feature analysis that looks at patterns across all informational text genre features for all the children. These patterns related to the children's abilities to identify features, to discuss functions and to describe the author's intent in using the features. Again, I emphasized what seemed harder and easier for the children.

Photographs

Photographs are a hallmark of informational texts. A sophisticated reader of these texts understands that photographs are valuable sources of information. Authors choose particular photographs that are linked to the text, which often provide images for the subjects under discussion. However, photographs also may provide a reader with new information that is not present in the text. Through the two photograph questions included in the ITI I sought to ascertain the children's abilities to read photographs and to understand a photograph's relationship to the body of the text.

Table 2 shows how the children's responses were distributed across the grounded categories related to emergent understandings of reading photographs and understanding of photograph-text relationships. It was possible to score more than one response per question.

Table 2

ITI Frequency Responses: Author's Intent to Use Photographs and Reading of Photographs

Response	Question 1: Photograph and Text Relationships	Question 2: Reading Photographs
A. Response included a semantically accurate attribute	1	6
B. Response included a semantically accurate characteristic event	6	6
C. Response included a semantically accurate actor/object	10	14
D. Response included an actor/object who was semantically related but not accurate	1	1
E. Response included a semantically inaccurate attribute	2	0
F. Response included a semantically inaccurate characteristic event	2	0
G. Response included a semantically inaccurate actor/object	3	2
H. "I don't know" indicated verbally or nonverbally	2	1

Note. Total number of children = 17

Photograph's relationship to text. With Question 1 I sought to measure the children's abilities to compose a potential photograph that was related to the text. I read the text, "Caterpillars are tiny when they hatch out of their eggs. They grow very quickly" to the children (Hartley et al., 2006, p. 8). Then, I showed them a covered photograph and asked, "What photograph would the author want to put here?" I designed this question to elicit the children's understandings as to the necessary relationship between a potential photograph and text in informational books. The coding document generated from the children's responses reflects their emergent understandings that a photograph depicts actors, attributes or events linked to the book's text.

Thirty-seven percent of the responses given to this question named a semantically accurate actor or object that was directly connected to the text (Response Category C). As part of the coding for this particular question, I noted if the children named more than one possible appropriate actor. Three of the 11 who named appropriate actors provided more than one actor. Some actors given by the children included "caterpillar" or "eggs," and these are directly linked with the text that was read to them

Twenty-two percent of responses for Question 1 provided a characteristic event associated with caterpillars and the eggs (Response Category B). This was the second most frequent response given by the children. The children who responded in this way seemed to be cueing into the actions they knew caterpillars participate in, such as "A baby caterpillar…that came out the egg." I coded this response with a semantically accurate actor (caterpillar) and a semantically accurate characteristic event (came out the egg). In fact, many of these responses were related to the idea of birth or being born.

Thirty seven percent of responses about photographs were not directly linked with the text read to the participants (Response Categories D, E, F, and G). The children responded in this way when naming actors, attributes, and characteristic events that were semantically inaccurate for the text. In many of these occasions (n = 4), the children seemed to cue into a related schema (e.g., worms have a similar body shape as caterpillars) when they provided either a semantically related but inaccurate actor or a semantically inaccurate actor for the proposed photo (Response Categories D and G). These children responded with "worm" or "snake."

Some of the children, when asked to name the subject of the proposed photo, cued into something that was tangentially related to the text. On these occasions, it was difficult to ascertain what the children were attending to when they gave their response. An example of a response I coded this way was "water."

Reading of a photograph. Question 2 asked the children to read or describe an existing photograph in the text. I read the text "Female butterflies and moths lay tiny eggs on the leaves of plants. Caterpillars hatch from these eggs. They eat the leaves" (Hartley et al., 2006, p. 10). I then asked the children to tell me what the photograph showed. The photograph adjacent to the text showed a large, white silkworm moth on a leaf that was labeled "female moth." Small, yellow eggs were scattered around the leaf and labeled, "Eggs."

The question was designed to elicit the children's abilities to read photographs for information. Readers of informational texts are constantly bombarded with photographs as they are asked to scan and read for visual actors, attributes, and characteristic events. To scan and read in this manner, readers are required to make connections between the visual image and the message of the text.

As with Question 1, the most frequent response was to name a semantically accurate actor or object in the photograph. In fact, 47% of the responses for Question 2 named a semantically accurate actor or object (Response Category C). Six of the fourteen responses that named appropriate semantic actors included more than one actor. Some potential actors given by the children included "leaves" or "eggs," and these were exactly the actors and objects depicted in the photograph and discussed in the accompanying text.

The second most common responses at 20% included a semantically accurate attribute (Response Category A), and 20% included a semantically accurate characteristic event that described what was occurring in the photograph (Response Category B). In these cases, the children described an actor or object or what the actor might be doing in the photograph. I would code a response like "yellow eggs" as a semantically accurate attribute (yellow) and object (eggs). When naming a semantically accurate characteristic event, a child stated, "She's laying out eggs."

In their demonstration of emergent understandings about reading photographs, 10% of the responses were either semantically related but not accurate or semantically inaccurate (Response Categories D and G). When providing responses not directly connected to the text the children seemed to cue into the visual image in the photograph. In these cases, the children read the image but gave an alternative name to the object in the photograph. The named objects often had something in common with the actual object in the photograph. For example, a child looked at the shape of the yellow eggs and named them as "seeds." Another child named the rather large silkworm moth as a "bird." Although these are not the accurate objects in the photograph, the children attended to the image and read the photograph using related schema.

Summary. These findings show that prekindergarten the children do attend to the photographs in informational texts. When Response Categories A, B, and C, (n = 43) were summed across ITI Questions 1 and 2, the children most frequently provided semantically accurate responses for a photograph. Most of these responses, as seen in Response Category C, (n = 24) were semantically accurate actors or objects for the photographs. However, there were a subset of responses (n = 11) provided by a group of the children (n = 7) who gave an actor or object that was either semantically related but not accurate or semantically inaccurate. There were differences in how the children responded with actors or objects that showed evidence of their emergent understandings of the connection between text and image. For example, a subset of responses provided actors such as "snake." This occurred even though the children were explicitly told the title of the book was caterpillars and even though they heard about caterpillars, not snakes, on every page of the text.

With photographs, it seemed easier for the children to provide semantically accurate features for a given photograph than when composing a potential photograph of their own for a text. There were fewer semantically inaccurate responses, as seen in Response Categories D, E, F, and G, in Question 2 (n = 3) than in Question 1 (n = 10). I believe this, in part, can be attributed to the fact that in Question 1, the children did not have a visual stimulus to cue their response. Rather, they only had the text that was read to them. This becomes evident when looking at the group's collective response to the photograph questions. When provided the visual cue of the photograph, most of the children (n = 14) provided at least one accurate feature (including actors, attributes, and characteristic events) for the displayed photograph. Whereas, only 10 children provided at least one accurate feature for a potential photograph that was covered by white paper. In addition, the children provided more accurate features, Category Responses A, B, and C, for the visible photograph (n = 26) than features for the covered one (n = 17).

First, this information suggests that these children did attend to the visual images in the text and read them with varying degrees of accuracy. Across, both photograph questions, 14 of the 17 children could provide at least one semantically accurate feature for a photograph.

However, although 82% of the children could come up with at least one accurate feature for a photograph, this task proved slightly harder when considering a potential photograph. In other words, without the immediacy of the image, many of the children had a slightly more difficult time coming up with appropriate features that related to the text. This suggests that although the children might read photographs for information, they might not as easily consider the necessary connection between the photograph and the body of the text when composing their own potential photographs.

These findings show that most prekindergarten children in this study did attend to the photographs in informational texts and they also demonstrated an emergent understanding of the relationship between photos and text. When prompted, most of the children read the photograph by attempting to name features of the image. However, there were subsets of the children who gave less sophisticated responses that did not link with the text semantically such as *worm*. These children seemed to cue into the visual features of the photograph rather than the text that had been read to them. Reading photos in relation to printed text was easier than making selections of appropriate photo content for a printed information text.

Scale

Many images in informational texts are not shown to true size. The use of scale in photographs can highly magnify an object making it significantly larger than in real life. To truly comprehend the information presented in informational texts, a reader must be able to read photographs for their relative size. Authors use scale to show a phenomenon differently. For example, a highly magnified photograph of a leaf might allow the reader to see the positioning of the veins of the leaf or the type of leaf edges. Scale shows something that would not necessarily be visible to the human eye upon casual observation. With the two scale questions I sought to ascertain the children's abilities to identify if scale was being used in a photograph and to elicit their emerging ideas about the intent of an author when using scale images in a text.

Identification of scale in photographs. With Question 3a I sought to measure the children's ability to identify if scale was used in a photograph. The children were shown a magnified photograph of a baby caterpillar crawling over eggs. The caterpillar eggs, were approximately 2 inches tall, clearly larger than the average size egg. The children were then asked, "Is this the real size of the caterpillar and the eggs?" Table 3 shows how the children's responses were distributed across the grounded categories related to emergent abilities to identify scale in a photograph. In this question, I coded the children's responses only once and assigned them to the most sophisticated category indicated by that response.

Table 3

ITI Responses: Identification of Scale in Photographs

Question 3a Response	Number of Children
A. "I don't know" indicated verbally or nonverbally	2
B. "Yes" indicated verbally or nonverbally	2
C. "No" indicated verbally or nonverbally	13

Note. Total number of children = 17

The majority of the children were able to identify when scale was being used in a photograph. In this case, 76% of the children denied that the caterpillar and eggs in the photograph were the correct size. The children indicated their answers verbally or nonverbally by shaking their head. In their emergent understandings of scale use, two children indicated that the caterpillar and the eggs were the accurate size and two had indicated that they did not know.

Authorial intention to use scale. With Question 3b I sought to measure the children's ability to discuss authorial intention to use scale in photographs. The children were shown the same magnified photograph of a baby caterpillar crawling over eggs. They were then asked, "Why would the person who made this book show the caterpillars and the eggs this big?" Table 4 shows how the children's responses were distributed across the grounded categories related to emergent understandings of authorial intention to use scale in photographs. In this question, I coded the children's responses only once and assigned them to the most sophisticated category indicated by that response.

Table 4

ITI Responses: Authorial Intention to Use Scale in Photographs

Question 3b Response	Number of Children
D. "I don't know" indicated verbally or nonverbally	6
E. Response was semantically inaccurate and may have included inaccurate use of size	2
F. Response described semantically accurate attributes, characteristic events, actors or objects in the photo (e.g., "butterfly" or "caterpillar")	3
G. Response reflected the personal preference of the author-not related to informing (e.g., "because he wanted to")	3
H. Response included a reference to increase in size or "to make big"	2
I. Response referred to author's intention to change the image to help the reader by making the image larger (e.g., "to help us see better")	1

Note. Total number of children = 17

The majority of the children were not able to discuss the author's intention for using scale in a photograph. In fact, the most frequent response given by 35% of the children was "I don't know" (Response Category D). It is possible that their inability to discuss scale was a reflection of the difficulty of the task. Authorial intention questions required the children to take the perspective of the author—an author who wrote this book with a particular purpose. The question asked them to consider why the author used scale as a genre feature in an informational text. To do so, a child needed to have some level of understanding about the purpose of informational texts—inform readers about a particular subject. The children also needed to be able to consider why a magnified look at the object of interest would be particularly informative.

Twenty-nine percent of the children responded by naming either a semantically accurate or inaccurate feature in the photograph (Response Categories E and F). Some answers were directly linked to the photograph, such as “caterpillar” and others were less so, like “worm.” These children approached the question in much the same way as the previous questions about photographs. Their emergent way of approaching authorial intention was to name or attempt to name features in the photograph.

Twenty-nine percent of the children were able to demonstrate some ability to take an alternative perspective and provide responses related to the author. These children provided responses like “because he wanted to” (Response Category 3G). Although this type of response did address the perspective of the author, it did not relate to the author’s intention to use magnified scale illustrations in the text. Similarly, some of the children responded with a vague reference to increasing size (e.g., “to make big” in Response Category 3H).

Only one child came up with the most sophisticated response (Response Category 3I) to this question that required the child to refer to the author’s intention to enlarge the image to help the reader. This child’s response, “to help us see better,” took a metastance towards the text. By using the word “us,” we know the child understood there was a reader who would benefit or learn something from the use of this feature. She went further to add that the use of scale aided in the reader’s viewing of the text—to see the content in a way that would not be possible without the magnified perspective provided in the photograph.

Summary. Collectively, identifying when scale was being used in a photograph was easy for 76% of the children. However, the yes–no structure of the question limited the type of response that the children could potentially provide. This potentially suggests that the yes or no question was easy for the children but not that informative. However, because such a high percentage of the children answered yes, these findings are likely not simply a reflection of chance.

Even though the children gave a correct answer to the first question about the relative size of the object in the photograph (Question 3a), it did not mean that they could talk about scale in an accurate manner (Question 3b). When the children did provide a response to Question 3b, their responses were diverse. In Response Categories 3H and 3I, the children (n = 3) provided evidence that they understood how scale works. All of the rest of the responses (Response Categories 3D–3G) were not informative about understandings of scale. Rather, five of these responses (Response Categories 3E and 3F) named a semantically inaccurate or semantically accurate feature and three responses (Response Category 3G) considered the actor mentioned in the question (the author) but in a way that was totally uninformative about their knowledge of scale.

It is possible that the ease with which the children identified magnified images can be attributed to the nature of the photograph itself and its adjacent location to a photograph of actual-size caterpillar eggs. The magnified eggs are depicted quite large, almost the size of a kiwi. The children's emergent understandings may have presented themselves differently if the use of scale were more subtle. Also, the kiwi-sized eggs were located on the opposite page from a photograph of the actual-sized eggs (approximately the size of a pinhead). Some of the children may have made the connection between the relative sizes of the two images on opposite pages.

It seemed easy for the children to accurately identify when scale was being used when they were asked a yes–no question (Question 3a). But it proved much more challenging for the children to actually talk about how scale works (Question 3b). When the question attempted to elicit the children's conceptual understandings about scale use, 29% named features and 18% referred to the author in an uninformative manner. Only 18% actually provided a response that indicated they knew anything about scale use through magnified images.

Labels

Label lines and label names locate and identify features in photographs and drawings. When a label is added to identify part of an image, it becomes a diagram. Often, labels provide the reader with information that is not in the text. For example, a labeled caterpillar provides the reader with detailed information about the names of the body parts—information that the author may not have deemed necessary to include in the accompanying text. Therefore, the ability to understand labels and their use adds to a reader's comprehension of a text. With the label questions in the ITI I sought to understand the children's emergent ideas about labels, their function and an author's intent in their use.

Questions 4a, 4b, and 4c were all asked about the same diagram in the text. The diagram showed a photograph of a caterpillar that was in the process of shedding its skin. Half of the caterpillar had "new skin" and was labeled with a label line pointing to the bright, new skin. The other half had "old skin" and was labeled with a label line pointing to the dry, old skin.

Metalinguistic identification of labels. Question 4a asked the children to identify the label as a genre feature. In the interview, I pointed to the label line and the label words (in this case, *new skin*) and said, “Do you know what these words and lines are called?” Table 5 shows how the children’s responses were distributed across the grounded categories related to the children’s emergent abilities to identify labels in a metalinguistic manner. In this question, I coded the children’s responses only once and assigned them to the most sophisticated category indicated by that response.

Table 5

ITI Responses: Metalinguistic Identification of Labels

Question 4a Response	Number of Children
A. “I don’t know” indicated verbally or nonverbally	10
B. Response named attributes, characteristic events, actors or objects that were semantically inaccurate	1
C. Response named attributes, characteristic events, actors or objects that were semantically accurate	3
D. Response described the function of purpose of the labels (e.g., “showing people what to point at”) and response may have provided an alternative name for labels (e.g., “stem”)	3

Note. Total number of children = 17

The most frequent response to the label identification question was “I don’t know” and was given by 59% of the children (Response Category 4A). The children’s inability to identify a possible response perhaps indicated their unfamiliarity with the term. This term was not specifically taught in the classroom. In addition, as a technical term, it can be assumed the children may not have heard it with great frequency. In fact, none of the children produced the term *label* when asked to identify the feature.

Twenty four percent of the children responded (Response Categories 4B and 4C) by naming or attempting to name a particular feature in the photograph. Some responses were directly linked to the photograph, such as “new skin” and others were less so, like “the caterpillar turned blue.” These children approached this question by naming features or characteristic events with which they had familiarity. They did so either by visual recognition of an image on the page or by drawing on schema related to what it means to be a caterpillar.

In their emergent understandings of labels, 18% responded (Response Category 4D) to the function of the label. These children approached this question by talking about what the label did in the photograph (e.g., “Stem things that point to the caterpillar’s body”). Again, as in other ITI questions, the children attended to the content of the photograph as they read attributes and actors in the image.

Function of labels. Question 4b asked the children to respond to the function of a label. In the interview, I pointed to the label line locating “new skin” and said, “Why is this line here?” Table 6 shows how the children’s responses were distributed across the grounded categories related to the children’s understandings of the function of labels. In this question, I coded the children’s responses only once and assigned them to the most sophisticated category indicated by that response.

Table 6

ITI Responses: Function of Labels

Question 4b Response	Number of Children
E. "I don't know" indicated verbally or nonverbally	4
F. Response named attributes, characteristic events, actors or objects that were semantically accurate (e.g., "new skin" or "old skin")	2
G. Response provided an alternative function for the line (e.g., "it's holding it" or "to collect that")	4
H. Response provided a purpose for the use of the label (e.g., "so people know about it" or "to show you the parts")	2
I. Response named an attribute or actor in the photo like "new skin" but also made a connection between the label and the image in the photo (e.g., "showing new skin")	5

Note. Total number of children = 17

Although the children did not use the term *label* to identify the feature, they were able to successfully discuss how that feature might function in a text. In fact, the most frequent response given by 24% of the children was the most sophisticated response (Response Category 4I). With the most sophisticated response, the children named a semantically accurate actor or attribute and also verbally made a connection between the label and the image. The verb *show* demonstrated the child was aware the feature had an informative function in the text.

Thirty-five percent of the children seemed to be considering the function of the label but with less conventionality. Four of these children responded with a less conventional response, e.g. "to collect that" as the child pointed at the caterpillar (Response Category 4G). These children clearly saw the label as doing something in the text and they knew it had to be related to the caterpillar. The other two children in this grouping responded to the purpose of the labels as seen in Response Category 4H. All six of these children were addressing the presence of the label and how it might function, but in less conventional manners.

As with the other questions, 12% of the children also named semantically accurate features in the photograph (Response Category 4F). In this case, the children were cueing into what the label was identifying rather than how it was functioning in the text. Their responses were "new skin" which was an accurate reading of the label. Twenty-four percent of the children did not know how to respond to the question.

Authorial intention to use labels. Question 4c asked the children to respond to the author's intent to use a label. In the interview, I pointed to the label identifying the "new skin" and asked, "So, the person who made this book wrote, 'New skin' and put a line that points right to this [I pointed to skin on caterpillar]. Why would they do that?" Table 7 shows how the children's responses were distributed across the grounded categories related to emergent understandings of an author's intent to use labels. In this question, I coded the children's responses only once and assigned them to the most sophisticated category indicated by that response.

Table 7

ITI Responses: Author's Intent to Use Labels

Question 4c Response	Number of Children
J. "I don't know" indicated verbally or nonverbally	7
K. Response named attributes, characteristic events, actors or objects that were semantically accurate (e.g., "new skin")	2
L. Response discussed the visual features of the label (e.g., "a line go here and a line go here")	1
M. Response reflected the personal preference of the author (e.g., "because they want to do that")	2
N. Response indicated author's intent to inform the reader (e.g., "to show where skin is")	5

Note. Total number of children = 17

The most frequent response given by 41 % of the children was "I don't know" (Response Category 4J). Similarly to the other authorial intention questions, the children did not quite know how to respond to this question. Again, it is possible this was related to the difficult work required by a prekindergarten child to take on the perspective of an informational text author attempting to inform readers.

The next most frequent response given by 29% of the children was the most sophisticated one (Response Category 4N). With this response, a child indicated that the author's intent was to inform the reader. The children identified and located the label (e.g., *new skin*) and showed where it was located with respect to the content under discussion (e.g., *caterpillar*).

Twelve percent of the children proposed some alternative intentions of the author (Response Category 4M). These children were able to take on an alternative perspective but the perspective did not line up conventionally with an informational text author using labels. Some of these responses included, "because he want to do that" or "they trying to be silly."

Twelve percent of the children responded to the question by naming the features that they saw in a photograph (Response Category 4K). In this case, the children responded by naming "new skin" or "the caterpillar." With this naming approach, the children cued into the visual image and knowledge they have about caterpillars.

Summary. Viewed collectively, the label questions provide interesting insight to these children's emergent understandings of the feature. In Question 4a, none of the children were able to identify a label with the use of the term. Of the seven children who did respond with something other than "I don't know," four of them named a feature of the photograph and the other three provided an accurate function for the label. Arguably, the children's abilities to accurately discuss function and intent showed a more sophisticated comprehension of the feature, than their inability to identify the term *label* might imply.

The children responded to the three label questions in one of four ways. Forty-one percent of the responses were "I don't know" (Response Categories 4A, 4E, and 4J). Eighteen percent of the responses (Response Categories 4B, 4C, 4F, 4K and 4L) named a feature of the image. Twelve percent of the responses (Response Categories 4G and 4M) were clearly different from naming usually by providing an alternative function or purpose that was not informative about their knowledge of labels. Lastly, 29% of the responses (Response Categories 4D, 4H, 4I, and 4N) gave an informative function or purpose that clearly indicated the children's knowledge about labels.

The most sophisticated responses to the labels questions were seen in Response Categories 4D, 4H, 4I and 4N. I looked across the three questions for frequencies of the children providing one response in at least one of the four response categories. Interestingly enough, even though the children might not know the metalinguistic term *label*, 53% of the children provided at least one response in those four categories. In these responses, the children clearly gave evidence that they knew how labels worked.

When these prekindergarten children were asked to respond to labels in the text, they did so predominately through discussing how the label functioned in the text. This occurred regardless of the type of question being asked. These data suggest that the children's inability to name the term *label* need not impede their ability to successfully interpret and interact with the feature in a text. One hypothesis for why the function response was so frequent could be the visual nature of the label and its relationship to "pointing." The label line makes an obvious, visual connection between the part of the image and the label word. Arguably, this visual stimulus was accessible and appealing for these emergent readers.

Headings

Headings are a textual genre feature used in the organizational structure of most informational texts. The headings act as a way of categorizing the types of information or content that is present in the text. Headings also support the reading of a text topically. To fully comprehend a text, a reader should understand that if they read the word, "Leaves," at the top of the page, it means that page of text will likely contain images and text about the many different types of leaves and their identifying features. Headings require the children to think in terms of categorization of like concepts. With the ITI heading questions I sought to understand the children's emergent abilities to identify headings as a genre feature, to discuss the function of the heading in a text and the author's intent for using a heading on a page of text.

In the ITI, Questions 5a and 5b ask about the same page of text. The heading on the page stated, "How do caterpillars move?" (Hartley et al., 2006). There was text below the heading (which was not read to the children) that discussed how caterpillars move. On the same page, there was a photograph of a magnified green caterpillar with white spikes on its back. The caterpillar was hanging upside down from a small branch.

Metalinguistic identification of headings. Question 5a asked the children to identify the heading as a genre feature. In the interview, I pointed to the heading at the top of the page and asked, "Do you see these words here? They are bigger and darker than the rest of the words on the page. Do you know what that is called?" Table 8 shows how the children's responses were distributed across the grounded categories related to emergent abilities to identify headings. In this question, I coded the children's responses only once and assigned them to the most sophisticated category indicated by that response.

Table 8

ITI Responses: Metalinguistic Identification of Headings

Question 5a Response	Number of Children
A. "I don't know" indicated verbally or nonverbally	12
B. Response named semantically accurate attributes, characteristic events, actors or objects in the photograph (e.g., "pointy things")	4
C. Response named a textual feature by providing an alternative name for the heading (e.g., "illustrator")	1

Note. Total number of children = 17

Seventy-one percent of the children were not able to generate a response for this question (Response Category 5A). *Heading* and *label* are similar technical terms that many of these children were not likely to have used or heard with great frequency. In fact, the term *heading* was not produced by any of the children during the interviews.

Twenty-four percent of the children did respond by naming semantically accurate features in the photograph on that page of text (Response Category 5B). The photograph on that particular page was of a caterpillar with large, white spikes. Many of the children cued into the uniqueness of the caterpillar by naming "pointy things" or "white spikes." Even though the children were asked to respond to headings, they responded by reading the visual image and naming features they knew.

Function of headings. Question 5b asked the children to discuss the function of the heading as a genre feature. In the interview, I pointed to the heading at the top of the page and asked, "And if this heading says, 'How do caterpillars move?' What do you think these words [I pointed to text on page] and this photograph is about?" Table 9 shows how the children's responses were distributed across the grounded categories related to emergent understandings of the function of headings. In this question, I coded the children's responses only once and assigned them to the most sophisticated category indicated by that response.

Table 9 *ITI Responses: Function of Headings*

Question 5b Response	Number of Children
D. "I don't know" indicated verbally or nonverbally	6
E. Response named semantically inaccurate attributes, characteristic events, actors or objects (e.g., "Venus flytrap")	2
F. Response included semantically accurate attributes, actors or objects associated with caterpillars but not specifically with how caterpillars move (e.g., "caterpillar, pokey caterpillar")	3
G. Response included attributes of how caterpillars move (e.g., "crawling, climbing on rocks")	4
H. Response included some variation of the phrase "How caterpillars move"	2

Note. Number of children = 17

The modal response for this question was "I don't know," and was given by 35% of the children (Response Category 5D). As the children had a difficult time identifying a heading, they similarly struggled with discussing its function. This question was particularly difficult as it required the children to discuss function of headings by interpreting an existing one. First, the children had to understand that headings mark the type of information that will follow on a page. Then, they applied that understanding based to the given heading about caterpillar movements.

The next most frequent type of response, given by 29% of the children, was an attempt to name an actor, attribute, or physical characteristic (Response Categories 5E and 5F). Three of these children named features that were more related to the subject under investigation such as "caterpillar" or "insect." Whereas, the other two children cued into objects that were not in the text such as "crickets."

Twenty-four percent of the children approached this question by naming the various ways a caterpillar moved (Response Category 5G). For example, one child offered "crawling" and another "climbing." These children were cueing into the topic under discussion, caterpillar movement, but were not doing so in a categorical way. Rather, they were listing the characteristic ways that they knew caterpillars to move. This is the type of information a reader would expect to find in the body of the text, rather than in the heading.

Twelve percent of the children provided the most sophisticated response which included a variation of the heading that was listed on the page, "How caterpillars move" (Response Category 5H). In these cases, both of these children took a distanced stance to the text and were able to use more metalanguage and categorical language. "How" being the operative word that indicated a child's use of metalanguage.

Author's intent to use headings. Question 5c asked the children to discuss the author's intent to use headings. In the interview, I asked, "So, here this [I pointed to text] says, "Caterpillars are found in fields, woods, parks and gardens." And this says, "Caterpillars live on the leaves of the plants that they eat." I covered up a heading and asked, "What would the author put up here?" Table 10 shows how the children's emergent responses were distributed across the grounded categories related to emergent understandings of an author's intent to use headings as a genre feature. In this question, I coded the children's responses only once and assigned them to the most sophisticated category indicated by that response.

Table 10

ITI Responses: Author's Intent to Use Headings

Question 5c Response	Number of Children
I. "I don't know" indicated verbally or nonverbally	4
J. Response named semantically inaccurate attributes, characteristic events, actors or objects	2
K. Response named semantically accurate attributes, characteristic events, actors or objects (e.g., "caterpillar, head")	9
L. Response indicated text needed (e.g., "a word")	1
M. Response provided a characteristic event about where caterpillars live (e.g., " caterpillars live on leaves")	1

Note. Total number of children = 17

The most frequent response for this question, provided by 53% of the children, was to name an actor, object, attribute, or characteristic event that might be semantically appropriate for this particular text (Response Category 5K). The children who responded in this nature gave responses such as "they eat leaves" or "the caterpillar and the leaves." The two different photographs on the side-by-side pages do, indeed, show close-up images of smaller caterpillars on large, green leaves.

Only 6% of the children responded by naming a particular place that a caterpillar may live, "caterpillars live on leaves" (Response Category 5M). This child was cueing into her schema for caterpillar habitats, but did not respond in a categorical way. Rather, she listed a particular location known to her, which she likely got from this text. Again, this is the type of information a reader would expect to find in the body of the text, rather than in the heading.

As with other authorial intent questions, the children had a difficult time responding in a truly conventional manner as it required a shift in perspective. In fact, no child was able to come up with the most conventional response which would have provided a heading-like, general statement such as “Where caterpillars live.” In order to respond to this conventionally, the children had to understand how headings functioned and then determined an appropriate heading for this particular page of text.

Summary. The questions about headings proved to be quite challenging for the children. Forty-three percent of the heading responses given by the children were to name a feature (Response Categories 5B, 5C, 5E, 5F, 5J, 5K, and 5L), 43% of the responses were “I don’t know” (Response Categories 5A, 5A, 5D, and 5I), 14% of the responses provided an accurate function for a heading (Response Categories 5G, 5H, and 5M).

The most sophisticated responses to the headings questions were seen in Response Categories 5G, 5H and 5M). I looked across the three questions for frequencies of the children providing at least one response in each of those three response categories. Seven of the children provided at least one response (Response Categories 5G, 5H and 5M) in those three categories that indicated they understood how a heading functions. With this response, the children provided evidence, through applying how the heading functioned in this particular text, that they at least implicitly understood how a heading worked. Conversely, seven of the 17 children responded with “I don’t know” on at least two of the three questions.

The children approached the headings questions by cueing into what they knew to be true in the visual image. They focused on the specifics of the information presented on the page. In their emergent responses, the children named features. To conventionally respond to the function of headings, a child had to process the visual and textual images on the page and assign it a supraorganizational category. The majority of the children did not appear to consistently engage in this multistep process.

Overall, the majority of the children in this prekindergarten classroom did not provide informative responses as to their understandings of headings. Only seven of the children provided at least one response that indicated any evidence at all that they knew how a heading functioned. The children were not able to produce the term *heading* and most could not respond to how the heading functioned. Rather, when they did respond, the majority reverted to naming visual or textual features.

These data might show that headings proved difficult for the children. Unlike with other questions on the ITI, fewer children offered emergent responses (such as naming a semantically inaccurate or accurate feature) to the questions. The frequent "I don't know" response did not provide much insight into the emergent or conventional ways the children approach headings.

Cross-Section Diagrams

The cross-section diagram is another feature of the informational text genre. With this diagram, the illustrator shows portions of an image, as if sliced in half. A cross-section diagram, like all diagrams, highlights significant features of images. In particular, this diagram makes details visible to the human eye that normally could not be seen. A reader who is able to read these diagrams experiences the text at a deeper level of comprehension. With the cross-section diagram questions I sought to understand the children's emergent abilities to read cross-section diagrams, respond to their function, and consider the author's intent for use.

Questions 6a, 6b, and 6c all concerned the same diagram in the text. The diagram showed a caterpillar surrounded by dirt hiding under the ground. A section of a diagram was shown as if a plane moved transversely at a right angle to the image. The diagram showed grass to reinforce that the caterpillar, indeed, was under the ground.

Reading a cross-section diagram. Question 6a asked the children to read a cross-section diagram. In the interview, I asked, "This says, 'Some caterpillars spin cocoons around themselves before turning into a pupa. Some hide under the ground.' What does this photograph show [pointing to the photo]?" Table 11 shows how the children's responses were distributed across the grounded categories related to emergent abilities to read cross-section diagrams. In this question, I coded the child's response only once and assigned it to the most sophisticated category indicated by that response.

Table 11

ITI Responses: Reading a Cross-Section Diagram

Question 6a Response	Number of Children
A. "I don't know" indicated verbally or nonverbally	2
B. Response named semantically inaccurate attributes, characteristic events, actors or objects	3
C. Response named a characteristic events and/or actor that may have been semantically related to the diagram but not accurate (e.g., "a snake hiding under the ground")	4
D. Response named a semantically accurate attribute, object or actor in the diagram (e.g., "a caterpillar" or "dirt")	5
E. Response named the semantically accurate actor and event matching the diagram in the text (e.g., "A caterpillar hiding under the ground")	3

Note. Total number of children = 17

In this question, the children were again asked to read an already existing photograph. The most frequent response, given by 29% of the children, was to name a semantically accurate actor or attribute in the diagram (Response Category 6D). The children who responded in this manner provided mostly one-word responses (e.g., "caterpillar" or "dirt").

There was also a group, 41% of the children, who attempted to provide a name, attribute, or characteristic event that was semantically appropriate but not accurate for the diagram (Response Categories 6B and 6C). These children provided responses that were either cued by the photograph, "a snake hiding under the ground," or from their schema, "caterpillars turn into butterflies."

Eighteen percent of the children gave the most sophisticated response, which named the caterpillar and where it was located (Response Category E). Significantly, these children gave responses that were couched in a phrase, “a caterpillar hiding under the ground.” They used more connected prose when describing what the diagram showed.

Identification of cross-section diagrams. In Question 6b, the children were asked to identify the use of a cross-section diagram. In the interview, I asked, “If you were walking outside, would you be able to see this caterpillar?” Table 12 shows how the children’s responses were distributed across the grounded categories related to emergent understandings of the use of cross-section diagrams. In this question, I coded the children’s responses only once and assigned them to the most sophisticated category indicated by that response.

Table 12

ITI Responses: Identifying a Cross-Section Diagram

Question 6b Response	Number of Children
F. “Yes” indicated verbally or nonverbally	6
G. “No” indicated verbally or nonverbally	11

Note. Total number of children = 17

In Question 6b, the children were asked to identify a cross-section diagram in use. Sixty-five percent of the children were able to recognize the caterpillar was underground (Response Category 6G). In doing do, they realized the cross-section diagram showed an alternative perspective.

In their emergent understandings of cross-section diagrams, 35% of the children responded that a person would, indeed, see the caterpillar when out walking (Response

Category 6F). In these cases, a couple of the children gave more than a simple one-word response. For example, one child responded with, “Yes. He’s right here” as she pointed to the caterpillar in the photograph. This particular child approached the question in a more concrete manner, cueing into the visual image but not into the unique perspective that could be potentially offered through the diagram.

Author’s intent to use a cross-section diagram. Question 6c asked the children to consider the author’s intention to use a cross-section diagram. In the interview, I asked, “Why would the person who made this book show the caterpillar this way?” Table 13 shows how the children’s responses were distributed across the grounded categories related to emergent understandings of an author’s intent to use a cross-section diagram. In this question, I coded the children’s responses only once and assigned them to the most sophisticated category indicated by that response.

Table 13

ITI Responses: Author's Intent to Use a Cross-Section Diagram

Question 6c Response	Number of Children
H. "I don't know" indicated verbally or nonverbally	6
I. Response named a semantically inaccurate feature (e.g., "the author")	1
J. Response named semantically accurate attributes, characteristic events, actors or objects	3
K. Response reflected the personal preference of the author (e.g., "because they're being silly")	2
L. Response indicated a general understanding of the author trying to convey information with images (e.g., "'cause they wanted to show everyone this")	2
M. Response informed or showed where caterpillars could be found (e.g., "Because caterpillars are supposed to be underground")	2
N. Response indicated the need for the author to show the caterpillar in this manner because the cross-section diagram allowed us access to something we would not normally see.	1

Note. Total number of children = 17

The children's emergent understandings of authorial intent to use cross-section diagrams were largely unconventional. In fact, the most frequent response, given by 35% of the children, was "I don't know" (Response Category 6H). The next most frequent response, given by 24% of the children, was to name features (Response Categories 6I and 6J).

The rest of the responses varied in conventionality across a rather large scale. However, all of the children made some attempt to address the purpose of informing. In fact, five of the seven responses actually cued into the function of informing or showing the reader something (Response Categories 6L, 6M and 6N). For example, one child responded with, "Cause they want to show everyone this." Another child provided the most sophisticated response, which used metalanguage linking the author with the intent to inform, "He want to show the caterpillar underground" (Response Category 6N).

Summary. Collectively, when responding to cross-section diagrams, 65% of the children were able to discern that the diagram was showing details that were not normally visible to the human eye (Response Category 6G). However, even though 35% of the children did not respond to the unique view afforded by the use of the feature (Response Category 6F), they were still able to read the image in Question 6a to provide a feature of the photograph. This implies that the children's inabilities to talk about the use of cross-section did not detract from their ability to glean pertinent information from the image.

I looked across the three cross-section diagram questions for frequencies of the children providing at least one response that indicated they understood cross-section diagrams (Response Categories 6D, 6E, 6G, 6L, 6M, and 6N). Sixty-five percent of the children provided at least one response in those six categories that provided evidence of their understandings of cross-section diagrams.

In Question 6a, of the 15 children who provided a feature for the image, 47% provided a semantically accurate feature in the photograph (Response Categories 6D and 6E). The other 53% either gave a semantically related but not accurate feature (Response Category 6C), or a semantically inaccurate feature (Category Response 6B) such as a "worm" or a "bug eating mud." These responses were surprising because by this point in the assessment the children had numerous exposures to the term *caterpillar* though reading the text, the other images, and the other questions. I believe this semantic ambiguity could be related to the nature of the image. In this particular image, the caterpillar was markedly different than in other images. It had distinct markings on its back and was brown. All of the other caterpillars were bright colors (such as blue, green, and yellow). This uncharacteristic looking caterpillar might not have a place in their existing schema.

That being said, the children who responded with a semantically ambiguous or inaccurate feature for the cross-section diagram may not have been able to remove themselves from the immediacy of the image to make a broader connection to the topic of the text, caterpillars. Rather, their responses may suggest that the image dominated their reading so that they were not able to cross-check their visual readings with the conceptual information already presented in the course of the interview. Another possible hypothesis might be that the children's background knowledge about caterpillars played a role in their ability to provide consistently accurate responses to images and text.

Surface Diagrams

Surface diagrams are typically composed of an image, either a photograph or an illustration, and labels identifying key features of that image. A surface diagram shows the exterior or surface of an image. Similar to other diagrams, surface diagrams point out features in a way that highlights what is important to know. In addition, diagrams may provide information not present in the text. With the surface diagram questions I sought to understand the children's emergent abilities to read a surface diagram, to consider how the diagram functions, and to respond to the author's intent for using such a diagram.

Questions 7a, 7b, and 7c all concerned the same page in the text. The page consisted of a surface diagram of a caterpillar with labels identifying various body parts. I covered the label that identified the head.

Reading a surface diagram. In Question 7a, the children were asked to read a surface diagram and name the features. In the interview, I asked, "This is a surface diagram of a caterpillar. Is there anything we can learn from looking at this" as I pointed to caterpillar diagram. Table 14 shows how the children's responses were distributed across the grounded categories related to emergent abilities to read surface diagrams. In this question, I coded the children's responses only once and assigned them to the most sophisticated category indicated by that response.

Table 14

ITI Responses: Reading Surface Diagrams

Question 7a Response	Number of Children
A. Response declined any new information could be learned	2
B. “I don’t know” indicated verbally or nonverbally	2
C. Response named semantically accurate attributes, characteristic events, actors or objects.	2
D. Response described the diagram but in a way that was not related to the content (e.g., naming of letters on the page.)	1
E. Response gave characteristic events of caterpillars or physical attributes (e.g., “we can learn about how caterpillars move”)	8
F. Response gave a physical attribute of the caterpillar naming-naming the possible body parts (e.g., “feet, tail”)	2

Note. Number of children = 17

In reading the diagram, I again asked the children to interpret an image and name features in a photograph. In the most frequent response, 47% of the children named a characteristic event, attribute, or actor associated with caterpillars (Response Category 7E). With these responses, the children were accessing their schema for caterpillars and providing a list of the types of things one could potentially learn about caterpillars. However, these lists were not specific to the surface diagram that was under investigation.

Twelve percent of the children were able to name actual attributes of the caterpillar in the photograph which was the most sophisticated response (Response Category 7F). Naming the parts of the caterpillar’s body was a more specific response than simply naming features about caterpillars. In this case, the children had to read the diagram in a detailed way in order to know what the individual label lines were locating and identifying.

A group, 24% of the children, were either unable to provide a response (n = 2) or declined that any new information could be learned from this diagram (n = 2). If children told me that nothing new could be learned from the diagram, perhaps this was information that they already knew. It was also true that the children might not have been familiar with a prompt that asked them to consider what they could "learn" from an image.

Function of a surface diagram. In Question 7b, the children were asked to consider how the surface diagram on this page functioned. In the interview, I said, "This says, 'eyes'" and pointed to the word *eyes*. "This says, 'breathing holes'" and pointed to the word *breathing holes*. "This says, 'back legs with suckers'" and pointed to the words *back legs with suckers*. "Front legs with claws" and "jaws" and pointed to the words *front legs with claws* and *jaws*. Then I asked, "What do you think this one says?" as I point to the covered label *head*. Table 15 shows how the children's emergent responses were distributed across the grounded categories related to emergent understandings of the function of surface diagrams. In this question, I coded the children's responses only once and assigned them to the most sophisticated category indicated by that response.

Table 15

ITI Responses: Function of Surface Diagrams

Question 7b Response	Number of Children
G. "I don't know" indicated verbally or nonverbally	6
H. Response was not semantically accurate (e.g., "the title page")	3
I. Response named semantically accurate attributes, characteristic events, actors or objects	1
J. Response gave a physical attribute or characteristic event of caterpillars	3
K. Response was the actor in the diagram	1
L. Response was the accurate physical attribute of the caterpillar or an acceptable alternative (e.g., "head," "front," or "back")	3

Note. Total number of children = 17

In this case, the most frequent response, given by 35% of the children, was "I don't know" (Response Category 7G). In part, I believe the children's nonresponse to this particular question could be because they interpreted the task as one requiring them to read the printed text. Although I did not ask them to read or attempt to read the covered label, many positioned their head and body as if they were trying to do so. After, they would respond, "I don't know." As the children realized they could not technically decode the print, they did not provide a response for the question.

Another type of response provided by 29% of the children was to provide actors, objects, attributes or characteristic events associated with *caterpillar* (Response Categories 7I, 7J, and 7K). These children cued into their understandings about what caterpillars did and what they looked like in order to name a feature. For example, a child responded with "caterpillars crawl." He did not appear to cue into the diagram itself or how labels functioned in a diagram when he gave his response.

Eighteen percent of the children provided the most sophisticated response, which was to name an appropriate or approximately correct attribute for the covered label (Response Category 7L). In doing so, the children implicitly demonstrated their understanding of how a diagram functions. They knew that this diagram labeled particular features and that the features being named were caterpillar body parts. In addition, they applied this understanding and responded with an appropriate term for the label.

Author's intent to use a surface diagram. In Question 7c, the children were asked to consider the author's intent to use a surface diagram. In the interview, I asked, "Why would the person who made this book put a picture of a caterpillar with all of these words and lines on it?" Table 16 shows how the children's responses were distributed across the grounded categories related to emergent understandings of author's intent to use surface diagrams. In this question, I coded the children's responses only once and assigned them to the most sophisticated category indicated by that response.

Table 16

ITI Responses: Author's Intent to Use Surface Diagrams

Question 7c Response	Number of Children
M. "I don't know" indicated verbally or nonverbally	7
N. Response listed semantically accurate physical attributes or characteristic events associated with the caterpillar (e.g., "front legs")	1
O. Response provides a function for the diagram that is not related to function of diagram (e.g., "to hold him up")	1
P. Response reflected the personal preference of the author (e.g., "because they are being silly")	4
Q. Response indicated a general understanding of the author trying to inform (e.g., "Because he drawed the picture like that")	1
R. Response indicated author's intent to teach about characteristic events or attributes associated with caterpillars	2
S. Response indicated author's intent to teach parts of the caterpillar body	1

Note. Total number of children = 17

The most frequent response, given by 41% of the children, was "I don't know" (Response Category 7M). However, as in the cross-section diagram question, a large group, 47% of the children, provided a type of response that indicated they attempted to take on the perspective of the author (Response Categories 7P, 7Q, 7R, and 7S). In their discussion of the author's intent, some of the children gave less conventional reasons such as"Because they're so silly." One child indicated a general understanding that the author was trying to demonstrate something (e.g., "Because he drawed the picture like that").

Three of the children specifically responded to the intent of the author to teach about caterpillars (Response Categories 7R and 7S). Two of those did so by naming features of caterpillars that were not directly evident in the diagram. One child responded with the most sophisticated response, which was to indicate that the author specifically wanted to teach about the body parts of caterpillars.

Summary. Collectively, the surface diagram questions indicated that many of the children could discuss the general content of a diagram in a semantically related or appropriate manner but had little sense of the work of the labels in the diagram or why an image would be labeled. Nearly half, 47%, of the children, could produce appropriate information about the content of the diagram that would inform a reader as seen in (Response Category 7E). However, only 12% of the children provided evidence that they knew how surface diagrams worked (Response Category 7F). These were the children who accurately read the diagram and provided semantically appropriate names for features of the caterpillar body in this particular diagram.

When asked to read a particular label in Question 7c, the children responded in a range of ways. Only 18% of the children (Response Category L) were able to provide a specific, potentially accurate label for the diagram. Another 29% of the children could respond to the global nature of the content, though they did not specifically tune into what work the label did (Response Categories 7I, 7J, and 7K). In fact, 41% of the children responded with “I don’t know.” This finding complicates the earlier findings in the labels section as many of the children provided accurate functions for labels in those particular questions.

One hypothesis for the children’s difficulties with Question 7c was the way the task was positioned to them. Even though I asked the children to consider what a particular covered label might say, many of them interpreted it as a reading task. Therefore, those who responded with "I don't know" could have been responding to their inability to decode the label word. In a similar fashion as the covered photograph in Question 2, the children had a more difficult time composing a label for a potential label than reading one that already existed (see Question 4c).

I looked across the two surface diagram questions that specifically asked the children to provide evidence of how surface diagrams work (Questions 7a and 7c). I checked for frequencies of the children providing at least one response that indicated they understood surface diagrams (Response Categories 7F, 7R, and 7S). Twenty-four percent of the children provided at least one response in those three categories that provided evidence of their understandings of cross-section diagrams.

Genre Feature Understandings: Cross-Feature Patterns

These findings show that prekindergarten children demonstrate emergent understandings about genre features. Of course, as with the research that examines older children's understandings of informational texts (Fingeret, 2008; Maduram, 2000; Moss, 1997; Pappas, 1993; Smolkin & Donovan, 2001; Williams et al., 2005), children have different levels of engagement with these texts and their textual features. In six of the seven genre features in ITI, I specifically asked the children to respond to metalinguistic identification of the feature, function and intent of the author to use the feature. The following discussion is a cross-feature analysis in which I describe the patterns in the children's responses to the three different types of questions. My discussion focuses on the three dimensions of each genre feature, metalinguistic identification, function and authorial intention, particularly highlighting the range in the children's responses to illustrate the patterns.

These data show three patterns of genre knowledge. First, the children tuned into the visual photographs on the page. These images were stimuli for the naming of actors, attributes or characteristic events. Second, some of the children were able to respond to how the genre features functioned in a text. Lastly, a select group of the children were able to take a metastance towards the text that allowed them to discuss the author's intent to use a genre feature.

Naming

A common way that the children engaged with the genre features, regardless of the way questions were asked, was by naming actors, attributes or characteristic events for the text. When providing a naming response on the ITI, a child would provide either a semantically inaccurate, semantically related but not accurate, or semantically accurate feature of an image or the text. In this case, the children named attributes, actors, and characteristic events associated with caterpillars.

First, by naming, the children were demonstrating that genre features, such as photographs and diagrams, are sources of information. Second, by naming and describing features in images, they demonstrated the ways in which they connected to the content in the text. The children did each of these with varying levels of sophistication and accuracy.

Sources of information. By interacting with the text through naming, the children demonstrated that the text is a source of information. As shown in the data, most of the children were able to successfully name actors, features, and characteristic events that would semantically fit within the parameters of the text. For example, in Questions 1 and 2 about photographs, 82% of the children named at least one semantically accurate feature for the photograph or potential photograph. The photographs and other images played an important role and provided stimuli for the children's responses. The children tended to use the visual image to name various known features in the photograph when giving their response. For example, in the reading of a photograph in Question 2, I said, "What does this photograph show?" and Leaun replied, "Umm. Leaves and that" as she pointed to the eggs in the photo (Transcript, February 9). Leaun successfully named an object in the photograph as the image did show a moth laying eggs on a large, green leaf. Leaun was not able to produce the correct name for eggs. Although, by pointing and identifying "that" she let us know she was aware of the significance of "that" object. Later in the conversation, she guessed the eggs were "beads." Leaun did not make a semantically accurate identification of the eggs, but by her actions she did demonstrate that the photograph should be read as an important source of information.

Similarly, another child demonstrated how naming described information located in the text. Sabria said, "You can learn about seeing if you can see this" as she pointed to the silk worm moth in the photo (Transcript, February 9). Sabria made known her understanding of photographs as providers of information. First, she took a distanced stance from the photograph when she used metalanguage by indicating, "You can learn about seeing." Second, she pointed to the object that could be "seen" in the photo, thereby highlighting its importance. I argue that she actually meant "know" when she pointed to the silkworm. In other words, a person could know about the silkworm by looking closely at the image. In this case, she did not identify the actor in the photo, but signified there was the potential to learn from it.

The children also used the photograph as a stimulus to name the features they were knowledgeable of. At the same time, they made evident their emergent knowledge of content vocabulary related to caterpillars. For example, consider Jaleah's responses to my question about the silkworm moth:

> Jaleah: It's a different caterpillar.
> Tanya: This one [I pointed to moth in photo]?
> Jaleah: [She nodded her head yes.]
> Tanya: Does it show anything else?
> Jaleah: It's like, um, a little, it got wings [She flapped her arms in the air].
> Tanya: What has wings?
> Jaleah: [She pointed to picture of moth.]
> Tanya: What is that?
> Jaleah: Um, I don't know what that is. (Transcript, February 8)

Jaleah first tried to name the moth by calling it "a different caterpillar." When I asked her for an additional response, she looked closer at the image to see if there was any part of the creature she could identify properly. She told me that "it" had "wings." Later, when I pressed her to reidentify "it," she admitted, "I don't know what it is." However, Jaleah did know that "it" had wings. She named those features she could properly identify as she processed the photo for information.

Even though all the children provided semantically accurate features at some point in the interview, at times the children provided responses that were not accurate names for features in the image. For example in Question 2, Andre and DeCosta were asked to read the image of the silkworm moth laying eggs and they responded with "a bird" and "a bumblebee." Arguably, even though Andre and DeCosta missed the mark with their reading of the photograph, they did cue into the visual image. The silkworm moth has a body structure that is visually reminiscent of both bumblebees and birds. Both boys read the image but did not connect their reading of the image to the text. Arguably, if they had, then they might have self-corrected their response as neither were related to the global content of the text, caterpillars*,* or to the text that they had just been read.

Connection to content. The children's naming of actors, attributes, or characteristic events also demonstrated a way of connecting with the content of the text. Often this connection to content was most evident when the children made references to features that were not present in the photograph but were pulled from their schema about caterpillars. This was evident on the most basic of levels and in more sophisticated ways.

As naming was related to the children's connection to content, it appeared that the children's existing content knowledge was related to how they responded to questions. At times, the children's naming of features demonstrated their emergent content knowledge about caterpillars. For example, in the following transcript I asked Anaih to describe the photograph of the silkworm moth.

> Tanya: It shows the eggs? Whose eggs?
> Anaih: The mama's eggs.
> Tanya: The mama's eggs? Who-what mama?
> Anaih: The caterpillar.
> Tanya: Ah, ok. The caterpillar's eggs. Anything else?
> Anaih: The lellow egg, it hatch when the mama comes. (Transcript, February 7)

As Anaih named the features, she personified the actors and objects in the photograph. She called the caterpillar a "mama" and told us the eggs "hatch when the mama comes." I argue that she was associating her knowledge of caterpillars and eggs with her schema for animal birth. Anaih painted a picture of a doting mother caterpillar returning to the egg just in time to see it "hatch." Although this was not an entirely accurate characteristic event associated with caterpillars, she demonstrated that by naming she was connecting to the subject of the text.

By naming, the children also connected to the features in the photograph for which they did have well-developed content knowledge. For example, I asked, "What does this photograph show?" Samaya replied, "It looks like a butterfly 'cause it has wings." I followed up, "What looks like a butterfly?" and she pointed to the picture of the moth (Transcript, February 7).

Samaya did not know the exact name of the actor in this photograph. However, by her naming of the attribute "wings," she typed the actor into the butterfly category. She connected to the attribute of the insect that she could name in order to interpret an unknown actor.

Significantly, some of the children did not connect with the content of the images as did Samaya and Anaih. Rather, when reading an image they provided a semantically related feature or a feature that was not in the image. Some of the children did this even though they were told numerous times and in numerous ways that the book was about caterpillars. For example, in Question 1 I asked the children to compose a possible subject of a photograph for a page in the ITI. Many of the children responded with the general term *bug*. Similarly, when I asked them to tell me what the cross-section diagram showed in Question 6, some of the children responded with "a snake" or "a worm." Although these responses were not accurate, the children were drawing on their schema for "being a caterpillar." In this schema, caterpillars are bugs that have shapes similar to snakes and worms.

However, the fact that there were emergent responses to the naming of features in the photographs implies that this is a process wherein some of the children are still in earlier stages of development. This research suggests some potential hypotheses for what factors should be considered when analyzing the children's reading of images in informational texts. First, the children who did not provide accurate features for images might not have the depth of content or background knowledge to facilitate their responses to the question. For example, the silkworm is a rather unusual looking moth with white fur. If the children had little exposure to moths or the features of moths, this image might have been confusing for them.

Second, those children who did not provide accurate features also failed to cross-check their reading of the image with the content that they had been exposed to by the reading the text.

This implies that their understanding of the necessary relationship between text and images in informational texts was in an early stage of development. These children could often not overcome the visual pull of the image, such as the caterpillar they called a "snake" in the cross-section diagram question, to consider how their response fit with the rest of the information presented in the text.

Function

When asked to discuss labels, headings, scale, and diagrams, some of the children were able to consider that the features themselves had a specific function in the text. By discussing function, a child discussed the work that was done by the feature. This was particularly evident in the children's responses to labels. One way that the children discussed the generic function of features was to tell how the feature worked or what it did. This ability was most apparent with the label questions. Consider this segment from DeCosta's interview. I asked, "What is this line here for?" as I pointed to the label line identifying the new skin. DeCosta replied, "So they know where to put it" (Transcript, February 8). DeCosta interacted with this text differently than a child who simply responded by naming "caterpillar." In his response, he demonstrated that he knew how the lines generally functioned. Their function was to show where something was located.

In looking across all three label questions, 76% of the children responded to the function of the feature with at least one of their responses. At times, the children more specifically responded to how a specific feature functioned in relation to a particular text or image. With some responses, a child provided a response about the generic functioning of a genre feature.

Of those who responded to function of labels, 31% responded with an inaccurate or generic function of labels. For example, Leaun responded to the function of a label in the following transcript.

> Tanya: Why is this line here [I pointed to the label line]? What is it doing?
> Leaun: So, he hold it.
> Tanya: What do you mean he's holding it? Who's holding it?
> Leaun: The line.
> Tanya: Holding what?
> Leaun: Umm, this [She pointed to caterpillar in the diagram]. (Transcript, February 9)

Leaun was clearly discussing how the "line" functioned in the diagram. In her emergent understanding, she considered the line a visual support that "holds up" the image of the caterpillar.

Some of the children responded more specifically to function and related the genre feature to a particular text or image. Of those who responded to function of labels, 69% provided at least one response that accurately discussed the function of labels within this particular text. Typically, this was done through identifying what the feature named when discussing labels. The following transcript illustrates a more specific response to the function of genre features: I said, "And this label says, 'New skin' and this label says, 'Old skin.' What is this line doing?" and the child replied, "It's pointing to the new skin" while pointing to the new skin on the caterpillar (Transcript, February 8). In this instance, Jaleah responded to the function of the line by stating, "It's pointing." The line pointed to or located a particular feature in the image. Then, she showed the depth of her understanding about function when she identified "new skin." She clearly identified both components of the label—the label word and the label line.

Carlos responded similarly to Jaleah when discussing the function of labels. I said, "Why would they make a label that says 'new skin' and a line pointing to right here on this photograph?" Carlos replied, "To show where the skin is" (Transcript, February 7). By using the word *show*, Carlos was demonstrating the intent of the author to inform. He was able to distance himself from the immediacy of the photograph and did not simply name "skin." Rather, he added some contextualizing language, the infinitive "to show," and demonstrated his comprehension of the text on a metalevel.

The analysis of the children's emergent responses to labels suggests two particularly interesting and significant findings. First, for many of the children, their ability to accurately discuss the function of the feature was not determined by their ability to produce the metalinguistic term for the genre feature. For example, Makayla told me she "didn't know" what a label was. However, when I asked her Question 4b about the function of the label she responded, "That means he getting old" as she pointed along the label line to old skin in the image, "and that means he getting new" as she pointed along label line to new skin in image.

Second, the children may have an easier time reading known labels than composing their own. As previously mentioned, in Questions 4a, 4b, and 4c many of the children could provide accurate functions for labels. However, this was not the case in the surface diagram question (Question 7b), which asked the children to compose a possible and likely label for a feature in the diagram. This suggests that the children might need the visual stimulus of the label word and the label line to help in their accurate reading of a label in a text. Also, producing a possible term rather than naming an existing one might be conceptually more sophisticated for the children.

Authorial Intent

Few of the children were able to conventionally discuss the author's intent to use genre features. Looking across the five questions that I used to determine the intent of the author (Questions 3b, 4c, 5c, 6c, and 7c), I determined how many of the children provided a response that indicated they had an understanding of authorial intent to use a genre feature. Fifty-three percent of the children were able to provide at least one response that indicated some knowledge of authorial intent. These children were able to distance themselves from the immediacy of the text and take on the author's intent to inform. The children had to make some difficult moves to respond to authorial intent. Upon doing so, it required them to shift to the author's perspective.

To inform. As previously noted, at least half of the children were able at one point to provide a response that addressed the author's intentions to inform. For example, in Question 8c about surface diagrams, I had asked Fayth, "Why would the author put all of these lines and words around this photograph of a caterpillar?" and she responded, "So that you know the parts" (Transcript, February 9). In order to give this response, Fayth interacted with the text on three different levels. First, she read the image and mentally named the features in the image. Second, she considered how the diagram functioned by naming the parts. Third, she took a metastance when she transferred her understanding of features and function to the perspective of the author and the intent to let people "know" about caterpillar body parts. Significantly, Fayth used the categorical term *parts* rather than naming individual features of the caterpillar body, which was the more typical response. As such, she demonstrated she knew there was a cumulative function of this diagram. Although the author showed and labeled discreet parts of the caterpillar body, his true intent was to show a caterpillar body in its entirety.

Purpose of features. In some cases, the children were able to respond to the specific purpose of a genre feature in the text. They did so with varying levels of conventionality. Some of the children responded with the understanding that there was some "other" who had made this book. However, the intent of the "other" had little to do with informing the reader.

> Tanya: So, why would the person who made this book, why would they put a picture like this [pointing to diagram] in here?
> Makayla: I don't know, 'cause they want it in there.
> Tanya: You don't know?
> Makayla: I said, "'Cause they want it in there." (Transcript, February 7)

Although Makayla's response did not in any way allude to the intent of informing, she did provide a purpose for the diagram. She did not name an attribute or actor, which was what many of the other children had done. Makayla acknowledged there was an author, "they," who created the text with some reason for using the feature. She did not, however, attest to what that true intent might have been.

Some of the children were able to respond, albeit in a limited way, to the intent of using the diagrams in the informational text. In general, their responses implied that the intent of the diagram was to be a source of information for people to look at and read. Jaleah responded to the intent of the author when I asked, "Why would the person who made this book, why would they put this picture here do you think?" with "So, people can look at it" (Transcript, February 8). In Jaleah's estimation, the diagram was in the text as an object for visual inspection. Significantly, Jaleah understood that the text was created for readers, like her, who would read these very diagrams to access information.

In yet another question, Anaih responded to the intent of the author when using the surface diagram.

> Tanya: Why would the person who made this book, why would they put in a picture like this with all of these lines and words do you think?
> Anaih: 'Cause, so we can learn.

Tanya: So, we can learn about what?
Anaih: The caterpillar.
Tanya: What about caterpillars?
Anaih: We can learn caterpillars move and turn into butterflies. (Transcript, February 7)

In her response, Anaih demonstrated that the surface diagram's purpose was to educate readers about concepts. In this case, she accurately assessed that the purpose of this diagram was to inform readers about caterpillars. However, when further pressed for more detail, she relied on her schema for caterpillars, rather than the actual diagram in the text. She stated that she could learn about the movements of caterpillars and metamorphosis, rather than the body parts of the caterpillar.

Conclusions

The children in this study demonstrated emergent understandings of genre features when participating in a book reading scenario with an informational text. With varying levels of conventionality, the children identified features and responded to how and why they were being used. A cross-feature analysis showed that the children approached the use of genre elements similarly by naming features or characteristic events associated with images in the text.

What Was Hard and What Was Easy for Individual Features?

Analysis of the individual genre features in the ITI illustrates that the children understood certain features more so than others. Almost all of the prekindergarten children in this study were aware that they should attend to photographs and other images. There was variation in the extent to which the children's responses semantically matched the image. However, all the children at some point were able to name a semantically appropriate feature for an image or text.

Although none of the children were able to produce the term *label*, many were able to consider how a label functioned in the text. Typically, the children were able to interpret the use of the label in the ITI photograph and discuss both the label term and the image in the text. However, producing or composing a label for a diagram proved to be a difficult task for most of the children.

The children typically approached the reading of diagrams as they did the reading of photographs. Most provided a response that named a feature of the photograph or the text. However, although the children could provide a general, topical feature, most of them had a more difficult time providing a response that gave evidence of how the diagram worked. In other words, the children might name a feature related to caterpillars but not the specific feature identified in the diagram.

Headings proved to be difficult for most of the children to discuss. None of the children were able to produce the term *heading* when identifying the feature. Similarly, the children most frequently were not able to discuss the function of a heading in a text or why an author might use one. Rather, when the children did respond to heading questions, most tended to cue into the existing visuals and name features or characteristic events associated with caterpillars.

In the ITI, most of the children were able to clearly answer yes or no when a photograph with a magnified image was being used in the text. However, they had less conventional abilities to ascertain the intent for using such an image. Most of the children did not provide any evidence that they actually knew the function or author's intent for using magnified scale images. The child who was able to provide a viable reason for the use of scale in photographs took a metastance to the text. Her response highlighted how scale use aided in the reader's understanding of the information by making features of the photograph more visible.

Considering the intent of the author proved difficult for most of these children. Although the children most frequently were not able to respond to the author's intent to use diagrams, there were small groups of the children whose responses reflected their attempts to shift from their own perspectives. In the most sophisticated of these responses, the children responded to the author's intent to teach the reader about attributes or characteristic events associated with caterpillars.

Cross-Feature Analysis: Naming

A cross-feature analysis of all features yielded three previously discussed patterns. First, most apparent was the children's tendency to cue into visual images to name features or characteristic events. They did so by reading images for information and/or connecting to their existing schema for caterpillars. Second, some of the children were able to respond to how the genre features functioned in the text. They predominantly demonstrated this ability by applying their knowledge and interpreting the use of the features in the text. Last, very few of the children could discuss the intent of the author to use informational text genre features. Discussing this intent required difficult conceptual moves as the children had to shift their perspective and take a more metastance to the text.

One of the more significant findings from this analysis was the propensity of most of the children to name features of an image during informational-text book reading scenarios. The way that the children consistently cued into visual images to label features connects to two other relevant strands of research. First, the caregiver/child book reading research (Heath, 1982) that analyzes the manner a parent, typically a mother, reads books with her child. Second, the informational text literature researchers (Duke & Kays, 1998; Pappas, 1993) analysis of children's readings of texts using genre features.

The mother–child book reading literature demonstrates that there are patterns to the way mothers read books with their children. Heath (1982) reported on the reading practices from three distinct socioeconomic classes in a community in the mid-South. She found that a pattern for working- and middle-class parents was to encourage the children to label images that they saw in books. When reading aloud with the children, parents would often pause at an image and ask the children to identify an object or actor in an image by asking "What's that?" and pointing to the image.

The data I reported in this chapter suggest that the children were using similar labeling practices when reading the ITI. This tendency to engage with the text by labeling was a particularly strong one for many of the children. Although some questions specifically asked the children to read, or label, an image, other questions asked the children to respond in a different manner either by discussing function or authorial intent. One hypothesis from this data is that many of the children reverted to this labeling approach when they were faced with a question that was slightly out of their developmental reach.

In the next chapter of this report I provide an in-depth analysis of the process of informational text writing using these same features in science journals. The children's knowledge of the informational text features, as ascertained from the ITI, was intimately related to the instructional process. These data shaped the demonstrations I provided to the children around genre features, the invitations to use the genre features, and the acceptance of the children's approximations of genre features. In the following chapter I provide a close look at how prekindergarten the children's informational text writing is produced in social interaction.

CHAPTER V

HOW ARE CHILDREN'S SCIENCE JOURNALS PRODUCED IN SOCIAL INTERACTION WHEN THEY ARE INVITED TO USE INFORMATIONAL TEXT FEATURES SUCH AS PHOTOGRAPHS, LABELS, HEADINGS, DIAGRAMS AND SCALE?

In this chapter, I present and discuss findings from the second research question in this study: How are children's science journals produced in social interaction when they are invited to use informational text features such as photographs, labels, headings, diagrams and scale? The data to be analyzed are video and science journals from all of the journal writing sessions in both instructional units. These data will show how children produced science journals with informational text features and how as the teacher I supported the children's compositions.

The act of learning to write is a social endeavor intimately related to interactions with others (Clyde, 1987; Harste et al., 1984; Rowe, 2008b; Short, Harste, & Burke, 1996; Smith, 1994). Similarly, a young child's oral language development is inextricably linked with the social environment. A responsive adult provides good demonstrations and models of language use, invites the child to talk and constructively accepts all approximations. If a boy is clearly reaching for a ball with arms outstretched shouting, "buh, buh," his mother understands his intention. She invites him to interact (e.g., "Would you like the ball?") as she accepts his approximations and demonstrates the correct usage of the term. Over time, the approximations made by this child become more and more conventional until everyone can clearly understand his usage of the term *ball*. He has learned how to use oral language through responsive scaffolding by the parent (Bruner, 1983; Cross, 1977; Snow, 1977).

Similarly, young children can be scaffolded into successful participation in the act of writing. They need to learn the processes, tools and language of being a writer, in this case a writer of informational texts. Emergent writers need authentic demonstrations of real writing occurring in real time. In addition, they must be invited to participate in writing experiences where they create authentic products like science journal entries. Lastly, their unconventional approximations should be accepted and understood as emergent forms of informational text writing processes and products.

In this chapter, I argue that similarly to learning to talk, children need rich and authentic interactions with adults in order to learn to write informational texts. These data demonstrate that young children learn how to participate in the act of science journal writing through a gradual release of responsibility and scaffolded support. This scaffolded support entails providing demonstrations, making invitations and accepting and encouraging approximations.

This chapter will focus on how the journal entries were produced in social interaction. First, I discuss how the analysis was completed for this research question. Then, I discuss the three components of a science journal writing session: demonstrations, invitations and acceptance of children's representations in science journals. I discuss the key features of each phase of the study.

Analysis

The data used for this strand of analysis were the videotapes of all journal writing sessions and the journal entries produced in these sessions. There were 24 journal sessions over the two instructional units. In all, the children and I spent 5 hours and 7 minutes writing in journals in the light unit and 7 hours and 49 minutes writing in the plant unit. The average journal writing session was 26 minutes for the light unit and 39 minutes for the plant unit. Analysis of journal writing data took place over three phases. As is consistent with the use of the constant comparative method (Strauss & Corbin, 1990), I conducted data analysis through all of these phases.

Phase 1

The purpose of Phase 1 was to develop initial, working hypotheses while collecting data. I conducted an ongoing analysis of field notes, video recordings, and children's journals and wrote daily theoretical notes about my emerging understandings. In addition, I discussed my initial hypotheses with the chair of my committee. The ongoing analysis in Phase 1 shaped the instructional invitations I made to the children and the emergent design of the study. In particular, I specifically designed the children's journal entries as embedded measures. I continually monitored these journal entries, and they shaped the emergent design of the study.

Phase 2

The purpose of Phase 2 was to use open and axial coding (Strauss & Corbin, 1990) to generate descriptive categories from the data. This phase began at the end of data collection. I coded a purposeful sample of video data and journal entries from key time points in the data collection. As there were 12 days of data collection for each of the units, I chose to sample 3 days from each unit. In all, I coded Days 1, 6, and 12 from the light unit and Days 1, 6, and 12 from the plant unit. I specifically choose beginning, middle, and ending points for each of the units as I wanted to capture the children's performances over time.

I watched the videos in their entirety and coded each for interactions of interest around the use of the science journals. Using open coding techniques, I parsed the data to yield categories that described the ways that the children produced journals and how I mediated the children's compositions. The three categories that emerged were demonstrations of the use of science journals with genre features, invitations to use science journals with genre features and the acceptance of children's representations in science journals. Upon creating these categories, I then compared them to each other to further refine their definitions and boundaries (see Appendix F).

Phase 3

The third phase consisted of axial coding of all data using each of the three categories generated in Phase 2. I watched all of the videos over again in their entirety and used axial coding to further describe the properties and dimensions of each category. In addition, I coded the children's journal entries, any journal entries that I had completed, and my field notes for the selected journal writing sessions.

I discovered the properties and dimensions of these categories through axial coding. They were grounded in the data and evolved during the analysis. I analyzed all three sets of categorical data to describe features of the setting, the participants, and the interactions occurring during the phenomenon. In addition, I analyzed the invitation and demonstration categorical data for type. As with Phase 2, I transcribed portions of journal writing sessions when there was an instance of a demonstration, invitation or acceptance of approximation.

While completing axial coding in Phase 3, I also watched each of the videotapes, paying particular attention to potential negative cases (Lincoln & Guba, 1985). This technique allowed me to strengthen my categories by consistently testing the boundaries of each of the definitions as I compared them to potentially new or different data.

Upon completing open and axial coding, I revisited all coded data to choose classroom exemplars that typified each of the three different categories to be included in the final report. In addition, I revisited the axial-coded data to choose instances that best illustrated the various properties and dimensions of the three categories. I have included these examples in the final report.

Demonstrations of Science Journals With Informational Text Features

Our ability to learn how to write is inextricably linked with the use of written forms (Smith, 1994). In other words, "We learn the conventions of writing when we have a use for its conventions ourselves or when we understand the use that others make of them" (Smith, 1994, p. 186). Smith (1994) aptly titled this process of seeing the how others use writing as demonstrations. For example, a mother provides demonstrations about the functional nature of print as she writes a reminder to herself to buy milk at the grocery store. As learners, we all have a "sensitivity" (Smith, 1994, p. 192) to these ever-present demonstrations. Smith argued that the degree to which one notices these demonstrations was directly related to the expectation that learning was likely to occur. Smith's ideas have significant implications for how demonstrations should be provided for young writers.

Written demonstrations should be deeply connected to the needs and experiences of the children who are in the process of learning to write. In her dissertation study, Jean Anne Clyde (1987) completed a descriptive study of the literate environment in a preschool classroom. Her research illustrated the importance of seeing children as "curricular informants" (Clyde, 1987, p.

302). By closely observing children, teachers were informed as to the next demonstration that should be made in the classroom.

In a seminal study, Harste et al. (1984) found that the analysis of written demonstrations proved to be a powerful way of understanding young children's marks. Similarly, in this study, I found demonstrations to be a particularly powerful way of showing how children produced science journals. In this study, a demonstration is defined as an intentional way of showing how something is accomplished (Harste et al., 1984). In the journal writing sessions, I demonstrated how to write a science journal entry. The demonstrations were meant to serve as examples for the children.

All demonstrations were layered with both processes and products of journal writing. These examples were both explicit and implicit in nature and were given by the researcher and the children alike. These demonstration entries always included a date stamp, my name, a drawing or a photograph, informational text genre feature(s) such as labels, diagrams, headings, scale and photographs, and often a caption meant to accompany the diagram or photograph.

The aim of my demonstrations was to show the processes and products of a conventional writer. Some of these processes included directionality, concept of word, the use of conventional form, speech to print match and message to image match. These processes were demonstrated mainly through the use of scaffolded writing (Leong, Bodrova, Wilder-Smith, & Hensen, 2009).

In this study, procedures for scaffolded writing were based on techniques introduced in the *Tools of the Mind Curriculum Project for Preschool* (Leong et al., 2009). In *Tools for the Mind*, children follow a series of five steps to write their play plan for the day. First, the writer must state aloud the intended message. Second, the writer restates the message and draws a word line for each word of the message. Third, the writer reads the empty word lines and points to each of the lines as the message is restated. Fourth, the child makes marks to represent each word on each individual word line. Last, the child rereads the completed message aloud, pointing to the individual lines.

In journal writing sessions, the children usually had open access to the demonstration entry; that is, it was continually visible to the children as they compared their own entries. In cases when the demonstration was completed before the children began writing, the entry was often left in a visible place such as the center of the writing table as the children began their writing. The children frequently looked at my paper and commented on it. Less frequently, I made the entry inaccessible to the children to encourage them to make independent marks rather than copying my own. Analysis of journal writing sessions showed that I made different types of demonstrations depending upon the support needed by the children.

Types of Science Journal Demonstrations

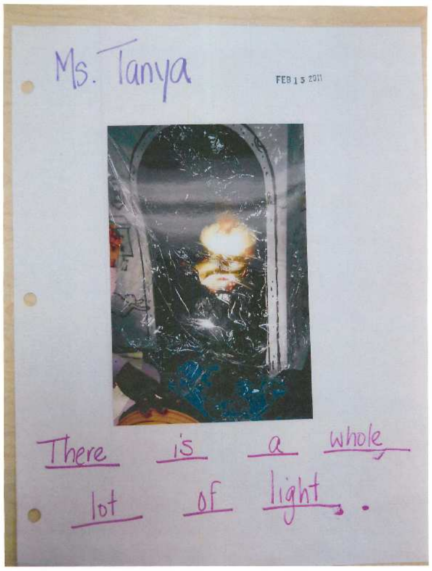
Analyses of my interactions with the children during journal writing sessions show that I used three types of science journal demonstrations: formal, parallel, and citation. I will briefly define each of these demonstrations using examples from the data. Then, I further describe the nature of each type of demonstration by describing key features.

Formal demonstration. In a formal demonstration, I set aside time in the journal writing session for the sole purpose of demonstrating a science journal entry. Typically, these formal demonstrations occurred at the beginning of the session and were connected to a discussion of the phenomenon under investigation. The demonstration was presented in a steplike manner, as evident by the procedural language I used when writing. During the formal demonstrations, the children typically watched me complete my journal entry before they did their own.

The following transcript comes from a formal demonstration I provided in the first week of the light unit. In all transcripts used in this report, any actions completed by the speakers appear in brackets. After a hands-on investigation of light and transparent materials, the children and I adjourned to the writing table to document findings in our science journals. For all six children, this was the first time they had been asked to write their own science journal entry. They had previously seen a whole class demonstration of how to write in a science journal. I said,

> Now, my next step is my picture—my photograph. Now, what you have to do first is put your photograph in your journal, right? So, I'm gonna glue it down like this [I put glue over the back of the photo]. And then I'm gonna stick it on [I adhere the photo to the paper], leaving myself room for my message, 'cause you have to write your message. Now, look. Let me think here. [I held my demonstration entry up for everyone to see.] What would be a good message for this photograph? Let's think about our experiment. Remember, we had three different things that we covered the door with. Carlos, what did we cover it with? (Transcript, February 15)

Figure 1 shows the journal entry that I completed during this formal demonstration. In this demonstration, I showed both content and process that were planned parts of the lesson with specific learning objectives. The children watched as I completed the entry before attempting one on their own.



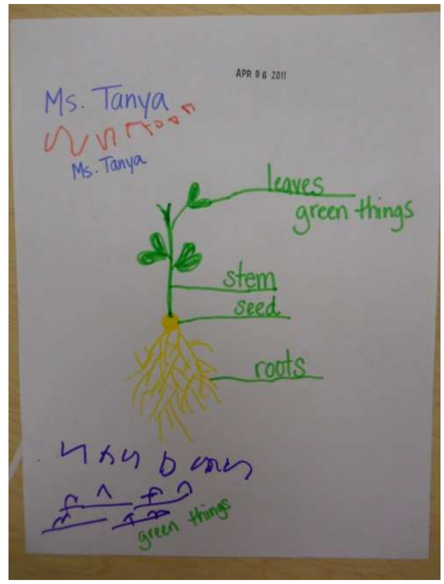


Figure 1. Formal demonstration, February 15.

Figure 2. Parallel demonstration, April 5.

Parallel demonstration. A parallel demonstration was one in which the entry was written alongside the children as they were writing in their own journals. These parallel demonstrations occurred throughout the writing session. At times, I would bring my demonstration to the attention of the children directly by holding it up and asking them to look it. More frequently, I narrated my writing and thinking aloud as I wrote.

The following excerpt came from a parallel demonstration given in the second week of the plant unit. By this time, the children had been invited to write in journals on five other occasions. In this particular session, the girls were making observations about the roots of a pea plant that they had dissected. The children had already begun to draw their pea plants and were beginning to label their diagrams. I said,

> I'm gonna do one too today. [I got a piece of paper and began to write my name at the top]. I'm gonna draw it, and then I am going to write a good message about these roots. I'm gonna start drawing while you guys are doing your date stamp. I'm gonna start with my stem of my plant. [I began to draw the stem of the plant]. (Transcript, April 5)

I produced my diagram of the bean plant (Figure 2) as the children were working on their own diagrams. The children were implicitly invited to participate in the demonstration as I talked aloud about the creation of the demonstration journal entry. For example, I stated aloud, “I’m gonna draw the stem of my plant.” By doing so, I highlighted significant features of the plant that were important to include and implicitly invited the children to include those features in their own work.

The children also provided parallel demonstrations in the writing sessions. In these cases, the children, writing alongside their peers, made their writing processes public. For example, Samaya gave numerous parallel demonstrations while diagramming a pea plant. She began by stating aloud, “I’m drawing my seeds” (Transcript, March 29). Later in the same session, Samaya highlighted another important part of her writing process for the group. She said, “Now, I’m gonna label,” and I replied, “Good, what are you gonna label?” She responded, “Strawberry (Transcript, March 29). In this case, Samaya knew that labeling was a significant component of the diagramming process. By making this intention public, she provided a valuable parallel demonstration for her peers.

Citation demonstration. A citation demonstration was when a verbal or physical reference was made to another journal entry. These citation demonstrations were made at all points in the writing session and were made by the children and me. The following transcript is an excerpt from a citation demonstration given in the final week of the plant unit. For these children, this was at least the eighth time they had been invited to write in science journals. It was also their last journal entry of the study. As Kianna began to label her diagram, I used a citation demonstration to elicit the word *petal*. I said,

> Look, I'll show you mine. [I take out my demonstration entry from the previous group where I had drawn and labeled the exact same flower. Both girls stop and look at my paper.] Look, I labeled it [I point to the word petal in my entry]. (Transcript, April 18)

When I used citation demonstrations, I most frequently referred to entries that were completed earlier with another group. Throughout the study, I cited the work of the children to their peers. These citations were meant to hold up particular features of a child's entry as a demonstration. Less frequently, the children made citation demonstrations. In the following transcript, DeCosta cited my demonstration journal entry to another child. The children were making observations and drawing different types of leaves. Ashlea drew a bean leaf and attempted to label the leaf *bean* but needed support in the spelling. DeCosta, who also drew a bean leaf, cited the spelling of the word "bean" in my journal. Ashlea said, "I don't know how to write *bean*," and DeCosta instructed her, "Look how she wrote it" as he pointed to my journal entry on the table in front of me (Transcript, April 12).

After this exchange, DeCosta proceeded to look closely at my paper as he wrote the word "bean" on his journal page. DeCosta cited my demonstration entry as a resource for his peer and, then again, for himself in his own entry.

Key Features of Science Journal Demonstrations

The analysis showed there were three salient features of all demonstration types. Demonstrations were co-constructed, scaffolded by rich teacher talk, and supported by informational texts. An explanation of these features shows how demonstrations supported the production of science journals with prekindergarten children.

Science journal demonstrations were co-constructed. The children played a key role in all types of demonstrations—even those I initiated in the journal sessions. They provided input through voice and action that shaped my writing processes and my journal entry. The following formal demonstration occurred after the children had dissected various pieces of fruit. During this discussion, I asked questions of Kylan, Jordan, and Sequoia. Their responses guided the nature of my journal entry, and I used them as prompts in the writing process.

> Tanya: Next, I'm gonna choose green for the leaves up here [I pointed to the leaves].
> Jordan: Write all of them.
> Tanya: I could even say how many there were because there were three here, so I'm gonna do three. Where were the seeds on the strawberry?
> Kylan: The outside!
> Tanya: The outside and they are kind of yellowish so I'm gonna choose yellow [I held the marker up to the seeds on strawberry]. Is there just one little seed?
> Jordan: No.
> Tanya: There was, they're all over! So, I'm gonna draw them all over. [I drew the seeds on the outside of the strawberry.] What color was the rest of my strawberry?
> Sequoia: Red. (Transcript, March 29)

In this event, the children's contributions shaped the nature of the adult demonstration and the drawing in the science journal page. Jordan decided that all of the leaves of the strawberry should be included in the representation, Kylan offered that the seeds of the strawberry should be on the outside, and Sequoia confirmed that the strawberry should be colored red.

The children's input was also integral to the creation of messages during demonstrations. I frequently asked them to help with the creation of the message for the entry. In the following transcript, the children and I were studying different types of plant leaves. One of the more popular plants in the classroom was the Venus flytrap. After I drew a Venus flytrap in the demonstration journal entry, the following exchange ensued:

> Tanya: Now, I'm going to write my message.
> Jaleah: I know what your message should be about.
> Tanya: What?
> Jaleah: Venus flytraps like to eat bugs.
> Tanya: OK, that's what I'll write then. (Transcript, April 12)

Before I even had the opportunity to ask the group what the message might be for this particular entry, Jaleah preemptively suggested a message to accompany my drawing.

During all demonstrations, the children helped spell or sound out words. In the following example, L'Yonna helped spell *bean* as I labeled my diagram of the pea plant. I said, "Bean" as I prepared to write it. L'Yonna exclaimed, "N!" and I explained, "There is an *n* at the end of the word *bean*" as I began writing the word (Transcript, April 13). Even though I did not directly solicit the help of the children, L'Yonna knew that I expected and encouraged the children to help with the construction of my journal entry. By saying the word aloud in an enunciated manner and pausing before preparing to write, I signaled to the group that this was an open endeavor. By acknowledging her contribution, I let the others know that this was an accepted way of participating in the journal writing process.

Rich teacher talk scaffolded science journal demonstrations. Rich teacher talk supporting the demonstration was another key feature of the science journal process. The journal writing sessions were preceded by a guided inquiry science activity where the children were involved in hands-on investigations. In these activities, I prompted the children to discuss phenomenon using key vocabulary. Right before the writing portion of my demonstration, I initiated discussion with the children about the objects under investigation.

Often, the children initiated discussion about the objects under investigation. These conversations included conceptually rich ideas and vocabulary that could be used to shape the content of their science journal. In the following transcript, Jordan and I had a conversation about the Venus flytrap he was planning to draw in his journal entry.

> Jordan: One of the leaves on the Venus flytrap is black.
> Tanya: Do you think that is a good thing?
> Jordan: No.
> Tanya: Why not?
> Jordan: It's sick. I think it's gonna die.
> Tanya: What do you think is wrong with it? Why would a plant die?
> Jordan: 'Cause if you don't feed it water or soil or other stuff than maybe it's gonna die.

Tanya: Well, it's in soil and it's wet [I felt the soil in the pot, and he felts it as well], so maybe something is wrong with the soil.
Jordan: Because the soil shouldn't be cold, real cold.
Tanya: Oh, so you think temperature has something to do with it?
Jordan: Yes. (Transcript, April 21)

In this brief exchange, I asked Jordan five open-ended questions to elicit his understandings about the needs of plants and a great deal can be learned about the depth and sophistication of his reasoning and content knowledge. The nature of teacher talk, particularly the use of questioning, was a key scaffold in demonstrations of journal entries. Questioning in demonstrations served many functions, including to elicit vocabulary, to encourage participation, and to revoice the children's offerings. Each of these functions will be discussed in further detail.

Teacher questioning to elicit vocabulary during demonstrations. During the demonstrations, I explicitly attempted to elicit key vocabulary words and concepts that I expected the children to use in their journal entry. This elicitation included possible phrasing the children might need to write messages or labels for their entries. In the following transcript, I demonstrated a diagram of the cardboard house investigation. In this investigation, the children examined light's abilities to pass through windows. I tried to elicit the word *window* from the group in order to include it my diagram.

Tanya: What did we put over the door, do you remember?
Kianna: The paper.
Tanya: The paper, that's right. What did I do with the paper?
Kianna: You put the thing that got the hole.
Tanya: The window, didn't I? So, I'm gonna make my window and I'm gonna color all of this dark because this was the paper. (Transcript, February 22)

Although Kianna did not produce *window*, she did give the definition (e.g., "the thing that got that hole"). I provided her with the term, and she later used this word in her journal entry when she labeled the window in her diagram.

Teacher questioning to encourage participation during demonstrations. Questions I asked during demonstrations also served to solicit the children's input in the creation of the journal entry. To encourage participation in assigning meaning to marks, I asked multiple questions about objects and drawings. Often, the purpose of this direct questioning was to elicit a term, (e.g., *window*), from the child and demonstrate the use of that term as a label in a diagram.

Questions also encouraged the children to participate in more conceptual conversations, particularly when I was eliciting a possible message to match a diagram or a photograph. In the following transcript, I drew a diagram that replicated the investigation with light and windows. I questioned the children regarding the direction of the ray of light. I asked, "Where did the light go?" Carlos responded, "This way" as he pointed in a line from the flashlight to the house, and I said, "This way" as I drew the light in the direction indicated by Carlos (Transcript, February 15).

To encourage the children to help with the construction of messages, I often asked them to describe a photograph or diagram and recreate what happened in the guided inquiry investigation. Open-ended questions helped the children recall the essential steps and objects of inquiry.

In the following exchange, I completed a demonstration entry for the investigation about sizes of shadows. I labeled one photograph, *small shadow*, the other photograph *big shadow*, and ascribed a heading at the top, *Shadows*. I said, "Now, I'm gonna write my message. What happened in both of these photos?" Carlos responded, "The shadow got bigger and smaller. I said, "The shadow changed size, didn't it? So, I'm gonna write, 'Shadows change size" (Transcript, March 7). My use of the phrase "What happened…" was a common one precipitating the writing of messages. Carlos provided me with a synthesizing message illustrating the key learning objective for the investigation. As emergent writers, the children often finished an activity with a message that was quite different from the one they had originally offered. As I knew the children had difficulty maintaining message permanence, I rephrased Carlos' statement to a more concise one. This revoicing of his offering provided the demonstration with a simple, yet conceptually rich message for the demonstration.

Teacher questioning followed by revoicing during demonstrations. Revoicing of children's language served a functional and conceptual role in demonstrations. Revoicing (O'Connor & Michaels, 1993) is a discourse move that reframes a speaker's utterance so that it can contribute to a larger conversation. Revoicing potential captions and labels for the children made the demonstrations more accurate and more accessible. It also made the messages more concise, thereby making it easier for the children to maintain permanence when writing.

The revoicing of the children's language also served to redirect their thinking about the concepts. After drawing a diagram, I was about to label the beam of light coming from the flashlight. I asked, "What was this" as I pointed to the light coming from the flashlight. Andre answered, "The yellow, the yellow," and I concluded, "For the light. Friends, I'm gonna put a line pointing to the light and then I'm gonna make, I'm gonna write the word *L-I-G-H-T*" as I wrote the word, label lines, and letters for light as I say the term aloud (Transcript, February 22).

I revoiced Andre's language from "the yellow" to "the yellow for the light." *Light* was a key term in this activity and a label that I hoped the children would include in their diagrams. Arguably, Andre was associating yellow with the light. I offered him some language in this demonstration that could help him later when he labeled his diagram.

Demonstrations of science journals included informational texts. Data showed that informational texts played a significant role in the journal writing sessions. Initially, the children were exposed to these texts in whole-group reading or writing experiences. At these times, texts were frequently read topically rather than in their entirety.

For demonstration purposes, I was primarily the one who brought informational texts into the writing sessions. The books were never read in their entirety. Rather, I read only those portions of the text that aided in the demonstration. We used the texts at various times throughout the demonstration and I positioned them as resources to be consulted. The analysis showed two patterns for use of informational texts during the demonstration phase: informational texts as resources and informational texts as exemplars.

Informational texts as resources for demonstrations*.* I consulted informational texts as resources in order to refine demonstration journal entries. I consulted texts to cross-check hypotheses and to seek out unknown information. In the plant unit, the children and I diagrammed parts of the flower. Fayth and I consulted a diagram of a sunflower in an informational text in order to identify an unknown feature of the flower

> Fayth: What are these? [She pointed to a part of the flower.]
> Tanya: I don't know what those are. Let's look in my book that I just read. [I opened the book and flip to the diagram of the flower.] Look, I found it, I found it! [I put the diagram in front of her as we looked at it together.]
> Fayth: What are these?
> Tanya: [I turned the flower over and point to the sepals for the rest of the group]. Fayth, look, these things [I pointed to the sepal on the actual sunflower] here are the same things [I pointed to the sepal in the book's diagram]. It's a different type of flower but look, look at this label [I pointed to the label of the sepal]. That's what these are, sepals. (Transcript, April 18).

Fayth and I used the informational text to seek new information about the content under investigation. This new information, the term *sepal*, certainly contributed to the richness of our discussion. More importantly, Fayth participated in the authentic process of using informational texts as a resource to be accessed for unknown information.

Informational texts used as exemplars during demonstrations. I also used informational texts to highlight the diagrams or photos of other authors who were engaged in similar investigations. The texts showed the children that they were engaged in a task common to informational text writers. I showed the children similar types of photographs or diagrams before doing their own in order to give them an example of how others had represented similar phenomenon.

In the following transcript, I discuss scale use in photographs at the writing table. I was going to draw a magnified image of a fern leaf for my demonstration entry, but before doing so I asked the children about the use of scale in a book about seeds.

> Tanya: L'Yonna, you were the one that told me that the person who made this book put these pictures in there…
> L'Yonna: Because, they want us to investigate these little seeds [she pointed to individual seeds in the magnified photograph].
> Tanya: They want us to investigate the seeds and they want to show them really closely so that we can get a good look at them. So, they make them look bigger. (Transcript, April 6)

In this case, the magnified photograph of a dandelion served as an example for the use of scale in photographs. The discussion about the text also made known L'Yonna's understandings of the function and purpose of scale.

The children also used informational texts in their demonstrations. In the following encounter, Kianna independently consulted a reference text to seek an exemplar diagram and demonstrated her use of it to the rest of the group. Initially, I showed her a sunflower diagram from an informational text, as she set out to label the parts of the flower in her journal entry. Later, she retrieved another text about plants from the science center. Kianna said, "It's the same thing!" as she opened her book to a page with a sunflower diagram and showed the group. I responded, "Ah, yes! You found the same diagram in a different book! You can use that one to help you label your flower. Kianna sat down, started to read the diagram, and said, "Leaves" aloud as she pointed to the label (Transcript, April 6). By actively seeking out a similar diagram and reading it for information, Kianna demonstrated that other informational texts could be used as exemplars to consult when writing.

Invitations to Use Science Journals With Informational Text Features

In this study, I defined invitations as requests made to the children, asking them to participate in the science journal writing process. In their seminal work, *Language Stories and Literacy Lessons,* Harste et al. (1984) discussed the key role of curricular invitations in the authoring cycle in the classroom. They suggested, "Teachers' efforts to introduce new contexts of literacy and to expand the child's world should be handled as invitations" (p. 205). These invitations can be made directly, such as by asking children to write notes to their mothers. Or these invitations can be made indirectly, such as Rowe's (1994) observation of when a preschool teacher pointedly left supplies, such as sheet music paper, in her writing center.

The manner in which these invitations are made is also significant to the child's participation and learning. Harste et al. (1984) argued,

> Reading and writing are tools which language users use in the process of getting things done. The reading and writing curriculum should not be isolated from other curricular areas, but rather be a natural and functional part of the opportunities selected by the class for exploring their worlds. (p. 204)

I used science journals as a functional way of supporting the children in their inquiry about plants and light. As legitimate participants, the children were invited to use the genre features in their own entries. Smith (1994) argued for the importance of treating the children as writers so that they come to identify as writers. He stated, “Learning to write is less an intellectual achievement than a social one” (p. 180). When learning to write, the children must be expressly invited to do the very things that writers do-read and write in meaningful contexts.

Rowe (1994) found that inviting the children to participate in functional literacy activities often required sophisticated expressions of meaning from the children. Learning occurred as the children were compelled to respond to invitations. Rowe reiterated that by inviting the children to participate in authentic writing tasks, adults positioned children as literate individuals capable of such work.

In this study, the children were invited to write throughout the journal sessions. After a formal demonstration, the children were always invited to draw and write. After these initial invitations were made, the children were consistently invited to discuss and write while producing journals. These invitations were made by both the children and me. The analysis showed that I made key curricular invitations during journal writing sessions. In the section that follows, I describe the four types of invitations: to draw, to write, to read, and to discuss science journals.

Types of Science Journal Invitations

All invitations were made for the express purpose of asking the children to engage in the practice of composing informational representations of their observations about the natural world. When writing science journals, the children were consistently invited to draw their observations, to write, to read marks and to discuss journal entries. I discuss each of these invitations in further detail.

Invitation to draw observations in science journals. If the journal entry for the day did not include a photograph, the children were always invited to draw observations of scientific phenomenon or artifacts. In the light unit, where the children engaged in more active inquiry, they frequently drew diagrams of those investigations. In the following transcript from that unit, I invited the children to create their own diagrams.

> Tanya: You guys are gonna do a diagram of what we did. First, what might you start by drawing?
> Ashlea: The light?
> Tanya: You could draw the light if you want. Remember what we saw, we saw the house, the hole—the window, the window was what let in lots of light, wasn't it? What are you gonna do, dude?
> DeCosta: The house.
> Tanya: OK, good, draw it [I pointed to his paper]. (Transcript, March 21)

I began by inviting the children to consider what they might draw first. My invitation indirectly implied there was an order to the drawing of the diagram. This was likely the case in diagrams from the light unit as they often showed procedures. Then, I directly invited DeCosta to draw by stating, "Draw it."

Invitations to draw often involved asking the children to carefully consider color when creating a diagram. In this transcript from the plant unit, the children made observations about plants growing in the root viewer. I asked the group, "What colors do you need for your plant?" and Sequoia responded, "Green and black for the dirt" as she chose those two color markers (Transcript, April 4). By inviting Sequoia to think about color choice before drawing, I compelled her to consider the accuracy of her diagram. This planning ahead was an example of prewriting with science journals.

On occasion, the children made invitations to draw. They invited their peers to draw something in a journal or offered to draw something for them. On Day 5 of the light unit, Andre was struggling with what to draw. Carlos offered him a suggestion, "Hey, how about him could make a picture?" (Transcript, March 22). Carlos recognized Andre was unsure of where to begin, so he invited Andre to start with a drawing.

Invitations to write in science journals. In each writing session, all of the children were invited to make marks or to write on their journal page. When we used photographs in journals, children were invited to write labels of key features and a corresponding caption. When we used diagrams in journals, children were encouraged to draw, to label and to write a corresponding caption.

The photograph or drawing in the child's journal entry played a key role in writing invitations. On the first day of the light unit, I invited Samaya to write a caption for her photograph. I asked, "What should your caption be? Remember what mine was? I looked at my photograph and you could see a lot of light went through. There's you in there, you're reading" as I pointed to her in the photograph. Samaya replied, "I went in the house, it was lots of light (Transcript, February 14). Inviting Samaya to look at the photograph became a prompt for mark making. The invitation to look at the photograph focused Samaya's gaze on the salient features of the guided inquiry activity such as the flashlight and materials used to block light. I elicited some of the key concepts or words from the image so that they could be used in Samaya's caption. When the children gave their responses, I invited them to write what they had stated.

Invitations to write labels were also elicited from the drawings or photos the children had on their journal pages. The invitations to label were more specific and direct than invitations to write captions. In the following exchange with DeCosta, I drew his attention to the flashlight as the light sourcethat he had already drawn in the diagram. "Oh, what's this?" I asked while pointing to the flashlight on Decosta's paper. Decosta responded, "The light." I asked "Oh, can you label it? Here, I'll get you started. I'll draw this line pointing to it and can you write light right here" as I drew the label line and pointed to the word line where he should write *light* (Transcript, March 22).

As I pointed and drew attention to the light in his drawing, I asked DeCosta to identify or name a specific feature. As was the case with the other labeling invitations, naming and labeling often functioned concurrently. The children were quite successful with labeling. By asking "What's that?" and pointing to something they had drawn, I indirectly invited them to label. The children accepted these invitations with ease and would require little, if any, prompting to write.

Invitations to read science journals. In every journal session, the children were consistently invited to read their captions and labels despite the unconventional nature of their marks. For example, in the light unit, Andre produced the following journal entry (Figure 3).

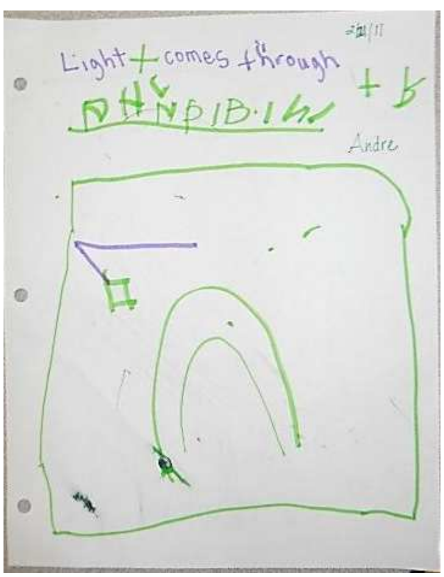


Figure 3.   Andre's journal, February 21.

Figure 4.   Sabria's journal, February 22

Afterwards, I asked him to read me his caption, and he read, "Light comes through." Without Andre's reading, I would not have been able to decipher his intended message as his writing was so unconventional. However, his verbal message was quite sophisticated, certainly more sophisticated than his written form indicated.

A day later, Sabria drew a similar diagram (Figure 4) of the cardboard house and the flashlight. She wrote, "FLT" as a label for the flashlight in her diagram. I asked her to read the label and she provided the message, "Flashlight." Given the context and the clearly discernible flashlight in the diagram, I did not necessarily need to ask Sabria to read her label in order to understand her intended meaning. I could have easily read her label for myself as it had enough conventional letters and letter/sound correspondence. However, the exercise of having her read her marks was a valuable one as she demonstrated a match between her own speech and her print.

Children's abilities to participate in the reading portion of the journal session varied by the types of marks they had made. Overall, children were more successful in maintaining message permanence with labels than with captions. In part, this success can be attributed to the number of words the children were expected to keep in their working memory. The labels were typically one word; whereas, captions were phrases or a sentence composed of multiple words. Also, with labels, I asked the children to read immediately after the label was written. With a caption, I asked the children to read after having made many marks and word lines to hold the place of multiple words. Captions required sophistication in syntax, such as the use of words like *there,* which was not necessary in one-word labels. Words that were not represented in an image (e.g., *there*) were more difficult for the children to produce.

Invitations to discuss science journals. All the children were invited to participate in discussions during each of the journal writing sessions. These discussions spanned all other invitation types—to draw, to write, and to read. Often, I initiated the discussions by asking the children to identify and explain their drawings or their marks. These explanations frequently led to the elicitation of the children's conceptual or genre feature understandings.

In the midst of small-group discussion, it often became apparent that the children had misconceptions about the science concepts or informational text features. At these moments, my invitations to discuss their thinking facilitated refinement of journal entries. For example, on the first day of the light unit, I provided a demonstration of how to do a science journal page with a photograph and accompanying caption. I used three different photographs of the children participating in the guided inquiry: a plastic curtain letting in a lot of light, newspaper letting in some light, and a black, opaque fabric letting in little light. After dispensing materials and different photographs to each child, I notice that Ashlea had begun to write her message. Although her photograph was not the same as mine (depicting newspaper letting in some light), she was staring at my demonstration entry and was furiously copying the print in my journal.

> Tanya: Now wait a minute, lady. Mine says, "The plastic lets in lots of light." [I pointed to the text in my journal.] Is your photograph the same photograph as mine? [I pointed to her photo to draw her attention to it.]
>
> Ashlea: [She shook her head to indicate it was not the same.]
>
> Tanya: So, then your message won't be the same. So, you shouldn't copy mine because your message is going to be different than mine because you have a different photograph [I picked up Samaya's journal entry and showed Ashlea]. Samaya has a different photo. The black fabric, Samaya, what is your message? Samaya: "There is a little light." (Transcript, February 14)

Although Ashlea knew how to participate in this event by making marks on her paper, she had not mastered the understanding that the marks carry specific meaning and should semantically match her photograph. Different photographs, quite likely, required different captions. By rereading my caption and inviting her to look closely at her own photograph, I created a type of cognitive dissonance. Her intended message for her caption did not match her photograph, as the translucent paper did not let in a lot of light. To further make my point, I invited her to look at Samaya's journal, which contained the third photograph and required another alternative caption.

Invitations to discuss conceptual understandings were made at all points in the journal writing session. Most often, the children were invited to reconsider marks or drawings on journal pages. During the plant unit, the children and I made observations about different types of leaves. Kianna drew what she believed to be two different leaves—the strawberry leaf and the bean leaf (Figure 5).

Figure 5. Kianna's journal, April 11.

In reality she drew two remarkably similar circular leaves. Her drawings can be seen above the photograph on the left-hand-side of the page. Afterwards, I invited her to reconsider what she had drawn, "These look just the same. Are these leaves the same?" I asked while pointing to the leaves on the two different actual plants] the same?" Kianna responded, "No." I asked, "Well, how are they different? (Transcript, April 11).

In this case, I invited Kianna to look at the actual plants in order to reconsider what she had drawn. Afterwards, we had a discussion about how the heart shape of the bean leaf was very different from the shape of the strawberry leaf. She labeled the photographs of the leaves correctly, wrote her caption and read the message, "The hearts are pretty." The "hearts" she referred to were the bean leaves.

We also discussed the children's drawings in order to deepen conceptual and genre feature understandings. On the sixth day of the light unit, the children were drawing diagrams and labeling. In the guided inquiry activity, the children took turns manipulating a large flashlight pointing it at a door in a large cardboard house. While sitting in the house, the children understood that the light did not pass through the cardboard door, but it did pass through the window. During the session, Sabria drew the following diagram.

Figure 6. Sabria's Journal, February 23.

When Sabria created her journal (Figure 6), I realized that she drew her flashlight and beams of light pointing in the opposite direction of the house. She also had not labeled the flashlight as the light source. I asked, “What’s this?” as I pointed to the flashlight]. Sabria answered, “The flashlight.” I followed up, “Where was the light going? Where did we aim the light? Sabria smiled and pointed to the door on the house she has drawn (Transcript, February 23)

I invited Sabria to look at the flashlight she originally drew and to consider the accuracy of its location. After our conversation, she put an *X* through her initial representation of “flashlight” and accurately redrew it pointing towards the house. By inviting her to look at what she had drawn, I helped her refine her diagram and to more correctly represent her understanding.

Acceptance of Children’s Productions in Science Journals

From an emergent writing perspective, it is crucial for those who study and work with young writers to understand that they are capable of making meaningful marks despite their level of convention (Clyde, 1987; Harste et al., 1984; Rowe, 2008a; Short et al, 1996; Smith, 1994). Short et al. (1996) argued,

> Because Beth’s writing sample looks like a scribble, it is easy for adults to describe her efforts using pejorative labels. As teachers of young children we need to learn to look beyond the surface of the text to the deep meaning if we are to take children and their early involvement in literacy as seriously as merited. (p. 21)

The acceptance of children’s meaningful approximations at conventional print is essential to truly understanding their capabilities as writers.

Young children are often keenly aware that their products are not conventional. Yet, it is essential that they are asked to participate in conventional writing practices. This participation requires a willingness to take risk on the part of the child (Harste et al., 1984). As Harste et al. (1984) stated,

> Access to the process can only be gained through involvement in the process, strategies which allow language users to set aside perceived or real constraints and which permit engagement on the language user's terms are central to growth and literacy. (p. 130)

As such, the children's productions demonstrate their emergent understandings about print and its use.

In this section I focus on the acceptance of the children's productions of journals with informational text features. It was important that I was willing to accept unconventional form and processes in order to encourage the children to participate in informational text writing. However, I also positioned these texts as functional science journals that were meant to be revisited and used as a resource. A certain degree of convention was necessary to support the use of the journals. Therefore, I conclude with a discussion of the powerful role adult writing played in the children's journals.

Acceptance of Unconventional Processes and Products in Science Journals

In order to encourage the children's use of genre features, I had to create an environment where they produced entries even though they knew their work was unconventional. Analyses showed that I made specific instructional moves to normalize unconventional processes and products. These instructional moves included offering affirmation of mark making efforts, citing the children's unconventional marks as demonstrations for peers, and encouraging and accepting the children's readings of unconventional marks. Lastly, I discuss the role that adult writing played in the construction of children's journals.

First, I offered the children a great deal of verbal encouragement to make marks. At the beginning of the study, the children were not that familiar with open-ended invitations to write with a blank piece of paper. On the first day of the light unit, I encouraged L'Yonna's approximations in her journal entry.

> L'Yonna: I don't know what to write.
> Tanya: I think you do. Look, you are already starting to write [I pointed to the marks and word lines on her journal page]. What is going on in the photo? [I pointed to her photo glued on her page.]
> L'Yonna: The same thing as here [she pointed to the photo I used in my demonstration entry].
> Tanya: Do you want to write the same message as me?
> L'Yonna: Yes.
> Tanya: Mine says, "The plastic lets in lots of light." [She still looked at me reluctantly and made no moves.] Write whatever words and letters you know. I just want you to do the best that you can. (Transcript, February 14)

A great deal of work went into facilitating L'Yonna's mark making in this particular journal session. First, when L'Yonna told me she did not "know what to write," I contradicted her by pointing to the unconventional marks she had already made on the page. Through her own unconventional marks she was already a legitimate participant in the practice. Second, I affirmed and validated her correct conceptual understandings about message/photo match. She recognized that we had the same photo and, therefore, could have the same caption. I affirmed this by suggesting she use my caption. Third, after she still did not resume writing, I encouraged her by telling her to "do the best you can." Doing her best might be "writing whatever words or letters you know," copying my journal, or making letterlike marks. When L'Yonna finished her entry, she read it as, "The plastic lets in lots of light." Afterwards, I told her "You did it." In doing so, I let everyone know that she had completed the task appropriately.

Another key instructional move to support the children's approximations was the citation of unconventional products as exemplars. In the plant unit, I took the validation of the children's emergent writing a step further by offering their approximations as demonstrations for each other. While diagramming the leaves of a pea plant, Fayth verbally spelled *leave* as "LEV." In that same writing session, Ashlea also diagrammed a pea plant. Ashlea began to label the *leaves* and asked aloud, "How do you spell *leaves*?" I responded, "Why don't you look at Fayth's paper? She just spelled leaves, *LEV*" (Transcript, April 5). By citing Fayth's version of *leaves* as a successful, appropriate and meaningful approximation of the word, I indirectly encouraged the children's emergent spelling.

Even though I made deliberate instructional moves to acknowledge approximations, the children had to willingly participate even though they knew their approximations were not conventional. The children's willingness to write with approximations varied. In the beginning, many of the children required a great deal of coaching in order to participate in journal writing. In the following transcript, I encouraged Ashlea (Figure 7) to write her caption, "A little light goes through."

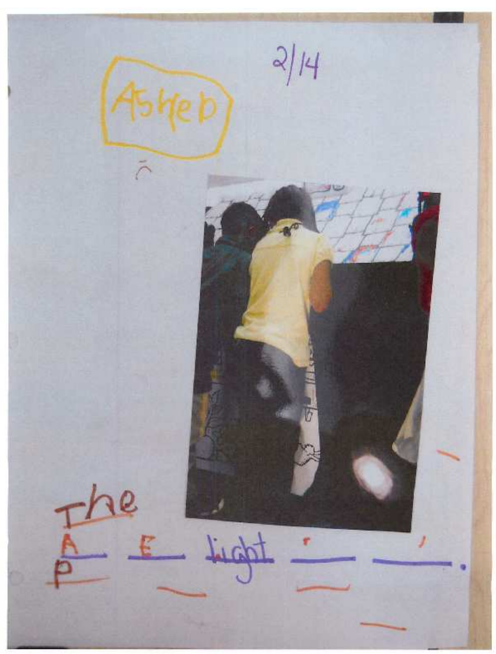


Figure 7.   Ashlea's Journal, February 14.

Tanya: You can do it. Write "A little light goes through" [I pointed to each individual word line as I said it aloud].
Ashlea: [She wrote the word *A* on the first word line and looked at me.]
Tanya: Great! Now write the word little [I pointed to the word line for *little*]. It's perfect whatever way you do it.
Ashlea: [She wrote the letter *E* on the word line for *little* and looked up at me.]
Tanya: Great! Now, keep going!(Transcript, February 14)

This interaction with Ashlea was an intricate dance. She had enough knowledge about letters and words to know that she was not able to conventionally write her caption as she had intended it. She looked at me after every mark she made, seeking validation that she was participating correctly in the activity. I encouraged her more than once by telling her, "It's perfect whatever way you do it" and "Great! Now keep going." Significantly, I encouraged any and all attempts she made at mark making.

Later in the light unit, the children and I made observations in our journal entries about how shadows change size. While writing in journals, I noticed that Jordan (Figure 8) was furiously making marks that covered his entire page.

Figure 8. Jordan's journal, March 7.

Tanya: Jordan, you're writing like crazy over there!
Jordan: I'm gonna make all Ms.

Tanya: But, what does your message say?
Jordan: M, M, M, M, M, M, M, M, M, M.
Aniah: That's so funny [she laughed at Jordan's caption and looked at me]. (Transcript, March 7)

When I asked Jordan what he was "writing," I classified his unconventional efforts at mark making as valid writing. Jordan and Anaih both knew that he had not written a conventional caption. Although he did know that his letters did convey some meaning as they were written. And, in fact, he was correct. His caption read, "M, M, M, M, M, M, M, M, M, M."

Another key instructional move that supported the children's marks was my requests for the children to read their unconventional products. In addition to asking the children to assign meaning to unconventional marks, I also asked the children to read these marks in a conventional manner. Most, if not all, of the children were acutely aware that they were not able to read in a conventional way. Consider the following transcript from the light unit:

Tanya: Will you read it to me?
Decosta: I don't know how to read it.
Tanya: Yes you do, you wrote it! Tell me what you wrote.
Decosta: [He hesitated.]
Tanya: What does this say [I pointed to the *b* he wrote for the word blocks]. (Transcript, March 1)

When Decosta initially refused me, he told me that he did not know how to read "it." I indirectly reminded him that he had an intentional message when he initially wrote his label. This message for his label had a speech to print match as he came up with the initial sound, /b/, for blocks.

The children also solicited me to read their captions and labels. On the last day of the plant unit, we were making observations about flowers. Jordan labeled his photograph of the tulip.

Tanya: What are you writing?
Jordan: You read it to me.
Tanya: You read it.

Jordan: Can you read?
Tanya: Yes, I can.
Jordan: Well, I can't.
Tanya: Yes, you can.
Jordan: Well, I just change my words all the time. (Transcript, April 21)

Jordan solicited my help in reading his caption. Rather than reading Jordan's caption, I asked him to read it. Poignantly, he asked me if I could read. When Jordan told me that he changed his "words all the time" he was, in essence, letting me know that reading was saying the words in the right order consistently. Jordan, like many other of the children, often struggled with message permanence for labels and captions. Their message might change as they were forming their marks or they would seemingly forget what they had intended to write.

Role of Adult Writing

Adult writing or grown-up writing played a key role in the acceptance of the children's approximations in science journals. In the study, the science journals were positioned as functional texts to be revisited. This positioning was particularly the case with the science journal that I completed with the children during whole-group writing time. I often referred to it as a resource to access information (e.g., our previous observations about plant growth).

In order to maintain the functional nature of the children's journals, I always wrote in grown-up writing on the children's entries. Typically, I invited them to read their message for their labels and captions and then transcribed their response on their own paper. If the children made efforts to verbally and/or visually segment their message, I would do so in my writing. Otherwise, I would write their intended message somewhere near their print.

Over time, the children began to invite me to write in grown-up writing in their journal. Many of the children would, of course, solicit my help if they were struggling. I considered these solicitations more of a request for assistance rather than an invitation to maintain the functional nature of print. The invitations for grownup writing were something markedly different. They always came after the child had made their marks and finished their labels or caption.

Data showed that adult writing served to support the children's unconventional products, rather than correct their attempts at convention. In the following example (Figure 9), Anaih worked very hard to show her observations of the parts of the pea plant.

Figure 9. Anaih's journal, April 11.

> Tanya: Let me write some grown up writing on here too, so I can remember, so it will help me remember what you said. "Stem" [I wrote *stem*], "Leaves" [I wrote *leaves*], "Roots" [I wrote *roots*].
> Anaih: Did I, did I write that wrong? [She pointed at the roots.]
> Tanya: You were real close, you were really close.
> Anaih: Ooo [she lightly banged her hand down on the table].
> Tanya: You had the *R*, the *T* and the *S*. You're just missing your two *O*s in there. Do you see how there are two *O*s [I pointed to my writing on her page]?(Transcript, April 5)

Grown-up writing was a significant part of the journal writing session for Anaih. She understood my print was conventional and cross-checked it for accuracy with her own. In

Figure 9, she labeled roots, “RTS”. I wrote “roots” below her label in black. After our conversation, she used a black marker to self-correct her spelling by adding in the two *o’*s. She independently used my print to make her own more conventional. In this case, the grown-up writing supported her emergent efforts at writing.

Conclusions

These findings demonstrate that prekindergarten children can be engaged in informational text writing through science journal use. While other emergent writing research may show processes of engaging young children in writing, this work makes a unique contribution. It shows how emergent writing processes look when writers use informational text features. And although general emergent literacy practices are important, these findings show that there are also additional key content-literacy processes that were essential in the production of science journals.

As indicated in emergent writing literature (Clyde, 1987; Harste et al., 1984; Smith, 1994), demonstrations were an integral part of this informational text writing process. In particular, this research project showed that different types of demonstrations were needed on a consistent basis to introduce and reinforce how one uses the genre features of informational texts. Although different in type, these demonstrations shared many key features. They were co-constructed in nature, scaffolded with rich teacher talk, and supported by informational texts.

A major novel finding of this study was how the use of trade book informational texts supported the writing process for children. Consistent with other research findings, the texts served to help the children make sense of observed phenomena (Ford, 2001; Magnusson & Palincsar, 2001). Also, informational text trade books also helped the children use and acquire discourse features such as content vocabulary and world knowledge (Duke, 2003; Pappas, 1993).

Throughout the journal writing process, the children were consistently invited to participate in informational text writing. Invitations to draw, to write, to read and to discuss science journals were made in every session. These types of general invitations to participate in science journal writing were consistent with other emergent writing practices (Harste et al., 1984; Rowe, 1994; Smith, 1994). However, these data show that invitations were curricular in nature—asking the children to draw scientific observations and to write using the specific elements of the genre.

Another major finding of this research was the way in which the informational text writing process was supported by discussion of the content and artifacts under investigation. In these discussions, I elicited the children's understandings through questioning. In addition, the children and I used the key content vocabulary repeatedly when discussing the actual artifacts under investigation or the journal entries.

A key feature in the supporting of the children's compositions of informational text writing was the acceptance of approximations as meaningful expressions of their genre feature understandings. In the journal writing sessions, it was necessary to accept the children's unconventional products by affirming their work (Harste et al., 1984). Adult writing played a unique role in this process as it was necessary to maintain the functional nature of the journal. Adult writing served to support the children's writing rather than correct their attempts at convention.

In the next chapter of this report I provide an in-depth analysis of the children's science journals. I analyzed science journals from a focal group of children for evidence of informational text elements. In Chapter 6 I discuss prekindergarten children's emergent abilities to use some of the hallmark elements of the informational text genre.

CHAPTER VI

WHAT IS THE NATURE OF PREKINDERGARTEN CHILDREN'S SCIENCE JOURNALS WHEN THEY ARE INVITED TO USE INFORMATIONAL TEXT FEATURES?

In this chapter, I present and discuss findings related to the third research question: What is the nature of prekindergarten children's science journals when they are invited to use informational text features? The data to be analyzed include the science journals from a focal group of children. These data will show children's emergent efforts to write in science journals using informational text features.

Nonfiction writing research in early childhood predominantly focuses on the evidence of informational text features in children's writing (Donovan, 2001; Pappas & Varelas, 2009; Smolkin & Donovan, 2005). Text structures, such as words and phrases, statements, simple couplets or attribute lists, have been identified in the nonfiction writing of young elementary students (Donovan, 2001). In addition, researchers have found that elementary students' use of visual features, such as diagrams and photographs, in nonfiction writing reflected their understandings of scientific dialogue and procedures (Pappas & Varelas, 2009; Smolkin & Donovan, 2005).

I could find no research that looks for evidence of informational text structures or visual features in the writing of prekindergarten children. Donovan's (2001) research with older children's structures of nonfiction print has informed this analysis. The prekindergarten children in this study were younger and wrote even less conventionally than the children in her study. In this analysis, I examined the emergent ways young writers used text structures in their science journals.

In this study I also describe the visual elements present in children's informational texts. Informational texts (e.g., science journals) contain distinct visual elements that mark them as members of a genre. In the analysis I describe the emergent patterns of drawing and photograph use in science journals.

Analysis

The data I used for this strand of analysis consisted of journal entries from a focal group of children. As needed, I viewed the video of the journal writing sessions to support the analysis. Over the course of the study, focal children produced 120 total journal entries. For each week of instruction, I chose the most sophisticated journal entry completed by a focal child. Six of the eight children produced at least one journal entry each week. Haley and DeCosta did not produce journal entries in two of the weeks, so I chose alternative entries from other weeks. The analysis of these journal entries (n = 64) took place over two phases.

Phase 1: Identification of Focal Children

To determine focal children for this portion of my analysis, I reflected upon all journal entries completed by all the children. I chose focal children by levels of conventional written form in order to show the full range of the children's productions; that is, I selected focal children to represent the diverse ways children used informational text features in their science journals.

I used the WriteStart! assessment (Rowe & Neitzel, 2008) to determine the children's initial levels of convention. An outside evaluator collected these data at the beginning of the school year as part of the ELLS project. The WriteStart! Assessment measures children's writing for both form and meaning. I took the results from two particular parts of this assessment: the name writing task and the photograph labeling task. I chose these tasks as I felt they were most directly related to the type of data I collected in this study.

In the name writing task, the children were asked to write their name on two different occasions. The evaluators measured the completeness of the children's names as determined by whether they could produce a signature with all letters of their name written in a recognizable form. The children's best or most sophisticated version of their name was coded. In the photograph labeling task, the children were shown a picture of themselves engaging in an activity and then asked to write a caption to accompany the photograph. Three features of the photograph label task were scored: the match between the photograph content and the message, the intentional use of print, and the form of the marks.

Using the results from these two tasks on the WriteStart!, I ranked all participants by conventional levels of form, then divided them into groups exhibiting low, moderate, and high levels of conventionality. The children who demonstrated lower levels of conventional form used letterlike forms or personal manuscript. The children who used moderate levels of conventional form used a mix of conventional letters and letterlike forms with no letter/sound correspondence. The children who used higher levels of conventional form used conventional letters with varying degrees of letter/sound correspondence. I selected focal children because they most consistently demonstrated low, moderate, or high levels of convention across both tasks. Table 17 shows the levels of convention for the eight focal children.

Table 17

Focal Children for Science Journal Analysis

Name	Level of Convention
Andre	Low
Haley	Low
Leaun	Moderate
DeCosta	Moderate
Sabria	Moderate
L'Yonna	High
Samaya	High
Jordan	High

Phase 2: Analysis of Focal Children's Science Journals

Using open coding techniques, I analyzed focal children's journals to describe the text structures, visual elements, and headings they used to create informational texts. This analysis included the ways in which children used print and images and how they assigned meaning to their productions. These properties were grounded in the data and evolved during the analysis. While completing axial coding, I also paid particular attention to potential negative cases (Lincoln & Guba, 1985). Paying attention in this way strengthened my categories by consistently testing the boundaries of definitions with new or different data that emerged.

Drawing on previous research (Donovan, 2001), I coded each of the entries for the text structure of the verbal messages. Text structure categories used by the children included *no message, one word or phrase, statement, attribute list, simple couplet,* and *complex couplet*. In each entry, I chose the child's most sophisticated structure for the analysis. I coded the verbal message for structure, not the written marks.

I also coded each of the 64 focal entries for the use of visual genre features. In this analysis, I used open coding techniques to determine the different ways the children used photographs and drawings in their journals, including scale in magnified images. Using axial coding, I developed grounded coding documents to describe the individual categories (see Appendix G: Journal Entry Coding Document). As I made curricular invitations to use headings to the children, I also completed a secondary analysis on this feature in the children's journals.

In addition, I analyzed the relationship between the children's written form and the semantic match of their messages for captions and labels. Using the written form categories of the WriteStart! (Rowe & Neitzel, 2008) writing assessment, I coded the captions and labels in the children's journal entries. All captions written by focal children were coded for written form. In addition, the most sophisticated label of every journal entry was also coded for written form.

To ensure that my coding of the journals was reliable, I asked a colleague to double code a portion of the journals (n = 28). This colleague was an educator and had a graduate degree in education. To train her, I created a journal coding book that supported the discussion. During that time, we also separately coded one of the journal entries and compared results.

To determine inter-rater reliability, I used a simple percentage method. Although Cohen's Kappa is the standard used in quantitative research, the nature of this data does not lend itself to this method of analysis. Each of the questions has a different scale making it difficult to compare values across questions. In the initial training, we were reliable on 2 of 2 items, yielding an acceptable inter-rater reliability rating of 100%. When calculating the remaining journal entries, we reached a cumulative inter-rater reliability rating of 97%. This rating reinforced my conclusion that the coding of the journal entries was reliable and consistent.

In the following sections, I report on the findings from these analyses. I describe the patterns for genre structures of the children's messages and the use of labels and captions to accompany visual genre elements in their journals. Lastly, I analyze the relationship between written form and the children's messages for labels and captions.

Text Structures of Emergent Informational Texts in Science Journals

Informational texts are written with characteristic text structures that mark them as a genre meant to inform, rather than further the narrative of story. These structures have been described through research (Duke & Kays, 1998; Pappas, 1986) and have been found in the nonfiction writing of older children (Donovan, 2001; Purcell-Gates et al., 2007). Text structures found in the text of kindergartners include words or phrases, statements, and attribute lists. These structures name features, either attributes or characteristic events, associated with the topic.

The prekindergarten children in this study used similar emergent textual structures (Donovan, 2001) in their verbal messages for captions and labels in informational texts. These structures included no message, word or phrase, statements, attribute lists, simple couplets and complex couplets. Table 18 shows the categories of organizational sophistication of informational texts produced by focal children.

Table 18

Categories of Organizational Sophistication of Informational Texts

Child	No message	Word or phrase	Statement	Attribute List	Simple Couplet	Complex Couplet
Andre		3	5			
Haley	1	3	4			
Leaun		5	3			
DeCosta		5	3			
Sabria		3	5			
L'Yonna		6	2			
Samaya		6	2			
Jordan		1	4	1	1	1
Total (Percentage of all entries)	1 (1.5%)	32 (50%)	28 (44%)	1 (1.5%)	1 (1.5%)	1 (1.5%)

Except on one occasion, the children participating in this study produced a verbal message when asked to read their marks. The majority of the journal entries produced by focal group children were words or phrases and statements. Only one focal child used more sophisticated structures like attribute lists, simple couplets, or complex couplets. In the following section, I discuss each of the structures using examples from the data.

No message. In Haley's first journal writing attempt (February 15), she did not respond when I prompted her to read her journal entry. Haley's lack of a response was the only time a focal child did not provide a message for a journal entry. Haley had no previous experience writing science journals with me. I believe her nonresponse could be attributed to issues of familiarity. In all subsequent journal-writing sessions, Haley always read a message for her captions and labels.

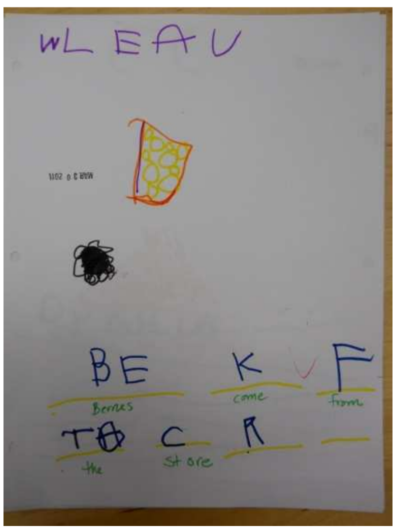
Word or phrase. When composing informational texts, the children provided words or phrases that were not independent clauses. For example, "A little bitty light" was coded as a word or phrase. This message contained a subject and some descriptive adjectives, but was not a complete sentence. Similarly, I also coded "petal" as a word or phrase. In the instructional phase of this study, I invited the children to use one-word labels as a means of locating and identifying features in their diagrams. As the teacher, my demonstration entries frequently showed one-word labels that located and identified key features of images.

Words or phrases were the most common structure used by the children in science journals. Fifty percent of the messages produced by focal children were coded as words or phrases. This was not surprising as a major focus of instruction was the use of diagrams with one-word labels. For example, in the second week of the light unit, Leaun drew a diagram of the large cardboard house used in our investigation. She drew a label line locating and identifying the yellow square of light in the cardboard house. Leaun identified the yellow square with print and read, "Window" (Transcript, February 21).

Statement. I defined statements as independent clauses that included an attribute or a characteristic event pertaining to the topic. I coded the independent clause "Lots of light comes from the flashlight" as a statement. In this case, the message made a statement about the significant amount of light shining through the plastic. As the teacher, I also frequently recorded my observations in my demonstration journals using statements.

In each journal session, I asked the children to make observations about light or plants. Their observations were frequently written as statements in their journals. For example, DeCosta drew a diagram of a piece of apple, wrote a caption and labeled the seeds. He read his message for his caption, “The seeds are in the middle” (Transcript, February 28). DeCosta’s message was an independent clause that stated information about the topic under investigation (e.g., the location of apple seeds).

Some of the children’s statements were observations that described attributes in an image. Others, like Leaun’s (Figure 10), described a characteristic event associated with a topic.



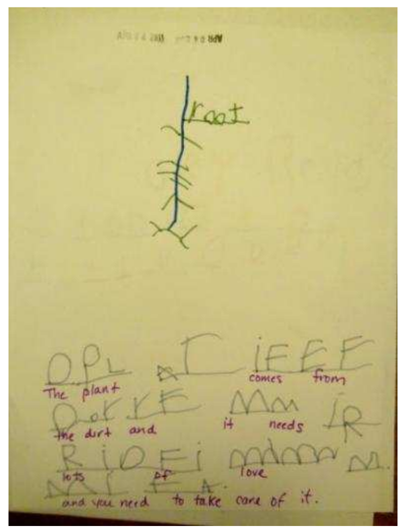


Figure 10. Leaun’s journal, March 30.

Figure 11. Jordan’s journal, April 4.

Most of Leaun’s peers wrote a message that described the location of the seeds. DeCosta located the seeds in his apple diagram by stating, “The seeds are in the middle.” Rather than name a physical attribute of the diagram, Leaun stated where the topic under discussion, berries, were characteristically located. In her entry (Figure 10), Leaun drew the strawberry, wrote her caption and read her message, “Berries come from the store.”

Attribute list. I defined attribute lists as two or more independent clauses. The children used this structure to provide a list of known information about the topic. For example, I would code "The flower has a leaf, the flower has a stem and the flower has a root" as an attribute list. In this case, the message listed three separate attributes about flowers and the order in which they were presented was not significant.

In the second week of the plant unit, Jordan (Figure 11) produced the only attribute list in the focal children's data. The children diagrammed a pea plant and made observations about the roots. Jordan drew an individual root and wrote a lengthy caption. He read his message, "The plant comes from the dirt and it needs lots of love and you need to take care of it." In this attribute list, Jordan listed three distinct attributes about plants. With the use of this structure, Jordan provided information about the nature of plants.

Simple couplet. I defined a simple couplet as an initial statement extended by a secondary statement. If the statements were read out of order, the meaning would be lost. For example, I would code "The flower has petals and they are red" as a simple couplet. The second clause "they are red" supports the first about the flowers. If the clauses were reversed, the message would lose meaning.

In the fourth week of the plant unit, Jordan produced the only simple couplet when he wrote a caption to accompany the magnified photograph of the tulip. He read, "There are pollen on these little things that I forgot 'cause I don't know" (Transcript, April 21). His message consisted of two independent clauses joined by the word *that.* His second clause, "I forgot 'cause I don't know," necessarily supported the first clause.

Complex couplet. I defined a complex was defined as a series of statements that were extended by other statements. As with a simple couplet, if the statements were put out of order the meaning would be lost. For example, I would code "Flowers have pollen and it is yellow. Bees like pollen" as a complex couplet. The first sentence was a simple couplet and the addition of another statement related to the first couplet made this more complex.

In the third week of the plant unit, Jordan made observations about the Venus flytrap. He drew a detailed diagram, wrote his caption, and then read, "The Venus loves to drink the stuff from that bug that it captured. It leaves the hard part and then the bug dies" (Transcript, April 13). The first sentence of his message was a statement that was extended by the ensuing simple couplet. The two sentences combined to form a complex couplet.

The use of a complex couplet demonstrates a sophisticated use of connected prose. Jordan's message demonstrated how informational text can convey detailed information. Not only did Jordan inform the reader about the nature of a Venus flytrap's diet, but he also described how the plant consumed its food.

Summary. Similar to Donovan's (2001) findings with kindergarten and first graders, the focal prekindergarten children in this study used words or phrases, statements, attribute lists, simple couplets, and complex couplets as text structures for their messages for labels and captions. However, the majority of the children used words or phrases and statements when structuring their messages. The propensity to use these specific structures may have been related to the instructional demonstrations and invitations provided to the children. I consistently invited the children to use one-word labels to identify features in an image and to "write what they see" in the form of a statement.

The use of these structures by the children demonstrated their emergent understandings of the intent of informational texts, to inform. With words or phrases, the children provided messages that named various features evident in images and often used key content vocabulary.

With statements, the children provided messages that described or made observations about key attributes, actors or characteristic events associated with the phenomenon under investigation. Both structures functioned by naming or stating what was to be learned from an image.

Children's Readings of Labels and Captions for Visual Elements and Headings

The children used photographs and their own drawings and combined them with labels and captions to produce visual elements consistent with the informational text genre. In the ensuing section I describe those genre elements the children used and how they read messages to express their scientific understandings. Table 19 names the types of visual genre elements and how many times they were used by focal children.

Table 19

Visual Genre Elements Used in Science Journals

Visual Genre Element	Number of Entries
Labeled photograph: A diagram with a caption	11
Labeled photograph: A diagram	9
Photograph with a caption	13
Labeled drawing: A diagram with a caption	9
Labeled drawing: A diagram	9
Drawing with a caption	13

In all the children produced approximately equal numbers of journal entries with photographs (n = 33) as they did journal entries with drawings (n = 31). This equivalence was not surprising given the types of demonstrations and invitations that I offered to the children. Genre features of informational texts were a focus of instruction in both units (see Appendix C: Instructional Plans). For 2 weeks of each unit, I provided the children demonstrations of drawings in journals. For the other 2 weeks of the unit, I showed the children demonstrations of photograph use in journals. As evident in previous transcripts, I consistently invited the children to label features of drawings and photographs in their journals and to use statements to make observations about the topic.

In the following section, I refer to the children's written marks that accompany photographs and drawings as captions and define diagram labels as a label line and label word that locate and identify a feature in an image. However, I refer to the children's verbal readings of those labels and captions as messages. For example, a child wrote the following caption to accompany a photograph, "F." Her message for that caption was "red flower."

Photographs

Overall, there were 33 total journal entries that used photographs. In 13 entries, the children wrote a caption to accompany the photograph. In the remaining entries, the children either turned the photograph into a diagram by labeling specific features (n = 9) or created a diagram with labels and included a caption (n = 11). I discuss each of the three ways the children used photographs further.

Photograph with caption. The children consistently wrote captions adjacent to visual images. Tables 20 and 21 show how the children's verbal messages were distributed across the grounded categories related to emergent abilities to write a caption for a photograph. In this analysis, I coded the child's verbal message only once for a semantic match between the message and the photograph (see Table 20) and once for the type of message (see Table 21).

Table 20

Photograph with a Caption: Message Match

Message Match Response	Number of Entries
Message semantically matched photograph	10
Message was semantically related to the photograph	1
Message named features of print	1
No message given	1

When writing captions for photographs, focal children most frequently (n = 10) used messages that semantically matched the image. In the light unit, Jordan included a photograph depicting shadows created during the block tower investigation (Figure 12).

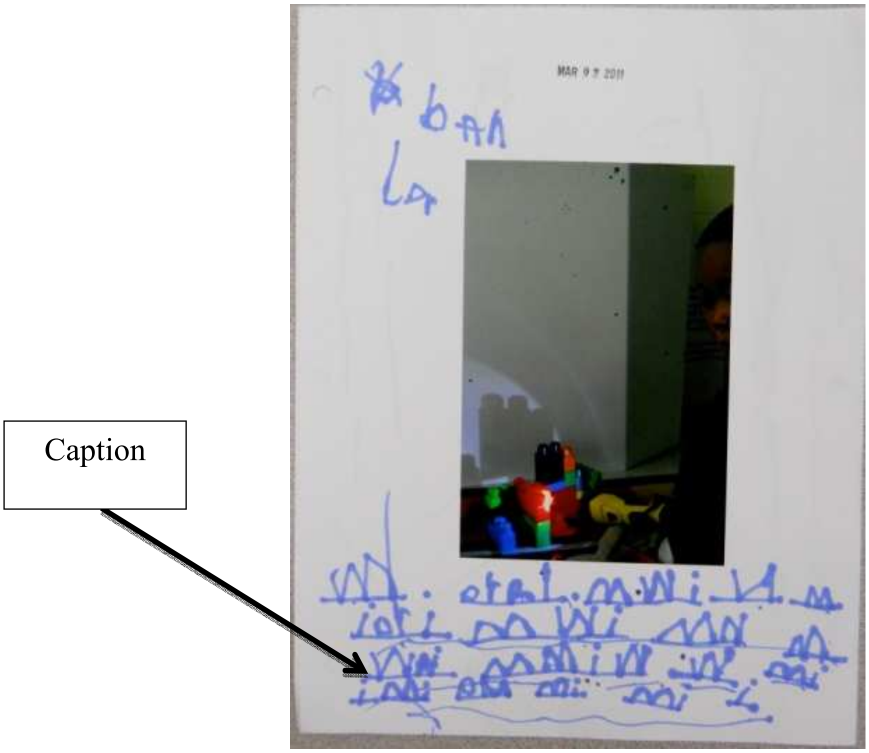


Figure 12. Photograph with caption.

The photograph in Figure 12 shows a child aiming the flashlight at the blocks and a shadow was cast on the wall behind the tower. Jordan wrote his caption below the photograph and read the following message, "The flashlight and blocks make a shadow" (Transcript, March 3).

In this category, Andre was the only child who read a message for a caption that was semantically related but not fully matched to the photograph. He completed a journal entry that included photographs of two different leaves and read, "The plant grows for a long day" (Transcript, April 13). In this way, his message was semantically related to the image but not entirely accurate. He wrote in a more general way about plants and growth rather than specifically about the leaves under investigation.

A smaller group of children either produced a message that was semantically unrelated (n = 1) or provided no message (n = 1). In the light unit, Jordan used a photograph of the shadow puppet investigation in his journal and proceeded to repeatedly write the letter *M*. He read, "I made lots of Ms" (Transcript, March 7). Although this verbal message matched his print, it did not semantically match the photograph of the shadow investigation.

Table 21

Photograph with a Caption: Message Type

Message Type Response	Number of Entries
Message described the photograph by naming a feature of the photograph	7
Message named a characteristic event associated with the topic of the photograph	2
Message was a personal statement	1
Message described the photograph in a semantically related way but used terms inaccurately	1
Message described the marks made	1
No message given	1

When writing captions, the children provided a variety of message types to accompany their photographs. However, most frequently (n = 9) the children provided a message that described a feature that was evident or visible in the photograph or named a characteristic event associated with the topic of the photograph. In the light unit, Samaya read, "There was a little light" (Transcript, February 14). This message accompanied her photograph of light shining through opaque fabric in the cardboard house investigation. Samaya used her message to describe what the photograph showed.

One child's message was a personal statement about the topic under investigation. Haley glued the photograph of the shadow puppet in her journal, wrote her caption, and then read the message, "I like the shadow" (Transcript, March 8). Although this message pertained to the topic of interest, she did not provide any new information about the nature of shadows. Rather, her message provided the reader with information about the author and was not conventional for informational text.

Labeled photograph: A diagram. The children also produced journal entries that consisted of a photograph with one or more added label lines or labels. Table 22 shows how the children's verbal messages were distributed across the grounded categories related to emergent abilities to use labels with photographs. With these journals, only one label was coded per entry. If a child used more than one label, I coded the most semantically accurate label.

Table 22

Labeled Photograph: Labels

Label Message	Number of Entries
Label message matched the identified object in photograph	9

In this category, all the children used at least one label name and label line with a message that accurately located and identified an object in the photograph. Figure 13 provides an example of a labeled photograph.

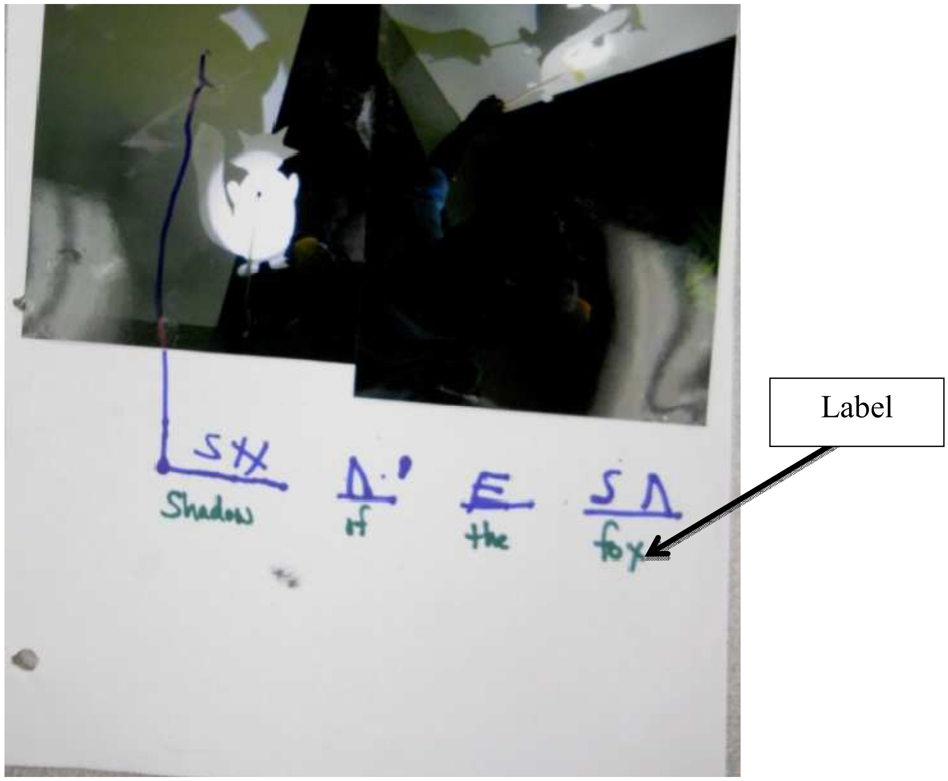


Figure 13. Photograph diagram.

In photograph diagrams (Figure 13), the children used labels and label lines to identify and name features of photographs. For example, the children labeled various images of shadows and read messages such as “shadow of the fox” (Transcript, March 8) and “shadow” (Transcript, March 1). In the plant unit, L’Yonna located and identified the “strawberry” leaf and the “bean” plant leaf in the respective photographs in her journal entry (Transcript, April 3).

Labeled photograph: A diagram with caption. When given a photograph to include in their journal entry, some of the children turned the photograph into a diagram by adding one or more labels and also adding a caption to accompany the photograph. Tables 23, 24, and 25 show how the children’s verbal messages were distributed across the grounded categories related to emergent abilities to use labels in a photograph and to write a caption for the same photograph. In these entries, I coded the children’s responses once for a semantic match between the message and the photograph (see Table 23), once for the type of message (see Table 24), and once for the most sophisticated label used in the entry (Table 25).

Table 23

Labeled Photograph With a Caption: Message Match

Message Match Response	Number of Entries
Message semantically matched photograph	7
Message was semantically related to the photograph	4

When creating captions for photograph diagrams, the children most frequently responded (n = 7) by providing a message that semantically matched the labeled photograph. In the light unit, the children used the magnified photograph of the tulip in their entries. Some of the messages they read included "petal of the tulip" (Transcript, April 20) and "pollen dust" (Transcript, April 20).

A smaller group of children (n = 4) wrote a caption and provided a message that was semantically related to the photograph used in the journal. For example, in the light unit, Haley wrote a message about the magnified photograph of the tulip she had labeled. She read the following message, "Flower a still is root" (Transcript, April 21). Haley used terms such as *flower* and *root* but not in an entirely accurate manner. So, her message was semantically related but not an accurate match for the photograph.

Table 24

Labeled Photograph With Caption: Message Type

Message Type Response	Number of Entries
Message described the photograph by naming a feature of the photograph	8
Message named a characteristic event associated with the topic of the photograph	1
Message described photograph in a semantically related way but used inaccurate terms	2

When writing captions for photograph diagrams, the children most frequently provided a message that named a feature of the photograph (n = 8) or a characteristic event associated with the topic of the photograph (n = 1). In the light unit, Samaya read “Shadows” for her caption accompanying the labeled photographs of the big and little shadows. Her message described the content of the images.

A smaller group of children (n = 2) wrote a caption and provided a type of message that described the photograph in a semantically related way but might have used terms inaccurately. For example, in the light unit, Leaun used two labeled photographs of the big and small shadows that were created with the shadow puppets. She wrote her caption and read the message “Light comes from the shadow.” In demonstrating her emergent understandings, Leaun used key terms but in a conceptually confusing manner.

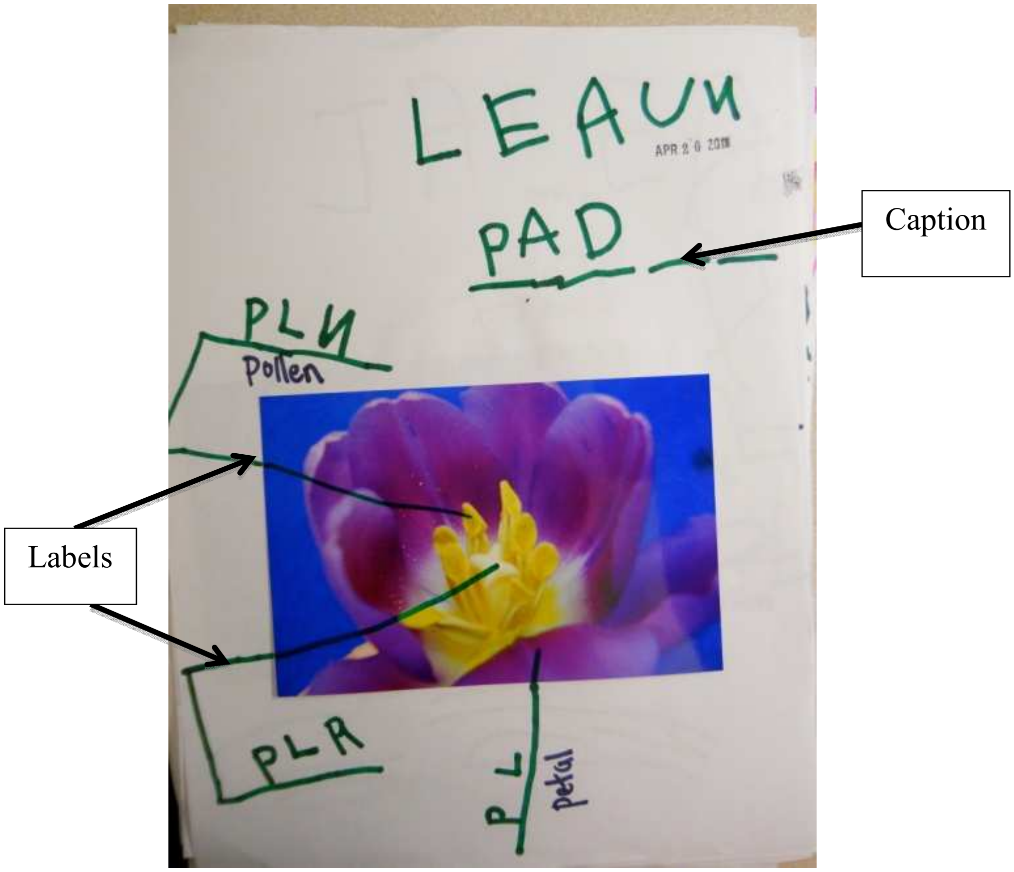


Figure 14. Photograph diagram with caption.

Table 25

Labeled Photograph With Caption: Labels

Label Message	Number of Entries
Label message matched the identified object	10
Label message was semantically related to the object identified	1

When creating photograph diagrams with captions, almost all of the children (n = 10) used a label and provided a message for that label that accurately located and identified a feature in the photograph. For example, in the plant unit, the children labeled the magnified photograph of the tulip with “pollen,” “dust,” or “petal.” See Figure 14 for an example of how Leaun labeled the features of the magnified tulip. In the light unit, the children accurately located and identified “shadow,” “puppet,” and “light.”

Summary of photograph use. Typically, when the children provided a caption for a photograph in their journal entry, the verbal message semantically matched the image. With their captions, the children most frequently described a feature of the photograph. In addition, almost all the children who labeled a photograph were able to accurately locate and identify at least one feature and produce a message for that label that semantically matched the feature.

Drawings

Overall, there were 31 journal entries that included the children’s drawings. In 13 of those entries, the children wrote a caption to accompany the drawing. In the remaining entries, the children either created a diagram by adding one or more labels (n = 9) or created a diagram with a caption (n = 9). I further discuss each of the three ways the children used drawings.

Drawing with a caption. On occasion, the children drew something they had observed and wrote a caption to accompany the drawing. Tables 26 and 27 show how the children’s verbal messages were distributed across the grounded categories related to emergent abilities to write a caption for a drawing. In this question, I coded the children’s responses only once for a semantic match between the message and the drawing (see Table 26) and once for the type of message (see Table 27).

Table 26.

Drawing With a Caption: Message Match

Message Match Response	Number of Entries
Message semantically matched drawing	9
Message did not semantically match the drawing	4

When writing captions for drawings, the children most frequently (n = 9) provided a message that semantically matched their drawing. For example, in the plant unit, Jordan drew a picture of the strawberry that he was observing (Figure 15). He read, "Orange seeds come from the strawberry" (Transcript, April 20).

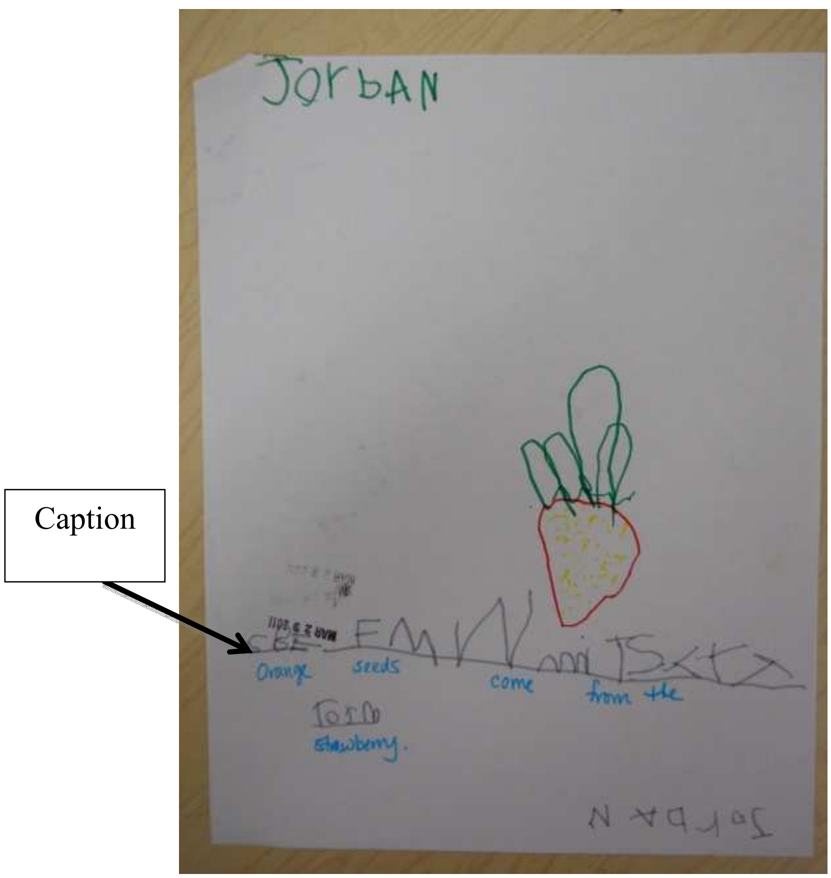


Figure 15. Drawing with a caption.

A group of children (n = 4) wrote captions and provided messages that did not semantically match their drawings. For example, Haley drew a picture of herself in her journal. She read, “The bug inside of the bug fly” (Transcript, April 13). Although Haley’s message was semantically related to the conversation we were having about the diet of the Venus flytrap, her drawing was not about our investigation.

Table 27

Drawing With a Caption: Message Type

Message Type Response	Number of Entries
Message described the drawing by naming a feature of the drawing	3
Message named a characteristic event associated with the topic of the drawing	3
Message described drawing with some semantic accuracy but used inaccurate terms	4
Messaged named characteristic events associated with a previous topic	2
Message named features of print	1

When writing captions for drawings, the children provided a variety of message types. The largest group of responses (n = 6) described features or characteristic events related to the drawing. For example, during the plant unit, two different children drew images of a particular plant that we were monitoring for growth. They each wrote their accompanying captions and read their marks, “No change” and “The roots don’t grow.”

Another group of children (n = 4) provided a message that was semantically related to the drawing in the journal entry. In these cases, the children typically used the key terms for the unit but in ambiguous ways. For example, in the plant unit, Andre included a drawing of the Venus flytrap, wrote his caption, and read, "The plant will grow for 2 hours" (Transcript, April 18). Andre's use of the terms *plant* and *grow* indicated his message was semantically related to the topic. However, his reference "for 2 hours" did not match the drawing in the journal.

Lastly, a few children (n = 3) provided a message that was not related to the drawing. Andre drew the blackberry that he had dissected and wrote a caption. He read his message, "The light don't go through the flashlight" (Transcript, March 30). In this case, Andre was recalling and reusing terms from the previous unit of study.

Labeled drawing: A diagram. In these journal entries, the children turned drawings into diagrams by adding at least one label line and label. Table 28 shows how the children's verbal messages were distributed across the grounded categories related to emergent abilities to use labels with drawings. With these journals, I coded only one label per entry. If a child used more than one label, I took the most semantically accurate label.

Table 28

Labeled Drawings: Labels

Label Message	Number of Entries
Label message matched the identified object	9

When using labels in drawings, all the children provided at least one message for a label that accurately located and identified an object in their drawing. For example, six of the drawing diagrams were of the cardboard house investigation. L'Yonna (Figure 16) created a diagram by drawing the cardboard house and labeling two of its features.

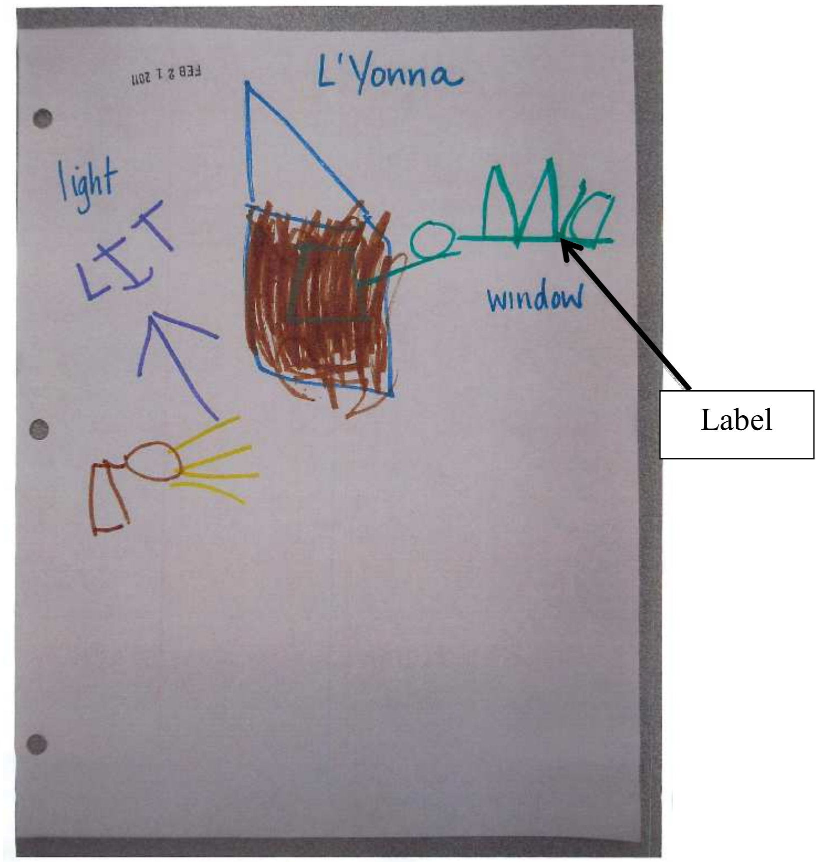


Figure 16. Labeled drawing: A diagram.

Other children accurately located and identified such objects in their drawing diagrams as "window, "light," and "flashlight."

Labeled drawing: A diagram with a caption. These journal entries contained a labeled drawing with a caption to accompany the diagram. Tables 29, 30, and 31 show how the children's verbal messages were distributed across the grounded categories related to emergent abilities to use labels in a drawing and to write a caption for the same diagram. In these entries, I coded the children's responses only once for a semantic match between the message and the drawing (see Table 29), once for the type of message (see Table 30) and once for the most sophisticated label used in the entry (Table 31).

Table 29

Labeled Drawing With a Caption: Message Match

Message Match Response	Number of Entries
Message semantically matched drawing	9

In the entries I coded as a drawn diagram with a caption, the children always provided a message for their caption that semantically matched the drawing. For example, Samaya drew a detailed drawing of a strawberry that showed all of the seeds located on the outside of the berry (Figure 17). She read her message, “The seeds are outside” (Transcript, March 29). L’Yonna drew the apple she had dissected and also showed the location of its seeds. She read her message, “The seeds are inside” (Transcript, March 29).

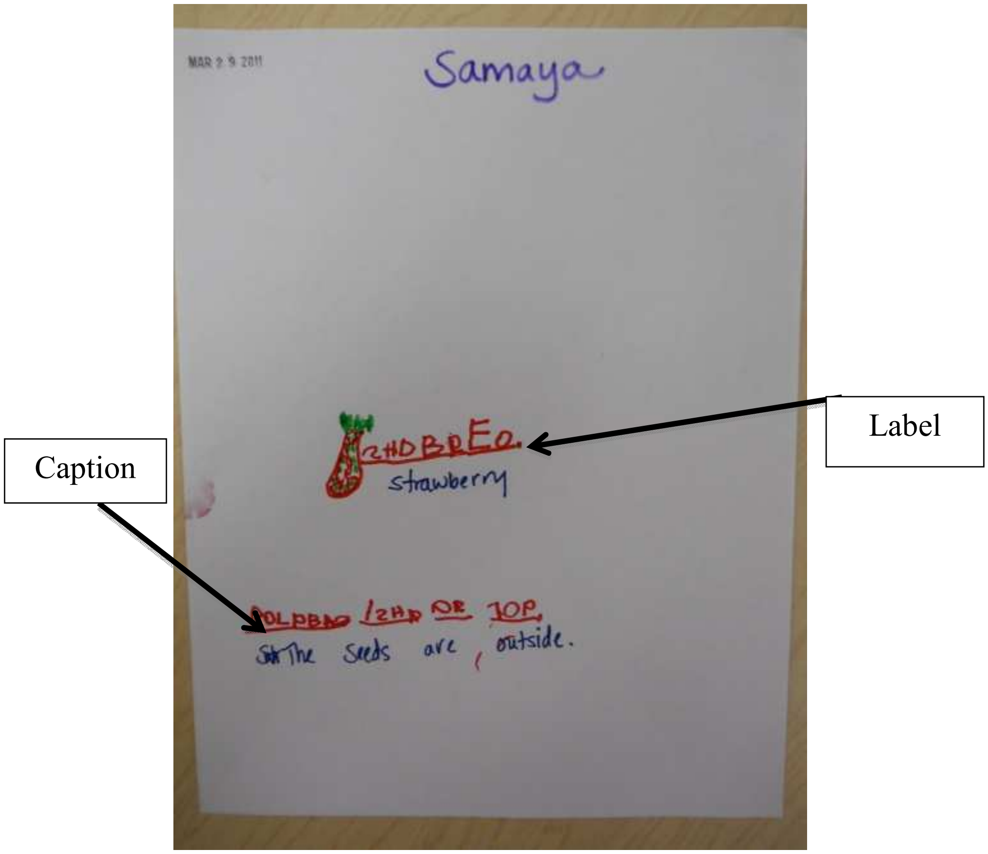


Figure 17. Labeled drawing: A diagram with a caption.

Table 30

Labeled Drawing With a Caption: Message Type

Message Type Response	Number of Entries
Message described the drawing by naming a feature of the drawing	5
Message named a characteristic event associated with the topic of the drawing	4

When writing captions for the photographs, the most frequent type of message the children (n = 5) provided named features in the drawings. Four of these entries were completed on the day the children dissected pieces of fruit. DeCosta drew the apple, wrote his caption, and read his message, “The seeds are in the middle” (Transcript, March 28).

A second group of children (n = 4) provided a message for their caption that named a characteristic event associated with the topic of the drawing. These messages provided information that was not visible in the image. For example, in the plant unit Sabria drew a diagram of the pea plant seedling showing where the roots were located. She wrote her caption and read her message, “Roots don’t want that much sunlight” (Transcript, April 4). Sabria’s message did not simply name a feature of the drawing. Rather, she took a more distanced stance from the image to write about the general needs of roots.

Table 31

Labeled Drawing With a Caption: Labels

Label Message	Number of Entries
Label message matched the identified object	9

All the children produced at least one message for a label that accurately located and identified an object in a diagram. Samaya located and identified the strawberry and produced the message, “Strawberry” for her label (Figure 17). Other children accurately located and identified the “seeds” in their drawings. “Roots” were also accurately located and identified in the drawings of two other entries.

Summary of drawing use. Most frequently, when the children provided a caption for a drawing in their journal entry, their message semantically matched their image. The majority of the children who wrote captions to accompany their drawings either provided messages that described a feature of the drawing or a characteristic event associated with the topic of the drawing. In addition, all the children were able to produce a message for a label that accurately located and identified a feature in the drawing.

Scale: Use of Magnified Images

In 2 weeks of each unit, focal children were given the opportunity to use magnified images in their science journal. In the first week, I drew a demonstration diagram of a magnified fern leaf. However, none of the children accepted the subsequent invitations to use scale in their own drawn diagrams. During the final week of the study, I introduced a magnified photograph of a tulip and asked the children to diagram its features in their journals.

Overall, the focal children produced six entries using this magnified image of the tulip. The children did use the magnified photographs in their journals to make observations with labels and/or captions. In the following examples, L'Yonna (Figure 18) and Samaya (Figure 19) used the magnified photograph of the tulip to create a labeled photograph with a caption.

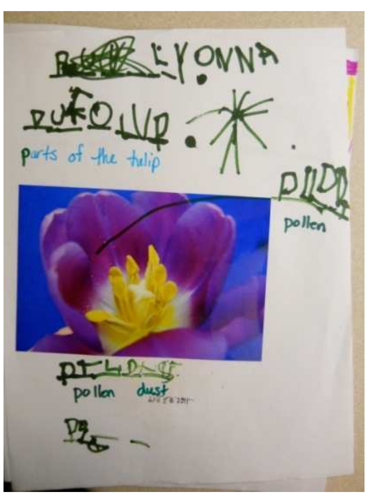


Figure 18. L'Yonna's journal, April 20.

Figure 19. Samaya's journal, April 20.

L'Yonna (Figure 18) used a label line to locate the pollen in her photograph and read, "pollen." She also wrote her caption and read her message, "pollen dust." Samaya (Figure 19) used label lines to locate four distinct features of the flower and provided messages for her labels that included technical terms, such as *anther* and *stamen*, to identify features in the photograph.

It may be that the use of magnified photographs created a medium for the children to demonstrate a heightened ability to name specific features in images. Although we discussed the various parts of the flower, including the anther and the stamen, it could have been the actual magnified image that showed the parts so obviously and afforded the opportunity for the children to locate those parts through label lines in a diagram. Future research could test this as a potential hypothesis.

Summary: Children's use of magnified images. Despite multiple demonstrations of using magnified drawings in journals, none of the children produced such a drawing in their journal. On all occasions that children used a magnified photograph in a journal entry, they chose to create a diagram that labeled individual features of the flower. This propensity to label these types of photographs so specifically could be related to the affordance provided by the use of magnified images.

Headings

In 2 weeks of each unit, I invited the children to include headings in their journal entries. In my demonstrations and invitations, I emphasized that headings were used to tell "what this page is all about." Therefore, I encouraged the children to write headings that categorized the information on the page. To do so, I included two or more objects to help the children generate a supracategory for the topic (e.g., two different types of shadows or two different types of leaves).

Overall, focal children produced five entries using headings in their journals. The headings were always located at the top of the journal page. It was possible that the children intended to use headings but located them within the body of the entry, which made them difficult to identify.

When the children did use headings in journal entries, they demonstrated emergent efforts to categorize information on the page. On three of the five occasions that the children wrote headings, they provided a semantically appropriate categorical message for the heading. On the other two occasions, the children demonstrated more emergent uses of headings and provided messages that were only semantically related to the information on the page. In the following examples, L'Yonna (Figure 20) was explicit in her intention of using a heading.

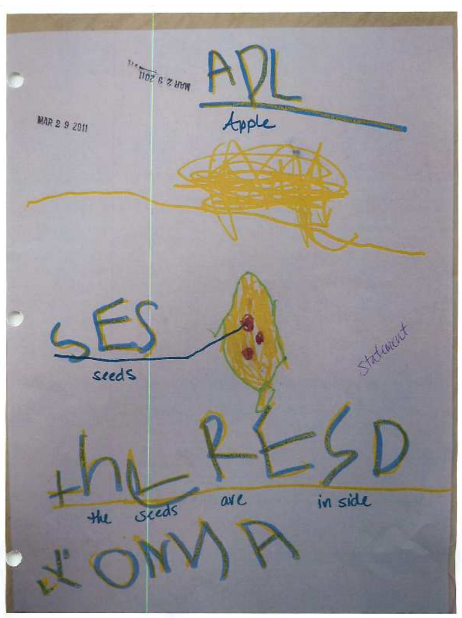


Figure 20. L'Yonna's journal, March 29.

L'Yonna (Figure 20) wrote her heading and read, "Apple." All of the other elements on her page, including the drawing, label and caption, were about apples. She effectively used the heading to categorize the visual images and text on the journal page. On the contrary, DeCosta wrote and read the heading "Light" for his journal page. His message for his heading, although semantically related to the information on the page, was not entirely accurate as his two photographs and both of his labels were about the shadows.

Summary: Children's use of headings. On all occasions that the children wrote a heading in a journal entry, they attempted to provide a message that categorized information on their journal page. The children typically did this by generalizing about the individual labels and captions on the page. The children demonstrated emergent abilities to generalize as some messages for headings were more semantically appropriate than others.

Relationships Between Form and Message in Labels and Captions

As demonstrated by images of the children's journals, they often used unconventional forms when writing labels and captions. Rowe (1994, 2008a, 2008b) demonstrated that emergent writers often produce more sophisticated verbal messages than their written form indicates. In the next section, I describe the relationship between the children's written form and their ability to verbally produce messages for labels and captions that semantically matched the visual image in the journal.

In this analysis, I placed the children into categories of written form based on how they scored on the WriteStart! Writing Assessment Form Rubric. Children demonstrated three general types of form in their journals: letterlike forms and/or a personal manuscript, a mix of conventional letters and/or letterlike forms with no letter/sound correspondence, and conventional letters with varying degrees of letter/sound correspondence. I placed the children's written labels and captions into one of these categories of written form.

In the analysis above in this chapter, I describe my coding of the messages the children produced for labels and captions for message match—the semantic match between the verbal message provided for the label or caption and the image. I collapsed this data to create two categories in order to demonstrate the relationship with form. All of the children who did not provide a message that semantically matched the image, either "semantically related" and "not semantically related," I placed in one new category titled "semantic approximation." The second category, "semantic match," remained the same in both analyses.

The children consistently wrote and read the labels they produced in diagrams using photographs and drawings. Table 32 reports the distribution of the children's emergent responses related to written form and the semantic match of messages for labels.

Table 32

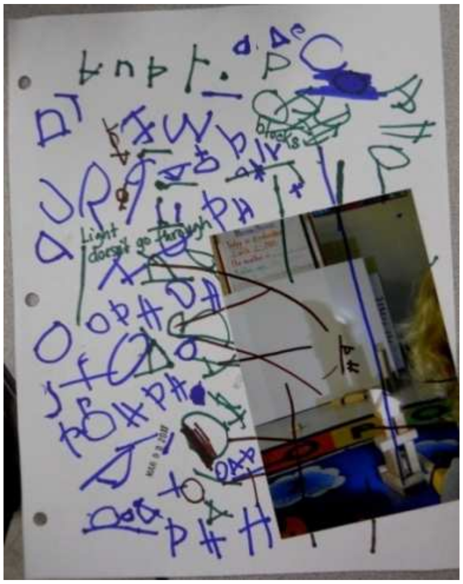
Labels: Form and Semantic Match of Message

	Form: Letterlike marks and personal manuscript	Form: Conventional letters and letterlike marks	Form: Conventional letters with letter sound correspondence
Label message: Semantic match	4	7	26
Label message: Semantic approximation	1	0	0

When the children wrote labels in their journals, they overwhelmingly made a semantic match between their verbal message and the feature they intended to identify. The children also typically used conventional written forms when producing labels. In fact, 68% of the labels were written using conventional letters with letter/sound correspondence. In these cases, the children used conventional letters with sounds represented for first letters, first and last letters or most letters in the word.

The relationship between the children's written form and their conceptual reading of the label showed interesting patterns. Of all the labels with semantically accurate messages, 70% of them were written using conventional letters with letter/sound correspondence. Nineteen percent of those semantically accurate labels were written using a mix of conventional letters and letterlike forms. Lastly, 11% of the semantically accurate labels were written using letterlike forms and personal manuscript.

These data demonstrate that children of all form levels were able to verbally produce a message that semantically matched their label. For example, consider the labeling of the photographs in the following two journal entries (Figures 21 and 22).



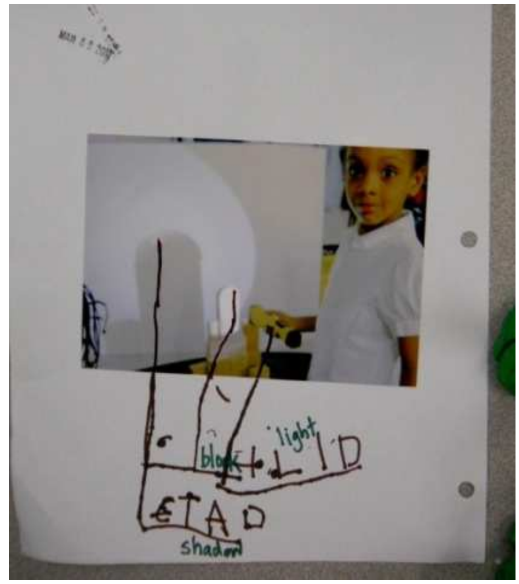


Figure 21 Andre's journal, February 24.

Figure 22. Sabria's journal, February 24.

I asked Sabria and Andre to label the important features in their photographs. In my demonstration, I labeled the blocks, the light source and the shadow. I also invited the children to label these features in their own entries. Andre (Figure 21) used personal manuscript and letterlike marks when completing his photograph diagram. He drew numerous label lines potentially locating many different features in the photograph, and his letterlike marks and personal manuscript covered the page. However, the two labels that he did read, "blocks" and "light doesn't go through," accurately located and identified features in the photograph. He used the labels to make accurate observations about shadow making.

Sabria used conventional letters with letter/sound correspondence when completing her photograph diagram (Figure 22). She distinctly labeled three features in her photograph—the blocks, the light, and the shadow—using conventional letters and beginning letter/sound correspondence. Her lines clearly located an individual object, and her ascribed meaning for each label matched the identified object. Both Andre and Sabria used labels accurately to locate features and then accurately identified those features in the messages they provided. However, they each did so using very different levels of written form.

The children consistently read the captions they produced to accompany diagrams, photographs and drawings. Table 33 reports the distribution of the children's emergent responses related to written form and semantic match of messages for captions.

Table 33

Captions: Form and Semantic Match of Message

	Form: Letterlike marks and personal manuscript	Form: Conventional letters and letterlike marks	Form: Conventional letters with letter/sound correspondence
Caption message: Semantic match	5	19	11
Caption message: Semantic approximation	5	4	2

When the children wrote captions, they typically provided semantically appropriate messages that matched the adjacent image. Most frequently, the children (n = 23) used writing forms with moderate levels of convention when producing their captions. In fact, 50% of the captions written by the children were done so using conventional letters and letterlike marks with no letter/sound correspondence.

The analysis of the relationship between the sophistication of the children's written form and their messages for their captions yielded interesting patterns. Of all captions with semantically accurate messages, 14% of them were written using conventional letters with letter/sound correspondence. Fifty-four percent of the semantically accurate captions were written using a mix of conventional letters and letterlike forms. Lastly, 32% of the semantically accurate captions were written using letterlike forms and personal manuscript. These data demonstrate that children of all levels of written form produced verbal messages for captions that semantically matched the image in their journal. For example, consider Figures 23 and 24 for the relationship between written form and semantic match of message.

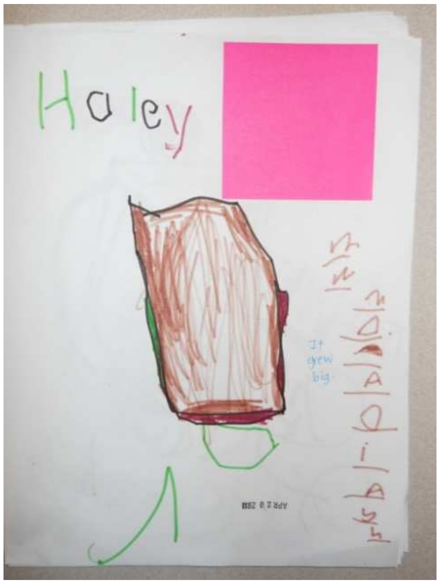


Figure 23. Haley's journal, April 20.

Figure 24. Decosta's journal, March 28.

Both children produced messages for captions that semantically matched the image that they had drawn in their journal. However, they each did so with very different levels of written form. In Figure 23, Haley used predominately letterlike marks to write her caption. She made her marks to the right of her drawing of a potted plant and provided the message "It grew big." She used letterlike forms interspersed with a few conventional letters.

DeCosta used conventional letters to write his caption (Figure 24). His message, "The seeds are in the middle," accurately matched the image of the apple that he had drawn. He used conventional letters with beginning and ending letter/sound correspondence to write some of the words in his caption. As with the labels, children of all levels of written form were able to produce semantically appropriate messages for the captions accompanying their drawings and photographs.

Conclusions

When prekindergarten children were provided rich demonstrations and invited to participate in informational text writing with authentic reasons to use genre features, they demonstrated emerging uses of the trademark elements of informational texts in their own writing. In this study, focal children adopted the structures of informational texts when reading their messages in science journals. In addition, the children also used the visual elements of informational texts when creating diagrams with photographs and drawings.

The structures used by the prekindergarten children in this study were nearly equally divided between a word or phrase and a statement. In part, this nearly equal division may be attributed to the fact that most demonstration entries I used with the children had those structures. The children rarely used structures that were more than one sentence long when producing messages for labels and captions in journals. Donovan (2001) found a similar pattern with kindergarten children.

As demonstrated in similar research with older children (Pappas & Varelas, 2009), these emergent writers did use visual genre elements such as photographs and drawings in their journals. In creating diagrams with these images, the children in my study used labels to locate and identify salient features and captions to support the image. The journal entries were nearly equally divided between those that contained photographs and those that contained drawings. In part, this nearly equal division may again be attributed to the equal number of demonstrations and invitations for each that I provided the children.

Looking at both visual elements, there were patterns in the verbal messages the children read for their captions. First, whether a photograph or drawing, most of the children produced a message that semantically matched the image's content. This semantic match showed that these prekindergarten children could accurately provide conceptual information and vocabulary related to the scientific phenomenon they encountered during guided inquiry. Second, regardless of the type of image, the children most frequently provided a type of message that described features in images or named a characteristic event associated with the subject of the image. The children used their captions to record their observations about the subject of the image.

Almost all of the prekindergarten children in this study were able to use labels to accurately locate and provide messages that identify a feature of an image in either a photograph or a drawing. Significantly, the children were able to use labels regardless of the image type. In labeling features, the children turned visuals into diagrams that provided more detailed information than the image alone could convey. They also had to accurately read images to locate and identify semantically appropriate features.

Even though the children were consistently invited to include drawings that used magnified images in their journals, they did not accept those invitations. None of the children independently produced a magnified drawing in their journals. As the children had significant amounts of support to produce scale drawings, we might infer that this was an element that was conceptually difficult for these prekindergarten children. However, when provided with a magnified photograph of a flower, the children were able to successfully use that image by creating diagrams and diagrams with captions. The children were able to read the magnified image and glean information from it to locate key features with the labels and captions.

Producing headings was also more challenging for the prekindergarten children in this study. During the 2 weeks I encouraged the children to produce their own headings, only five of the entries demonstrated heading use. These attempts showed emergent efforts to categorize information by creating a more general term that applied to the messages, labels and images on the page. Typically, these efforts to produce headings were made at the end of the journal writing session—when the children could reflect upon all of the other marks and images on the page.

The analysis of connections between the sophistication of writing forms and messages demonstrated that form was not a limiting factor for the children. The children who used lower levels of conventional writing forms still had meaningful participation in the science journal process. Even though the writers may have demonstrated very emergent marks, they produced sophisticated and semantically appropriate conceptual understandings and vocabulary related to the scientific phenomenon under investigation.

CHAPTER VII

CONCLUSIONS

In this chapter, I provide a brief summary of this study and the research questions. Then I discuss the significant findings from each of the research questions. In this section, I link these significant findings to relevant research literature by comparing and contrasting findings. Lastly, I highlight the implications of these findings for research and practice.

Summary of the Study

The findings I present in this report provide initial understandings about informational text writing in prekindergarten. As with other studies (Duke & Kays, 1998; Pappas, 1993; Purcell-Gates et al., 2007; Smolkin & Donovan, 2001), the focus of this research was the informational text genre, a key type of nonfiction. I designed this study to yield data that would provide an understanding of prekindergarten children's informational text writing in science journals. First, I described children's understandings of key informational text genre elements in book reading scenarios. Second, I demonstrated how informational text writing, in the form of science journals using informational text genre elements, was produced in social interaction. Lastly, I discussed the nature of children's informational texts in science journals when they were explicitly invited to use key informational text genre elements.

The research questions for the study were the following:

- What do a group of prekindergarten children understand about informational text genre features?

- How are science journals produced in social interaction when children are invited to use informational text genre features such as photographs, labels, headings, diagrams and scale?
- What is the nature of children's emerging representations in science journals when they are purposefully invited to use these informational text features?

In this study I used a constructivist inquiry design (Lincoln & Guba, 2000) and took a participant/observer role. In this role, I assigned and taught two guided inquiry science units. This role as teacher allowed me insider access to the unconventional productions of emergent writers in the classroom. The participating children used journals and informational texts to support their hands-on inquiry about the natural world. Specifically, the science units were focused on the topics of light and plants.

Each week, the children engaged in a hands-on inquiry activity. In addition, the children participated in weekly whole group reading sessions of informational texts pertaining to the inquiry. Informational texts were also placed in the writing center and frequently accessed when children wrote in journals. Every week, children completed a science journal entry after participating in guided inquiry. The children and I wrote these journal entries in the writing center. In addition, the children received weekly demonstrations of science journals in large group interactive writing settings.

The science journals served authentic purposes in the inquiry process. I repeatedly positioned the journals as a means of recording our observations about the natural world. I encouraged the children to accurately record what they observed about the phenomena of light and plants as they were engaged in the inquiry. In some cases, the children made observations after the inquiry by writing captions for photographs that depicted them engaged in activity.

The data I collected in this study included videotape, field notes, and written products. I collected the ITI video data before instruction as I wanted to ascertain the informational text feature knowledge of children who had not received any formal instruction around informational text features. The timing of the assessment was significant as little work has been published in the field about how prekindergarten children respond to the visual and textual features of informational texts in a book reading scenario.

As part of the curricular intervention, I taught all lessons in the units. All of my instruction and interactions pertaining to the instructional units were captured on videotape. However, only the videotape of the journal writing sessions was analyzed in this report. I collected all journal entries completed during the study. Using constant comparative analysis, I analyzed the field notes, videotapes, and written products (Strauss & Corbin, 1990). I generated descriptive and analytic categories from these data to show the ways in which the children produced informational texts with genre features and how they used them in their own writing. In addition, through the ITI I elicited the children's understandings about specific informational text features while they participated in a book reading scenario. In the analysis of the ITI and the journal entries, I created grounded coding documents representing the range of the children's emergent responses.

Major Findings: Question 1

The ITI provided the data for this strand of analysis. In the interview, I read portions of an informational text to individual children. During the book reading scenario, I stopped and asked children to respond to the text's genre features including photographs, use of scale or magnified images, labels, headings, cross-section diagrams, and surface diagrams. The analysis of the ITI allowed me to show in detailed ways what was easy and what was hard about the aforementioned genre features. This analysis showed that the children tended to name features in images with relative ease, but it was more challenging for children to take on the perspective of the author to consider the purpose for using genre features. In addition, in this section I report on the difficult nature of assessing the informational text feature knowledge of emergent readers.

What Is Easy and What is Hard About Informational Text Genre Features?

My analysis of the ITI data reaffirmed previous findings (Duke & Kays, 1998; Pappas, 1993) that young children can and do have meaningful and productive interactions with the key features in informational texts. Duke and Kays (1998) and Pappas (1993) conducted similar types of studies that asked kindergarten children to respond to informational texts. However, in both of these cases, children were asked to read an informational text on their own. In this study, I read a text to children and asked them to respond to features as I read. This adaption was necessary as these prekindergarten children were not independent readers.

The nature of the data collected by Pappas (1993) and Duke and Kays (1998) was such that they analyzed children's informational text readings for book language or genre-specific discourse patterns. For example, Duke and Kays (1998) found that after being exposed to almost daily readings of informational texts, 20 preliterate kindergartners in New England were able to adopt common discourse patterns, such as timeless verb construction and more frequent repetitions of topical theme, in their pretend readings of informational texts (Duke & Kays, 1998).

Similarly, Pappas (1993) found that in their multiple readings of informational texts, kindergarten students were able to maintain co-classification in informational texts and that the ability to do so increased over readings. In the second reading, Pappas found that students were able to use more technical vocabulary from the books in their readings. Pappas argued that this evidence of abilities to maintain co-classification and to learn vocabulary from the informational text demonstrated that children were very capable of interacting with and engaging in the discourse necessary for comprehending informational text.

Rather than focus on the genre-specific discourse of informational texts, my study focused predominately on children's responses to specific visual and textual features. Recently, Duke et al. (2012) reported similar data of prekindergarten through third grader's comprehension of visual images in informational texts. Similar to my study, their questions focused on children's abilities to interpret photographs and diagrams (including cross-section and surface). They used a researcher-created tool to assess 60 children. They then randomly selected 12 children from each grade level, including prekindergarten. In their report, they discuss four major findings. First, children's understandings of graphical devices was developmental. Generally speaking, children in second or third grade scored highest on the assessment and children in prekindergarten the lowest. Duke et al. also found that children's understandings of graphics differed by device. They found that many prekindergarten children were already able to understand the use of insets, a wordless graphic. However, they noted that the prekindergarten children had a harder time interpreting pictures with captions. The researchers hypothesized that comprehension of wordless graphics might develop before graphics with words. Duke et al. also found that graphic comprehension differed by child and there was a range to any given child's understandings. A child may score higher on a declarative response but lower on interpretive responses for the same genre feature. Lastly, they found that most children's understandings of graphical devices are incomplete. Even though comprehension of surface diagrams was the relatively highest scoring feature, very few children could describe both the purpose for the feature and then apply that purpose.

The ITI findings both support and further develop the findings of similar research with graphical devices in informational texts by Duke et al. (2012). Similar to Duke et al.'s findings, children's understandings about features on the ITI differed by visual element. However, unlike Duke et al.'s work, the prekindergarten children in this study did not necessarily read wordless images better than images with text. Rather, these children approached the reading of photographs similar to the reading of surface and cross-section diagrams. Most children responded by naming a feature of the image in the diagram. Although children might have been able to provide a topical feature related to the graphic, they gave little evidence that they knew how the graphic device functioned.

As Duke also found, there was a range of responses across the group with some children providing more semantically accurate responses to visual graphics than others. The grounded coding documents describe the semantic range in children's responses from inaccurate, semantically related but inaccurate and semantically accurate. However, all children were able to at least name one semantically accurate feature for a visual graphic.

I also found that children's understandings of visual graphics were incomplete. Very few children answered positively to the function, intent, and metalinguistic naming of a feature. For example, although most of the children could positively answer yes to identify a magnified image in the text, only one of the children responded with a viable reason for why an author would choose to show the image that way.

Unlike the work of Duke et al. (2012), through the ITI I also elicited children's emergent responses to certain textual genre features including labels and headings. In the ITI, many children could respond to the function of labels even though they could not name the feature. No children could identify the term *heading*, and the children most frequently could not discuss the function or intent for using a heading. Moreover, when I asked the children about headings, most cued into the visual image on the page and named features or characteristic events associated with the subject of the image.

The centrality of visual images: Naming. Informational texts contain many graphics (Pappas, 2006). In an analysis of texts (Fingeret, 2008) written for second and third graders, 60% of the graphics in texts contained information that was only available in the image. Eye-tracking research (Roy-Charland, Saint-Aubin, & Evans, 2007; Verhallen & Bus, 2011) tells us that children spend significant amounts of time attending to visuals in shared readings of texts. In fact, Roy-Charland et al. (2007) found that second graders spend 50% of the time attending to visuals in the text. Verhallen and Bus (2011) conducted a study that tracked the gaze of second language learning kindergarten children as they were read storybooks with illustrations. Verhallen and Bus found that children's gaze focused more on those features of the illustration that were mentioned in the text than on those features that were not. In other words, the text limited where the children would look in the illustrations.

Drawing on familiar schemata for responses to genre features. Data from the present study shows that at even younger ages, children spend a good deal of time focusing on the images in texts that are read to them. A major finding from this strand of analysis was children's tendency to cue into visual images and name features of images in informational texts. Some children gave responses that were semantically related or inaccurate. In the case of a semantically related response, children might respond by calling the image of the caterpillar a "bug." This type of reading response has also been observed by Harste et al. (1984) in their seminal study of emergent literacy. Harste et al. analyzed young children's readings of familiar logos in their environment. For example, when asked to read the image/text of a Crest toothpaste logo, many children responded by reading "toothpaste." As children approached the reading of certain images in the ITI, it seems that children similarly approached the reading of logos as found by Harste et al. This suggests that the semantic related response may be a strategy used by emergent readers when they are exposed to novel print or images.

The majority of the children were able to name semantically accurate features apparent in images. This finding is particularly interesting when considered with the findings of Verhallen and Bus (2011). They found that children's gaze was limited by the features discussed or highlighted in the text. In the ITI, I read the children the text and asked them to respond to images. The children were able to name, with relative ease, semantically accurate features of images. A possible hypothesis for this ease could be my reading of the text that highlighted the possible features children would later use in their reading of images.

A subset of the children also named characteristic events associated with the subject of the image but not necessarily described in the text or seen in the image. In doing so, they demonstrated their connection to the content under investigation as many children often pulled information from their conceptual schema for the topic. In schema theory (Anderson, 2004; Bransford, 2004), comprehension is viewed as directly related to world knowledge. World knowledge or content knowledge is information about the natural and manmade world including vocabulary, theories and systems. A person's knowledge consists of a network of schema—a framework of constructs—that are used to help understand, categorize, and assimilate new information. In this theory of learning, when a child is presented with new information, she relates it to already established schema.

In the ITI, I presented children with images of potentially new and unique content. All children were familiar with the term *caterpillar* or *butterfly*. It is likely that most children had a schema for each of these terms. The data suggests that it is possible some of the images in the ITI, such as the large, furry silkworm moth, challenged children's existing schema. None of the children used the term *moth* to describe this photograph. Rather, some children read the visual image and produced a term that was semantically related, *butterfly*. Upon viewing this novel image, children placed the object in an already, existing similar schema as both of the images had wings and similar body structures.

Connections to adult/child book reading events. A possible reason for the relative ease with which children participated in the naming of images could be the influence of traditional book reading practices (Heath, 1982; Ninio, 1980; Ninio & Bruner, 1978; Snow & Goldfield, 1983). This research shows that when many parents read books with their children, an emphasis is often placed on labeling images in texts. Names are often elicited from children as caregivers point to features of images. Children are frequently asked to provide information about the text or images by questions that ask children to identify features.

The ITI, in many ways, followed a traditional book reading scenario. I designed the protocol to include many questions that asked children to identify genre features or features of images. Most frequently, the children would respond accurately by naming a feature. However, with the ITI I asked children to respond to more analytic questions. When asked to respond to why an author might include a feature, the children would provide labels or names for features even when the question I asked them did not ask them to do so. This suggests two potential hypotheses for further investigation. First, perhaps children reverted to naming as it was a familiar book reading practice (Heath, 1982; Ninio, 1980; Ninio & Bruner, 1978; Snow & Goldfield, 1983). Second, perhaps children, when confronted with a more challenging question, relied on a practice with which they had known success. All the children were able to name semantically accurate features in a photograph; however, fewer were able to accurately respond to questions that asked them to consider the function of genre features or the author's intent to use such features.

Relative difficulty of genre features: Considering authorial intent. Certain individual genre features and facets of those genre features seemed more difficult for children than others. Of the individual genre features, responding to headings seemed to be a difficult task for children. The majority of children gave no evidence that they understood what a heading was or how it functioned. Similarly, although most children could identify when magnified scale was being used in an image, the majority could not provide any evidence that they knew how scale functioned.

As previously mentioned, children were asked to respond to different dimensions of particular features including metalinguistic identification, function, and authorial intent. Authorial intent, requiring children to take up the perspective of another was more difficult. Approximately 50% of children demonstrated they understood the purpose of informational texts—to inform readers. This was evident when they were able to respond positively to one of the questions about why an author would use particular features in a text. The other half of the children had a difficult time shifting from their own perspective to that of the author's in order to consider the intent for using particular features. When children did respond to the author's intent, they demonstrated the ability to use metatalk that distanced themselves from the immediacy of the images and print in the text.

The field of cognitive psychology offers insight into children's abilities to take on the perspectives of others (Piaget, 1962) that are potentially helpful for this analysis. Piaget (1962) argued that children moved from egocentrism to sociocentrism through a series of four developmental stages. In this theory, children from the ages of 2–7 are in a preoperational stage that is characterized by egocentric thought where children cannot adopt the viewpoint or perspectives of others. According to Piaget, the operational stage (6–12 years) is characterized by children's abilities to undergo concrete thinking and a move from solely egocentric thought.

Fifty percent of the children in this study were not able to take on the perspective of the author of the informational text. Piaget would have classified these children in the preoperational stage where egocentric perspective tends to strongly dominate thinking. However, in contrast to Piagetian theory, the other 50% of the children were able to shed an egocentric perspective to respond to the position of the author. This finding coincides with the work of Donaldson (1978), who suggested that the stages Piaget suggests in his work are not to be so clearly defined by age boundaries. As in my study, Donaldson suggested that the stages are often blurred and children cannot be categorized so definitively into solely one or the other.

In her research, Donaldson (1978) also found that young children could more easily take on the perspective of another when the task was a more familiar one. In this study, approximately one out of every two children could take on the perspective of the author to discuss intent for using genre features. This suggests a possible hypothesis to pursue is the relationship between children's understandings of the purpose of books and authors and their ability to shift their perspective to that of the author. Perhaps, the children who were able to adopt the perspective of the author were more generally familiar with the purpose of books and the work of authors.

Difficulty of assessing genre knowledge of emergent readers. Assessing the informational text feature knowledge of prekindergarten children was not an easy task. As research indicates (Duke, 2000; Pentimonti et al., 2010; Yopp & Yopp, 2006), it seems reasonable to speculate that the participant children in this study have had little contact with informational texts and their features. This lack of exposure combined with the unconventional nature of the young readers necessitates an approach that highlights children's emergent responses. The ITI and resulting grounded coding documents used in this study provide the research field with a standard task developed for 4-year-olds.

I created this assessment to assess children's knowledge of genre features in a book reading and discussion interaction. I designed the task to emulate an interactive read aloud but in a one-on-one context. This research supports and builds upon the standard tasks that are in development at the LARC (Billman et al., 2008; Duke et al., 2011; Hilden et al., 2008).

As already discussed, Duke et al. (2011) have also developed a standard task meant for pre-K through third grade that assesses children's knowledge of visual genre features. Although Duke et al.'s task covers different visual features, such as inserts and tables, it similarly covers diagrams and photographs. The assessment asks children to respond to discrete images that have been pulled from multiple sources.

The ITI, although assessing similar features, accomplishes the task differently than Duke et al. (2011). The ITI is meant to replicate a book reading scenario. This is more like other work completed at the LARC (Billman et al., 2008; Hilden et al, 2008). However, these assessments—the Informational Strategic Cloze Assessment and the Concepts of

Comprehension Assessment—were not developed for children as young as prekindergarten and do not as heavily emphasize the assessment of graphic genre features. In contrast, the ITI contributes a standard assessment for 4-year-olds but also allows the researcher to see children's responses to visual and textual genre features in the context of an informational text. In this way, the assessment is positioned to be more similar to the authentic read-aloud experience they would have encountered in the classroom and at home.

This issue of authenticity of task is one essential to the fields of both emergent literacy (Rowe, 2008b) and the integrated literacy/science field (Bravo et al., 2008; Gelman & Brenneman, 2004). Informational text literature also emphasizes the role of authenticity of task when asking children to comprehend informational texts (Purcell-Gates et al., 2007). In a longitudinal study of 420 primary grade children, Purcell-Gates et al. (2007) tested the impact of explicit teaching of genre features on reading comprehension. Purcell-Gates et al. found a strong relationship between the degree of authenticity of the reading and writing activities during science instruction and growth for four of the five literacy outcomes.

The analyses of the ITI questions suggested possible limitations to the current version of this assessment. Some of the uninformative responses given by children for the features that seemed more difficult to understand could be related to the nature of the questioning in the ITI. Some of the questions, particularly the yes/no ones, elicited little information about what children truly knew about a concept. For example, one of the questions about scale asked children to respond *yes* or *no* if the caterpillars in the image were "really that big." Considered individually, these binary responses tell me little about whether or not the children understood how scale functions. This was a particularly important reason I analyzed the questions, including yes/no questions, in aggregate.

The children's frequent response of "I don't know" on the ITI did not contribute to my ability to discuss the emergent ways children responded to features. However, in cases such as identification of headings, where 71% of the children responded with "I don't know," it does suggest that the term *heading* was likely a very unfamiliar term for almost all of the children. In this case, the children did not even provide an alternative response that indicated they might have known something about the function of the feature or the content of the image.

Major Findings: Question 2

The second strand of analysis concerns how science journals with informational text features are created in social interaction. The data from this analysis were the 24 journal writing sessions that I engaged in with small groups of children. These journal sessions took place as we were making observations about actual artifacts, such as in the plant unit, or after the guided inquiry, more commonly seen in the light unit. I invited the children to complete journals using informational text features to label, organize, or make observations about their own drawings or photographs. The data I collected consisted of videotape of all journal sessions and the science journals produced in those sessions.

In large part, these findings reaffirm existing literature around emergent writing. These young writers benefited from meaningful demonstrations (Clyde, 1987; Harste et al., 1984; Smith, 1994). Similar to Smith (1994), I also found that the production of journals was deeply related to the ways in which, as the teacher, I could show them how journals were written. Similar to Clyde's (1987) analysis of emergent writing, the children's responses to my demonstrations served to inform the instructional interactions I had with children around the use of informational text genre features in their journals.

In addition, the journal writing process was supported by authentic invitations to write (Harste et al., 1984; Rowe, 1994; Smith, 1994). Similar to Harste et al.'s (1984) findings about invitations, I also found that the functional nature of the invitation to write or draw in science journals particularly supported the writing process. In this study, I asked the children to draw their observations and label them with print so as to make a record of their conceptual understandings about scientific phenomenon.

Lastly, the journal writing process was supported by the acceptance of the children's approximations of print (Short et al., 1996). As Short et al. (1996) found, I similarly found that the acceptance of children's approximations allowed me to truly see the children's capabilities. As the teacher, I found this approach was also particularly helpful in encouraging children to begin to participate in the journal writing process. As a researcher, I found this approach to emergent writing also influenced the way I looked at the data. Through encouraging and later analyzing children's emergent approximations at genre features, I was able to describe such matters as the relationship between conventional print and meanings attributed to captions for photographs and labels in diagrams.

Although the production of science journals shares many similarities with the general emergent writing process, this research specifically contributed new findings to the field of emergent informational text writing. These findings include the crucial role the informational text, both trade books and demonstrations of science journals, played in the writing process. In addition, these findings provide an analytic discussion of the significant role of the teacher in scaffolding the use of informational text genre features.

Role of Informational Text in Science Journal Writing

A major finding from this analysis was the key role of the informational text during the journal writing process. As seen in research with older children (Palincsar & Magnusson, 2001; Ford, 2001), informational text trade books helped children make sense of observed phenomenon. Palincsar and Magnusson's (2001) research with the integration of guided inquiry science and literacy offers insight into the use of informational texts in the service of science learning. They argued that in an integrated literacy/science curriculum children undergo primary investigations through science inquiry and secondary investigations through the use of informational texts. Their research found that informational texts can reinforce understandings from the primary investigation, offer insight into fields or concepts that are impossible to explore in the classroom, and apply processes learned in inquiry to other domains.

Palincsar and Magnusson (2001) primarily focused on the ways in which informational texts could support science learning in the classroom. By contrast, in this study, children were asked to create their own informational texts using some of the indicative features of the genre. In addition, I exposed the children to a curricular cycle that highlighted the use and production of informational texts in whole groups and small groups.

The particular design of this study allowed for the focus of this analysis to be the role the informational text played in the children's own informational text writing. I found that informational texts used in conjunction with guided science inquiry served to reinforce the informational text writing process for children. The children and I used the texts as references to seek unknown information and as resources when making observations in science journals such as using a diagram in a text to help identify features of plants for an inquiring child. Children also independently sought out texts to help with their current investigation. They accessed previously viewed diagrams in texts to help as they drew similar diagrams science journals.

Role of Teacher in Science Journal Writing

Another major finding from this strand of analysis was the crucial role that the teacher played in scaffolding the discussion of the content and the artifacts under investigation. As the teacher, I provided consistent and diverse types of demonstrations to use the genre features in writing. I often accomplished this provision through the use of informational texts such as trade books or my own texts created in my science journal. This research suggests that the informational texts, used in conjunction with scaffolded support from me, may have aided in children's acquisition of discourse features such as content vocabulary and world knowledge (Duke, 2003; Pappas, 1993).

The powerful role of demonstrations in learning to write has been well documented (Clyde, 1987; Harste et al., 1984; Smith, 1994). From this research, we know that children take up the demonstrations of others in powerful ways. The findings presented in this study offer a more specific analytical focus that details the teacher's demonstrations during emergent informational text writing experiences. Specifically, this analysis documents the teacher's role in providing authentic demonstrations of informational text with varying levels of support. Depending on the needs of the young writers, a formal, parallel or citation demonstration can be used to support children. In addition, these findings add to the demonstration literature by specifically detailing the ways in which informational texts play a key role in supporting young writers of nonfiction.

Major Findings: Question 3

The final strand of analysis describes the nature of children's informational text writing in science journals when they were invited to use key genre features. The data used in this analysis were the children's science journals produced during journal writing sessions. Journals were analyzed for a variety of features including structures of messages, visual elements, and textual elements. In addition, an analysis of children's writing form was conducted. The analysis of journals resulted in descriptive categories that reflect the range of emergent responses produced by children.

Use of Textual Genre Features

These findings show prekindergarten children were able to use several of the genre features to produce informational texts. First, children's verbal messages reflected common structures used in informational texts. No children produced more than two sentences for a message for a journal page. Rather, children predominantly produced one word or phrases and statements about the content in the photograph or drawing on the journal page.

These findings contribute to a similar analysis completed by Donovan (2001) with similar categories and older children. Donovan asked kindergarten children to write a nonfiction text. Like me, she also analyzed children's verbal readings of their texts as messages. She also found that the vast majority of kindergarten writers in her study used one word or phrases and statements for their messages. This work supports Donovan's conclusions as the prekindergarten children in this study also most frequently used those same structures in their informational text writing. It specifically contributes by adding an analysis of prekindergarten children's nonfiction writing to the field.

Use of Visual Informational Text Features

The children in this study used visual genre elements such as photographs and drawings to create various forms of diagrams with accompanying captions. The children used some of the genre features more frequently and with more convention than others. Most children used labels and messages that semantically matched the image in the journal. Scale, although not produced in children's drawings, was used successfully by some children in magnified photographs. Children's limited attempts at heading use demonstrated their emerging efforts to categorize information they had produced on the journal page.

This study's analysis of visual elements contributes to work by Pappas and Varelas (2009) with older children. In Pappas and Varelas' study, children participated in interactive read alouds of informational texts and guided science inquiry. Children independently made science books as part of a summative assessment of a unit of study. They discuss them in two major ways: the ways children adopted the images of science in their texts and how the books demonstrated their thinking around content and science processes.

Pappas and Varelas (2009) found that the children were able to appropriate and adopt the visual images of science in their books. This adoption included the linguistic register of informational texts such as using generic nouns and technical terms. In addition, children used informational text features like labels, captions, and headings. Pappas and Varelas also found that when children wrote about the topics they did so by including characteristic events associated with the topic. Also, some children used their images to convey meaning that was not evident in their written text.

Pappas and Varelas (2009) conclude that the children were successful in adopting these images because they were immersed in an integrated experience where they participated in guided inquiry science and were exposed to informational texts. The children in the study were not specifically taught how to use the discourse of science. They argue that the children appropriated it after being exposed to enriching curriculum and instructional interactions.

Similarly, in the present study children's informational texts were analyzed for the use of visual features of science texts. In this case, I analyzed children's use of photographs and drawings and other genre features in science journals. I found that children significantly younger than those in Pappas and Varelas' (2009) study were able to use drawings and photographs to create diagrams. In addition, most of these prekindergarten children produced messages for labels and captions that semantically matched their images. Unlike Pappas and Varelas, in this study I looked at the visual representations of prekindergarten children's informational texts. Thus, through this study I extend the depth of our understandings about children's use of visual genre features to prekindergarten.

In addition, this work contributes an analysis of the emergent productions of nonfiction writers. As many of the earliest writers are unconventional, I analyzed the marks that children are actually producing rather than the marks that they are not. In this analysis I provide grounded coding documents that describe the visual productions of children in science journals.

Relationship Between Written Form and Verbal Messages for Captions and Labels

Another major finding of this particular analysis of children's journal entries was that written form did not constrain children's ability to participate in the science journal process. Children of all levels of written form produced messages and labels that semantically matched images. Even those children with low levels of conventionality in written form produced conceptually accurate messages and labels using content vocabulary from the units.

An analysis of emergent informational text writers is important to the field of early literacy. Most measures of early literacy only focus on convention. In other words, various standardized subtests of writing such as those in the Woodcock Johnson (Woodcock, McGrew, & Mather, 2001) predominately measure children's abilities to conventionally spell words. Although some of my analysis discusses convention, the primary focus is on describing the emergent written responses of children. This focus is important to the field as it allows us to see that children have conceptual and schematic resources that support their literacy participation even when they are very unconventional writers.

Implications for Research

The ITI proved to be a valuable tool when determining how prekindergarten children interacted with informational texts in book reading scenarios. The further refinement of this tool would add to these findings about prekindergarten children's emergent understandings of genre feature elements. These refinements include the use of the ITI in multiple settings with diverse populations of children. Also, as previously discussed, the ways in which the phrasing of certain yes/no questions may not have elicited the depth of children's informational text feature knowledge. The reworking of some of these questions could potentially contribute to the extent the protocol elicits children's understandings. Lastly, the piloting of other texts, with alternate content, would contribute to furthering the validity of this assessment as a viable measurement.

In addition, the focus of the ITI analysis on what genre features were hard or easy for this group of prekindergarten children contributes to the field of informational text research. Similar types of research with young children (Duke & Kays, 1998; Pappas, 1993) provide information about how young children read informational texts. In these analyses and report of findings (Duke & Kays, 1998; Pappas, 1993), particular emphasis is given to children's abilities to adopt the discourse or register of informational texts. The present study contributes an analysis of children's emergent understandings of different visual and textual genre features. This focus on emergent abilities allowed me to discuss relative levels of difficulty.

Children's content knowledge may have been related to their ability to name features in photographs and in their own texts. This study was limited by the lack of a standard task that measured children's content knowledge of light and plants. Future research could seek to understand the relationship between children's ability to read images and their knowledge about the subject matter. This research could be done through coordinating a standard measure of knowledge with children's abilities to read and write about a topic.

These findings show the capability of a group of prekindergarten informational text writers when they received scaffolded support. As these data showed, all facets of the journal writing process were co-constructed. A next step would be to create a standard task that sought to measure the independent capabilities of prekindergarten informational text writers. Similar to the actual journal entry, children could be asked to independently label a photograph to create a diagram.

When the ITI and journal entry data were analyzed for the group of focal learners, children appeared to use similar approaches when reading and writing informational texts. When reading informational texts, children cued into the visuals and read images to name features. In their science journals, children most frequently made observations about visuals, such as drawings or photographs, through creating a labeled diagram and/or adding an accompanying message. In future research, an alternative analysis could closely describe the likely relationship between how individual children read and write informational texts.

Implications for Practice

This research has possible implications for how informational texts should be read aloud to prekindergarten children. The ITI findings suggest that read alouds planned to leverage children's tendency to read images and name their features may have the potential to support children in reading and responding to informational texts. Interactive discussion, including thoughtful questioning, could help children accurately interpret images. Teacher demonstrations of ways to read images through pointed observations and naming key features appear to be a promising practice for supporting young readers of informational texts.

This research also suggests that one way of engaging prekindergarten children in informational text writing is through guided inquiry science supported by science journals. In the classroom, teachers can create an authentic context for writing by engaging children in guided inquiry science. The hands-on investigations use actual artifacts that support children's language and writing in the classroom. Rich demonstrations of informational texts can be provided by writing and reading informational texts as support for the inquiry and writing process. Teachers work closely with individual children and small groups to scaffold writing through making invitations and engaging children in rich discussion.

The science journals produced in this study show how a group of prekindergarten informational text writers used some features of the genre. Children's journal entries demonstrated emergent, yet functional, uses of informational text elements such as labeling to create diagrams and including semantically relevant captions. Through encouraging children to use these features and write in this manner, teachers will expose children to a key genre that factors so predominantly into their lives as readers and writers.

The analysis of children's labels and captions for written form demonstrated a potentially important finding for prekindergarten classroom curricula and instruction. These findings show that conventional written form need not precede rigorous literacy and science curriculum for prekindergarten children. Even though some of these children could not produce conventional letters or conventional spellings of words, they were able to assign accurate messages to their productions. These semantically accurate and sophisticated messages demonstrated their ability to successfully participate in the science journal process when it was supported by guided inquiry and informational texts.

These findings from a group of prekindergarten children suggest that a teacher will likely be faced with groups of children who have very different understandings of informational text genre features. Duke et al. (2012) also found this difference of understanding to be the case with the children in their study although they gave a particular emphasis to the lack of knowledge around visual features. Both of these studies suggest that teachers of young children cannot assume that their students know about genre features in informational texts.

When faced with children with very different understandings of genre features, teachers need to flexibly adapt their instruction and scaffolding to meet the needs of all children. In this study, the analysis presented in Chapter 5 shows how the scaffolding provided by the teacher varied depending upon the context and the child. Teachers can flexibly use different types of demonstrations for children including formal, parallel, and citation demonstrations. In less formal demonstrations, less direct teaching is required by the teacher.

In addition, children should be invited to talk about content and features while writing and drawing informational texts. Some children might require more direct invitations depending upon their stage in genre feature understanding. As in this study, a teacher might need to write part of the genre feature, such as a label line and/or label word, in order to get children started. Children will also likely need suggestions for messages for captions in the beginning stages of the informational text writing process.

Final Remarks

Collectively, the data from all strands of analysis provide a holistic view of one type of nonfiction writing with a group of prekindergarten children. This study provides information about how children read informational texts, how they see them as functioning, and what they see as the intent of the text. With these understandings, teachers can scaffold children into the informational text writing process by providing meaningful demonstrations, making authentic invitations, and accepting children's unconventional approximations. These findings suggest that the teacher plays a significant role in this process, particularly through the inclusion of informational texts and the facilitation of rich discussion. The science journals in this study demonstrated the potential of a group of prekindergarten writers when they were positioned as legitimate participants within the informational genre. Even the most emergent writers who used the least amount of written convention were able to partake in the science journal process.

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Appendix A:

Phases of Inquiry

Phase of Inquiry	Approximate Date	Data to be Collected	Purpose
Phase 1: Field entry	January 2011	Field notes Access to previously collected assessments including WriteStart! Writing Assessment and PPVT	Obtaining consent, developing rapport, planning and taking notes on students' overall representational abilities
Phase 2: **Assessment, Instruction & Data Collection** ○ **Assessment: Informational Text Interview** ○ **Instruction: Unit 5** ○ **Instruction: Unit 6**	January 2011- May 2011	Field notes Assessment: Informational Text Interview Science journals Student work Videotaped classroom interactions	To develop initial hypotheses regarding the nature of children's representations in talk and text during guided science inquiry when informational texts and science notebooks are emphasized
Phase 3: **Analysis and writing of dissertation**	June 2011-May 2012		Theoretical sampling to refine hypotheses: category formation, triangulation of data and review of field notes Analysis of data Writing of final report: share portions of findings with participants, check credibility, member check and peer debriefing

Appendix B

Book List

Light and Shadows

Fun with Shadows (Siamon, Siamon, & Benjamin, 2005)

Light and Color (Riley, 1998)

Light and Dark (Riley, 2002)

Light and Shadow (Ring, 2003)

Plants

Flowers Bloom (Wade, 2009)

From Seed to Plant (Gibbons, 1991)

How Plants Grow (Royston, 1999)

Plants Grow (Wade, 2009)

Seeds Sprout (Wade, 2009)

Trees, Weeds and Vegetables-So Many Different Kinds of Plants (Wade, 2009)

Appendix C
Instructional Plans

Unit Five: Light
General Overview

In this four week long unit, the same types of activities will be repeated weekly. Each week there will be a Learning Centers activity, a Small Groups activity, a Let's Find Out About It whole group activity and a Read Aloud to the whole group. See the Table below for the weekly schedule.

Day One	Day Two	Day Three
Learning Centers: Guided Inquiry Lesson	Learning Centers: Guided Inquiry Lesson	Learning Centers: Guided Inquiry Lesson
Small Groups: Guided Inquiry	Small Groups: Guided Inquiry	Small Groups: Guided Inquiry
Let's Find Out About It: Whole Group Inquiry	Read Aloud: Informational Text	

The guided inquiry science lessons occurring during Small Groups and Learning Centers are a combination of lesson plans from *Science for Developing Minds: A Science Curriculum for Kindergarten and First Grade: Science is Delightful* (Massey & Roth, 2000) and *OWL: Unit Five: Shadows and Reflections* (Schickendanz & Dickinson, 2005). The center will remain the same for all three days of the week. I will encourage all children to participate in the center on at least one of the instructional days. Children will be invited to write in their Science Journals and to consult informational texts as they engage in the guided inquiry centers.

The Small Groups lesson plans for this unit all come from *Science for Developing Minds: A Science Curriculum for Kindergarten and First Grade: Science is Delightful* (Massey & Roth, 2000). On each of the three days, I will see a small group of children (around 6) and guide them in an inquiry lesson. On each of these occasions, children will be invited to write in their Science Journal and to consult informational texts during the course of the lesson. The groups will rotate so that by the end of the week, I will have seen each group once.

The Let's Find Out About It lessons for this unit are a combination of lessons from *Science for Developing Minds: A Science Curriculum for Kindergarten and First Grade: Science is Delightful* (Massey & Roth, 2000) and a researcher created lesson. This is a whole group format where children will be observers of a scientific demonstration and/ or partners with the researcher in the scientific inquiry. I will guide children in an Interactive Writing lesson at the completion of the science activity where we will be writing in the Big Book Science Journal.

The Read Aloud of informational texts is all interactive in nature. Children will be encouraged to actively listen and orally respond throughout the reading of the text. I will use various techniques to develop comprehension including explicitly and implicitly defining vocabulary, making reading processes evident through think alouds and discussion of the selected informational text genre features. The informational texts in (see Appendix B) will be utilized as a resource and available in each planned activity.

On each of the three days, I will teach the same lesson for Centers and Small Groups. During Centers and Small Groups, children will be invited to write in their science journals. These Literacy Invitations will take one of four forms: Photograph; Surface Diagram; Photograph/Surface Diagram with Label; and Photograph/Surface Diagram with Headings. Each week a different genre feature will be featured in the Literacy Invitations.

Unit Five: Weekly Plans

	Science Objective	Literacy Objective	Science Journal	Invitation Type
Week One **Centers** Inside the Dark Room (Massey & Roth, 2000, p.43) **Day1,Day2, Day3**	Children will understand that light is an entity that comes from different sources.	Children will understand that photographs convey information and are related to the text. Children will use a photograph in their Science Journal.	Observations of light coming from different sources.	Photograph
Week One **Small Groups** The Light Blockers Line (Massey & Roth, 2000, p.51) **Day1, Day2, Day3**	Children will understand that light is able to pass through some materials more so than others.	Children will understand that photographs convey information and are related to the text. Children will use a photograph it in their Science Journal.	Observations of light passing through some materials and not others.	Photograph
Week One **Let's Find Out About It:** Science Journal introduction (Flushman) **Day1**	Children will understand that light is an entity that comes from different sources. Light is able to pass through some materials more so than others.	Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will learn that science journals are tools used by scientists in inquiry. They will understand the functional purpose of the journal as a means to document and record observations through an investigation of light sources in the room.	Observation and recording our observations of light sources in the room	Big Book Science Journal: Photograph
Week One **Read Aloud Informational text** *Light and Shadow (Ring, 2003)* **Day2**	Light is able to pass through some materials more so than others.	Children will learn that informational texts serve a functional role in scientific inquiry. Children will understand that photographs convey information and are related to the text.	Observations of light coming from different sources. Observations of light passing through some materials and not others.	

	Science Objective	Literacy Objective	Science Journal	Invitation Type
Week Two **Centers** Dark Room (continued) There's a hole in the curtain/wall (Massey & Roth, 2000, p. 69) **Day1, Day2, Day3**	Children begin to understand when a material has holes in it light passes through. The rest of the material blocks light. Children will begin to connect windows as the holes in houses that allow light to pass.	Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon. Children will draw surface diagrams in their science journals.	Observations of light passing through some materials and not others.	Surface Diagrams
Week Two **Small Groups** The paint house and the light house/Painting with stencils (Massey & Roth, 2000, p. 81) **Day1, Day2, Day3**	Children begin to understand that a shadow is created when light is blocked. Using an analogy with the stencil-children will further their understanding about how shadows are created.	Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon. Children will draw surface diagrams in their science journals.	Observations of a shadow created when light is blocked.	Surface Diagrams
Week Two **Let's Find Out About It** Designing with light (Massey & Roth, 2000, p.93) **Day1**	Further develop the analogy between stencils and the creation of shadows through allowing children to use the stencils to make shadow/light designs.	Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon.	Observations of a shadow created when light is blocked.	Big Book Science Journal: Surface Diagrams
Week Two **Read Aloud** *Light and Color (Riley, 1998)* *ONLY pages 8-11* **Day2**	Light travels in a straight line; shadows are created when light is blocked.	Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon.	Observations of a shadow created when light is blocked.	

	Science Objective	Literacy Objective	Science Journal	Invitation Type
Week Three **Centers** Blocks: City buildings and shadows (Schickendanz & Dickinson, 2005, p.90) **Day1, Day2, Day3**	Children will learn that a shadow is not only determined from the object alone but also the positions relative of the light source and the object. Shadows can be different sizes and shapes than objects.	Children will understand that labels convey information about the image (photograph or diagram) in the text. Children will put photographs or diagrams in their science journals with labels.	Observations that shadows can be different sizes and shapes. Use journal to facilitate explanation that it depends upon light source.	Photographs and diagrams: Labels
Week Three **Small Groups** Can you tell an object by its shadow? (Massey & Roth, 2000, p.133) **Day1, Day2, Day3**	Children will learn that a shadow is not only determined from the object alone but also the positions of the light source, screen and object. Shapes may differ from the shape of the object.	Children will understand that labels convey information about the image (photograph or diagram) in the text. Children will put photographs or diagrams in their science journals with labels.	Observations that shadows can be different sizes and shapes than objects. Use journal to facilitate explanation that it depends upon light source.	Photographs and diagrams: Labels
Week Three **Let's Find Out About It** Big shadow, small shadow (Massey & Roth, 2000, p.125) **Day1**	Children will learn that a shadow is not only determined from the object alone but also the positions relative of the light source, the screen and the object. Shadows can be bigger or smaller than the size of the actual object.	Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will understand that labels of photographs and diagrams convey information about the image in the text.	Observations that shadows can be different sizes and shapes. Use journal to facilitate explanation that it depends upon light source.	Big Book Science Journal: Photographs and diagrams: Labels
Week Three **Read Aloud** *Fun with Shadows (Siamon, Siamon, & Benjamin, 2005) ONLY pages 5-9* **Day2**	Children will learn that shadows can be different sizes and shapes depending upon the light source.	Children will learn that informational texts serve a functional role in scientific inquiry. Children will read labels and also understand that labels should accurately identify certain parts or features of an object or phenomenon.	Observations that shadows can be different sizes and shapes. Use journal to facilitate explanation that it depends upon light source.	

	Science Objective	Literacy Objective	Science Journal	Invitation Type
Week Four **Centers** Shadow size and shadow puppets (Schickendanz & Dickinson, 2005, p. 122) **Day1, Day2, Day3**	Children will learn that a shadow is not only determined from the object alone but also the positions relative of the light source and the object. Shadows can be different sizes and shapes than objects.	Children will understand that headings signify important information regarding what text and images will be about. Children will use headings in their science journals to categorize their photographs or diagrams.	Observations that shadows can be different sizes and shapes. Use journal to facilitate explanation that it depends upon light source.	Diagrams and photographs with headings
Week Four **Small Group** The Object has it, will it show in the shadow? (Massey & Roth, 2000, p. 137) **Day1, Day2, Day3**	Children will make predictions and give explanations as they create shadows with an object, a light source and a screen.	Children will understand that headings signify important information regarding what text and images will be about. Children will use headings in their science journals to categorize their photographs or diagrams.	Children document predictions and observations of shadows.	Diagrams and photographs with headings
Week Four **Let's Find Out About It** Faint shadow/dark shadow (Massey & Roth, 2000, p. 111) **Day1**	Children will understand that shadows are created by blocked light and certain materials block more light than others.	Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will understand that headings signify important information regarding what text and images will be about.	Children document observations of varying intensity of shadows.	Big Book Science Journal: Diagrams and photographs with headings
Week Four **Read aloud** *Light and Dark (Riley, 2002)* **Day2**	Children will learn that a shadow is not only determined from the object alone but also the positions relative of the light source and the object.	Children will learn that informational texts serve a functional role in scientific inquiry. Children will read headings and understand that headings should accurately identify the information presented on that page of the text.	Observations that shadows can be different sizes and shapes. Use journal to facilitate explanation that it depends upon light source.	

Unit Five: Light

Daily Plans

Week One: Day One

Centers: *Inside the Dark Room* (Massey & Roth, 2000, p. 43)

Science Objectives: Children will learn that light is an entity that comes from different sources.

Content Literacy Objectives: Children will understand that photographs convey information and are further explained through captions. Children will also take a photograph that appropriately represents the scientific phenomenon under investigation in Centers Time and put it in their Science Journal.

Literacy Invitation: Children will be invited to take photographs of different light sources while engaging in the guided inquiry Dark House activity during Centers time. They will be asked to put the photographs in their science journals and to write captions for the photos describing the phenomenon captured in the image. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of photographs and captions. In addition, I will demonstrate taking a photograph and writing a caption in my own science journal. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: See Massey & Roth, 2000, p. 43.

Literacy tools: My science journal; science journals, informational texts, digital camera, photograph printer, markers and crayons

Small Groups: *Light Blockers Line* (Massey & Roth, 2000, p.51)

Science Objectives: Children will learn that light is able to pass through some materials more so than others.

Content Literacy Objectives: Children will understand that photographs convey information and are further explained through captions. Children will also take a photograph that appropriately represents the scientific phenomenon under investigation in Small Groups and put it in their Science Journal.

Literacy Invitation: Children will be invited to take photographs during the experiment that include pictures of the different materials as light passes through them. They will be asked to put the photographs in their science journals and to write labels and captions for the photos describing the phenomenon captured in the image. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of photographs and captions. In addition, I will demonstrate taking a photograph and labeling it in my own science journal. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: See Massey & Roth, 2000 page 51.

Literacy tools: My science journal; informational texts; digital camera; photograph printer; markers and crayons

Let's Find Out About It: *Science Journal Introduction*

Science Objectives: Children will learn that light is able to pass through some materials more so than others. Children will learn that light is an entity that comes from different sources.

Content Literacy Objectives: Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will learn that science journals are tools used by scientists in inquiry. They will understand the functional purpose of the journal as a means to document and record observations through an investigation of light sources in the room.

Literacy Invitation: I will introduce children to the Science Journal through a Big Book Science Journal that I have created. I will demonstrate how to use the science journal through taking a photograph of a light source and affixing it to the journal. Then, I will write a caption that describes the picture. Lastly, I will show children photographs from informational texts that have captions.

Tools: Chart paper; digital camera; my science journal; informational texts; photograph printer; markers and crayons

Week One: Day Two

Centers: *Science Activity: Inside the Dark Room* (Massey & Roth, 2000, p. 43) *(Continued from Day One)*

Small Groups: *Light Blockers Line* (Massey & Roth, 2000, p.51) *(Continued from Day One)*

Read Aloud: Informational Text: *Light and Shadow* (Ring, 2003)

Science Objectives: Children will learn various concepts about light. The emphasis will be placed on the concept that light is able to pass through some materials more so than others. Children will learn that light is an entity that comes from different sources.

Content Literacy Objectives: Children will learn that informational texts serve a functional role in scientific inquiry. Children will understand that photographs convey information and are further explained through captions.

Literacy Invitation: I will engage children in an interactive read aloud of the informational text. I will introduce the text as a tool in our scientific inquiry about light and shadows. As I read, I will discuss the content of the book but also make explicit connections between the content and the photographs through modeling think-aloud strategies that make observations and ask questions about photographs and captions.

Tools: Light and Shadow (Ring, 2003)

Week One: Day Three

Centers: *Science Activity: Inside the Dark Room* (Massey & Roth, 2000, p. 43) *(Continued from Day One)*

Small Groups: *Light Blockers Line* (Massey & Roth, p.51) *(Continued from Day One)*

Week Two: Day One

Centers:

Science Activity: Inside the Dark Room (Massey & Roth, 2000, p. 43) in addition to *There's a Hole in the Curtain/Wall* activity (Massey & Roth, 2000, p. 69)

Science Objectives: Children will begin to understand that when a material has holes in it, light passes through because the rest of the materials block the light. Children will begin to see windows as the holes in houses that allow light to pass.

Content Literacy Objectives: Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon. Children will draw surface diagrams in their science journals.

Literacy Invitation: Children will be invited to draw surface diagrams that accurately represent observations while engaging in the guided inquiry during Centers time. They will be asked to draw the diagrams in their science journals. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of diagrams. In addition, I will demonstrate drawing a diagram that accurately represents my observation. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: See Massey & Roth, 2000, p. 69.

Literacy tools: My science journal; science journals, informational texts, markers and crayons

Small Groups: *The Paint House and the Light House* (Massey & Roth, 2000, p.81)

Science Objectives: Children will begin to understand that a shadow is created when light is blocked. Using an analogy with the stencils, children will further their understanding about how shadows are created.

Content Literacy Objectives: Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon. Children will draw surface diagrams in their science journals.

Literacy Invitation: Children will be invited to draw diagrams during the experiment that illustrate how shadows are created when light is blocked. They will be asked to put the diagrams in their science journals and to write labels describing the phenomenon captured in the diagram. During this time, I will provide various supports to the student as they write which include the referencing of informational texts. In addition, I will demonstrate drawing a diagram in my own science journal. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: See Massey & Roth, 2000, p. 81)

Literacy tools: My science journal; informational texts; digital camera; markers and crayons

Let's Find Out About It: *Designing with Light* (Massey & Roth, 2000, p.93)

Science Objectives: Children will further explore the analogy between stencils and shadows through using stencils to make shadow/light designs.

Content Literacy Objectives: Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon.

Literacy Invitation: I will invite the children to participate in an Interactive writing lesson using the Big Book Science Journal that I have created. The children and I will con-construct a surface diagram of the design made with light in the experiment. The children and I will label the diagram. I will provide various supports as needed including thinking aloud about my own writing and scaffolding of letters, words or whole messages.

Tools:

Science tools: See Massey & Roth, 2000, p.93.

Literacy tools: My science Big Book journal; informational texts; digital camera; markers and crayons

Week Two: Day Two

Centers: *Science Activity: Inside the Dark Room* (Massey & Roth, 2000, p. 43) in addition to *There's a Hole in the Curtain/wall* activity (Massey & Roth, 2000, p. 69) (*Continued from Day One)*

Small Groups: *The Paint House and the Light House* (Massey & Roth, 2000, p.81) *(Continued from Day One)*

Read Aloud: Informational Text: *Light and Color* (Riley, 1998)

Science Objectives: Children will learn various concepts about light. The emphasis will be placed on the concept that light travels in a straight line and that shadows are created when light is blocked.

Content Literacy Objectives: Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon.

Literacy Invitation: I will engage children in an interactive read aloud of the informational text. I will introduce the text as a tool in our scientific inquiry about light and shadows. This book will not be read sequentially. Rather, only pages 8-11 will be read. Specific attention will be given to the diagrams on both pages. As I read, I will discuss the content of the book but also making explicit connections between the content and the surface diagrams through modeling think-aloud strategies that make observations and ask questions about the surface diagrams on pages 8 and 10.

Tools: Light and Color (Riley, 1998)

Week Two: Day Three

Centers: *Science Activity: Inside the Dark Room* (Massey & Roth, 2000, p. 43) in addition to *There's a Hole in the Curtain/wall* activity (Massey & Roth, 2000, p. 69) (*Continued from Day One)*

Small Groups: *The Paint House and the Light House* (Massey & Roth, 2000, p.81) *(Continued from Day One)*

Week Three: Day One

Centers: *Science Activity: Blocks: City Buildings and Shadows* (Schickendanz & Dickinson, 2005, p.90)

Science Objectives: Children will learn that a shadow is not only determined from the object alone but also the position of the light source, screen and object. In addition, shadows can be different sizes and shapes that objects.

Content Literacy Objectives: Children will understand that labels convey information about the image (photograph or diagram) in the text. Children will put photographs or diagrams in their science journals with labels.

Literacy Invitation: Children will be invited to either take photographs or make surface diagrams of shadows while engaging in the guided inquiry blocks activity during Centers time. They will be asked to put the photographs or diagrams in their science journals and to write labels for the images. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of photographs and diagrams with labels. In addition, I will demonstrate the labeling of images in my own science journal. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: See *OWL* (Schickendanz & Dickinson, 2005, p. 90).

Literacy tools: My science journal; science journals, informational texts, digital camera, photograph printer, markers and crayons

Small Groups: *Can You Tell An Object by Its Shadow?* (Massey & Roth, 2000, p.133)

Science Objectives: Children will learn that a shadow is not only determined from the object alone but also the position of the light source, screen and object. In addition, shadows can be different sizes and shapes that objects.

Content Literacy Objectives: Children will understand that labels of photographs and diagrams convey information about the image in the text. Children will put photographs or diagrams in their science journals with labels.

Literacy Invitation: Children will be invited to take photographs or draw diagrams during the experiment that include images of the Shadow Theater apparatus and the various objects and shadows. They will be asked to put the photographs in their science journals and to write labels for the photos and diagrams describing the phenomenon captured in the image. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of photographs and diagrams with labels. In addition, I will demonstrate taking a photograph or diagram and labeling it in my own science journal. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: See Massey & Roth, 2000, p.133.

Literacy tools: My science journal; informational texts; digital camera; photograph printer; markers and crayons

Let's Find Out About It: *Big Shadow, Small Shadow* (Massey & Roth, 2000, p.125)

Science Objectives: Children will learn that a shadow is not only determined from the object alone but also the position of the light source, screen and object. In addition, shadows can be different sizes and shapes that objects.

Content Literacy Objectives: Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will understand that labels of photographs and diagrams convey information about the image in the text.

Literacy Invitation: I will invite the children to participate in an Interactive writing lesson using the Big Book Science Journal that I have created. We will take a photograph or draw a diagram of the Shadow Theater and the shadows in the journal. Then, we will label the diagram or photograph. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

See Massey & Roth, 2000, p.125; Chart paper; digital camera; my science journal; informational texts; photograph printer; markers and crayons

Week Three: Day Two

Centers: *Science Activity: Blocks: City Buildings and Shadows* (Schickendanz & Dickinson, 2005, p.90) *(Continued from Day One)*

Small Groups: *Can You Tell An Object by Its Shadow?* (Massey & Roth, 2000, p.133) *(Continued from Day One)*

Read Aloud: Informational Text-*Fun with Shadows* (Siamon, Siamon & Benjamin, 2005)

Science Objectives: Shadows can be different sizes and shapes depending upon the light source.

Content Literacy Objectives: Children will learn that informational texts serve a functional role in scientific inquiry. Children will read labels and also understand that labels should accurately identify certain parts or features of an object or phenomenon.

Literacy Invitation: I will engage children in an interactive read aloud of the informational text. I will introduce the text as a tool in our scientific inquiry about light and shadows. During the read aloud, I will define labels for children and point out numerous examples in the text. This book will not be read sequentially. Rather, only pages 5-9 will be read. Specific attention will be given to the labels used on page 8. As I read, I will discuss the content of the book but also making explicit connections between the content and labels through modeling think-aloud strategies that make observations and ask questions about the labels on pages 8 and 10.

Tools: Informational text

Week Three: Day Three

Centers: *Science Activity: Blocks: City Buildings and Shadows* (Schickendanz & Dickinson, 2005, p.90) *(Continued from Day One)*

Small Groups: Can *You Tell An Object by Its Shadow?* (Massey & Roth, 2000, p.133) *(Continued from Day One)*

Week Four: Day One

Centers: *Science Activity: Shadow Size and Shadow Puppets* (Schickendanz & Dickinson, 2005, p.122)

Science Objectives: Children will learn that a shadow is not only determined from the object alone but also by the position of the light source, screen and object. In addition, shadows can be different sizes and shapes than objects.

Content Literacy Objectives: Children will understand that headings signify important information regarding what text will be about on the page. Children will use headings in their science journals to categorize their photographs or diagrams.

Literacy Invitation: Children will be invited to either take photographs or diagram created shadows while engaging in the guided inquiry blocks activity during Centers time. They will be asked to put the photographs or diagrams in their science journals. Children will be encouraged to use a heading that names the phenomena in their journal entry. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of headings. In addition, I will demonstrate the use of headings in my own science journal. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

For Science tools: See Schickendanz & Dickinson, 2005, p.122.

Literacy tools: My science journal; science journals; informational texts; digital camera; photograph printer; markers and crayons; think markers for bold words

Small Groups: *The Object Has It, Will It Show in the Shadow?* (Massey & Roth, 2000, p.137)

Science Objectives: Children will make predictions and give explanations for the shadows created with an object, light source and screen.

Content Literacy Objectives: Children will understand that headings signify important information regarding what text and images will be about. Children will use headings in their science journals to categorize their photographs or diagrams.

Literacy Invitation: Children will be invited to take multiple photographs or draw multiple diagrams during the experiment that include images of the various objects and shadows. They will be asked to put the photographs and diagrams in their science journals and to use headings for the photos and diagrams categorizing the phenomenon captured in the images. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of headings. In addition, I will demonstrate taking a photograph or diagram and using headings. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: (Massey & Roth, 2000, p. 137)

Literacy tools: My science journal; informational texts; digital camera; photograph printer; markers and crayons

Let's Find Out About It: *Faint Shadow, Dark Shadow* (Massey & Roth, 2000, p.111)

Science Objectives: Children will learn that a shadow is created by blocked light and certain materials block light more than others.

Content Literacy Objectives: Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will understand that headings signify important information regarding what text and images will be about.

Literacy Invitation: I will invite the children to participate in an Interactive writing lesson using the Big Book Science Journal that I have created. We will take multiple photographs or draw multiple diagrams of the varying shadows of the house created in the experiment. Then, we will put a heading at the top of the journal page and discuss why this is an accurate heading for this page.

Tools: See Massey & Roth, 2000, p.111; Chart paper; digital camera; my science journal; informational texts; photograph printer; markers and crayons

Week Four: Day Two

Centers: *Science Activity: Shadow Size and Shadow Puppets* (Schickendanz & Dickinson, 2005, p.122) *(Continued from Day One)*

Small Groups: *The Object Has It, Will It Show in the Shadow?* (Massey & Roth, 2000, p.137) *(Continued from Day One)*

Read Aloud: Informational Text: *Light and Dark* (Riley, 1998)

Science Objectives: A shadow is determined by the object but also by the relative position of the light source and the object.

Content Literacy Objectives: Children will learn that informational texts serve a functional role in scientific inquiry. Children will read headings and understand that headings should accurately identify the information presented on that page of the text.

Literacy Invitation: I will engage children in an interactive read aloud of the informational text. I will introduce the text as a tool in our scientific inquiry about light and shadows. During this read aloud, I will define headings for children and point out the examples in the text. As I read, I will discuss the content of the book but also making explicit connections between the content and headings through modeling think-aloud strategies that make observations and ask questions about the headings.

Tools: Informational text

Week Four: Day Three

Centers: *Science Activity: Shadow Size and Shadow Puppets* (Schickendanz & Dickinson, 2005, p.122) *(Continued from Day One)*

Small Groups: *The Object Has It, Will It Show in the Shadow?* (Massey & Roth, 2000, p.137) *(Continued from Day One)*

Unit Six: Plants

General Overview

In this four week long unit, the same types of activities will be repeated weekly. Each week there will be a Learning Centers activity, a Small Groups activity, a Let's Find Out About It whole group activity and a Read Aloud to the whole group. See the Table below for the weekly schedule.

Day One	Day Two	Day Three
Learning Centers: Guided Inquiry Lesson	Learning Centers: Guided Inquiry Lesson	Learning Centers: Guided Inquiry Lesson
Small Groups: Guided Inquiry	Small Groups: Guided Inquiry	Small Groups: Guided Inquiry
Let's Find Out About It: Whole Group Inquiry	Read Aloud: Informational Text	

The guided inquiry science lessons occurring during Small Groups and Learning Centers are a combination of lesson plans from *Discovering Nature with Young Children* (Chalufour & Worth, 2003) and *OWL: Unit Six: Living Things* (Schickendanz & Dickinson, 2005). In this unit, the center will be called the Plant Center. The specific center activity will remain the same for all three days of the week. I will encourage all children to participate in the center on at least one of the instructional days. Children will be invited to write in their Science Journals and to consult informational texts as they engage in the guided inquiry centers. The Plant Center will also have an assortment of different plants at different stages of growth that will not necessarily be related to the specific instructional activity occurring that week.

The Small Groups lesson plans for this unit are a combination of lesson plans from *Discovering Nature with Young Children* (Chalufour & Worth, 2003) and *OWL: Unit Six: Living Things* (Schickendanz & Dickinson, 2005). On each of the three days, I will see a small group of children (around 6) and guide them in an inquiry lesson. On each of these occasions, children will be invited to write in their Science Journal and to consult informational texts during the course of the lesson. The groups will rotate so that by the end of the week, I will have seen each group once.

The Let's Find Out About It lessons for this unit are a combination of lessons from *Discovering Nature with Young Children* (Chalufour & Worth, 2003) and *OWL: Unit Six: Living Things* (Schickendanz & Dickinson, 2005). This is a whole group format where children will be observers of a scientific demonstration and/ or partners with the researcher in the scientific inquiry. I will guide children in an Interactive Writing lesson at the completion of the science activity where we will be writing in the Big Book Science Journal. The lessons will also take the format of a *science talk* whereby children are encouraged to make observations and offer explanations while listening to their peers do the same.

The Read Alouds of informational texts are all interactive in nature. Children will be encouraged to actively listen and orally respond throughout the reading of the text. I will use various techniques to develop comprehension including explicitly and implicitly defining vocabulary, making reading processes evident through think alouds and discussion of the selected informational text genre features. The informational texts in (see Appendix B) will be utilized as a resource and available during each planned activity.

On each of the three days, I will teach the same lesson for Centers and Small Groups. During Centers and Small Groups, children will be invited to write in their science journals. These Literacy Invitations will take one of four forms: Photograph; Surface Diagram; Photograph/Surface Diagram with Label; and Photograph/Surface Diagram with Headings. Each week a different genre feature will be featured in the Literacy Invitations.

Unit Six: Weekly Plans

	Science Objective	Literacy Objective	Science Journal	Invitation Type
Week One **Centers** Plant Center: What's in a seed? (Schickendanz & Dickinson, 2005, p. 19) **Day1, Day2, Day3**	All living things grow, develop and reproduce.	Children will understand that photographs convey information and are related to the text. Children will take a photograph that appropriately represents the scientific phenomenon under investigation and put it in their Science Journal.	Observations about the insides of seeds	Photograph
Week One **Small Groups** Looking closely at seeds and representing our observations (Chalufour & Worth, 2003, p. 70-71) **Day1, Day2, Day3**	There is great diversity and variation amongst living things. Living things are diverse as they need to adapt to their environments in order to survive.	Children will understand that photographs convey information and are related to the text. Children will take a photograph that appropriately represents the scientific phenomenon under investigation and put it in their Science Journal.	Document and observe the diversity amongst seeds	Photograph
Week One **Let's Find Out About It** Science Talk: Science Talk: Looking closely at the seeds in cut fruit (Chalufour & Worth, 2003, p. 70) **Day1**	All living things grow, develop and reproduce.	Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will learn that science journals are tools used by scientists in inquiry. They will understand the functional purpose of the journal as a means to document and record observations through an investigation of how new plants start.	Science journal entry (revisit protocol) documenting an observation	Big Book Science Journal: Photograph
Week One **Read Aloud** *Seeds Sprout* (Wade, 2009) **Day2**	All living things grow, develop and reproduce.	Children will learn that informational texts serve a functional role in scientific inquiry. Children will understand that photographs convey information and are related to the text.	Reflect on observations and understandings that seeds are parts of plants	

	Science Objective	Literacy Objective	Science Journal	Invitation Type
Week Two **Centers** Plant center: Planting grass seeds (Schickendanz & Dickinson, 2005, p. 51) **Day1, Day2, Day3**	In order to sustain life-to grow, develop and reproduce-living things need water, food and proper living conditions.	Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon. Children will draw surface diagrams in their science journals.	Reflect on observations and understandings that roots are parts of plants	Surface diagrams
Week Two **Small Groups** Germinating seeds and transplanting seedlings and representing our observations (Chalufour & Worth, 2003, p. 63) **Day1, Day2, Day3**	In order to sustain life-to grow, develop and reproduce-living things need water, food and proper living conditions.	Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon. Children will draw surface diagrams in their science journals.	Reflect on observations and understandings that roots are parts of plants	Surface diagrams
Week Two **Let's Find Out About It** Science Talk: What do plants need to grow? (Schickendanz & Dickinson, 2005, p. 63) **Day1**	In order to sustain life-to grow, develop and reproduce-living things need water, food and proper living conditions.	Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon.	Reflect on observations and understandings that roots are parts of plants	Big Book Science Journal: Surface Diagrams
Week Two **Read Aloud** *From Seed to Plant* (Gibbons, 1991) *So Many Kinds of Plants* (Wade, 2009) **Day2**	In order to sustain life-to grow, develop and reproduce-living things need water, food and proper living conditions.	Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon.	Reflect on observations and understandings that roots are parts of plants	

	Science Objective	Literacy Objective	Science Journal	Invitation Type
Week Three **Centers** Plant center: Grouping different types of leaves (Chalufour & Worth, 2003, p 59) **Day1, Day2, Day3**	All living things grow, develop and reproduce.	Children will understand that labels convey information about the image (photograph or diagram) in the text. Children will put photographs or diagrams in their science journals with labels.	Observe how all living things grow, develop and reproduce.	Photographs and diagrams: Labels
Week Three **Small Groups** Comparing leaves (Chalufour & Worth, 2003, p 59) & representing observations **Day1, Day2, Day3**	There is great diversity and variation amongst living things. Living things are diverse as they need to adapt to their environments in order to survive.	Children will understand that labels convey information about the image (photograph or diagram) in the text. Children will put photographs or diagrams in their science journals with labels.	Document and observe the diversity amongst leaves	Photographs and diagrams: Labels
Week Three **Let's Find Out About It** Science talk Comparing leaves of a bean plant at different stages of development (Chalufour & Worth, 2003, p 59) **Day1**	All living things grow, develop and reproduce.	Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will understand that labels of photographs and diagrams convey information about the image in the text.	Reflect on observations, understanding that leaves are parts of plants	Big Book Science Journal: Photographs and diagrams: Labels
Week Three **Read Aloud** *Plants Grow* (Wade, 2009) **Day2**	All living things grow, develop and reproduce.	Children will learn that informational texts serve a functional role in scientific inquiry. Children will read labels and also understand that labels should accurately identify certain parts or features of an object or phenomenon.	Reflect on observations, understanding that leaves are parts of plants	

	Science Objective	Literacy Objective	Science Journal	Invitation Type
Week Four **Centers** Plant center: Grouping different types of flowers (Chalufour & Worth, 2003, p 66) **Day1, Day2, Day3**	All living things grow, develop and reproduce.	Children will understand that headings signify important information regarding what text and images will be about. Children will use headings in their science journals to categorize their photographs or diagrams.	Reflect on observations and understandings that flowers are parts of plants.	Diagrams and photographs with headings
Week Four **Small Group** Looking closely at cut flowers and representing our observation (Chalufour & Worth, 2003, p. 66-67) **Day1, Day2, Day3**	There is great diversity and variation amongst living things. Living things are diverse as they need to adapt to their environments in order to survive.	Children will understand that headings signify important information regarding what text and images will be about. Children will use headings in their science journals to categorize their photographs or diagrams.	Document and observe the diversity amongst flowers.	Diagrams and photographs with headings
Week Four **LFOAI** Science Talk: Looking closely at bean plants in different stages of development (budding, flowering, forming seed pods) (Chalufour & Worth, 2003, p.67) **Day1**	All living things grow, develop and reproduce.	Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will understand that headings signify important information regarding what text and images will be about.	Reflect on observations and understandings that flowers are parts of plants.	Big Book Science Journal: Diagrams and photographs with headings
Week Four **Read aloud** *How Plants Grow* (Royston, 1999) *Flowers Bloom* (Wade, 2009) **Day2**	All living things grow, develop and reproduce.	Children will learn that informational texts serve a functional role in scientific inquiry. Children will read headings and understand that headings should accurately identify the information presented on that page of the text.	Reflect on observations, understanding that leaves are parts of plants	

Unit Six: Plants

Daily Plans

Week One: Day One

Centers: *Plant Center: What's in a seed?* (Schickendanz & Dickinson, 2005, p. 19)

Science Objectives: All living things grow, develop and reproduce.

Content Literacy Objectives: Children will understand that photographs convey information and are further explained through captions. Children will also take a photograph that appropriately represents the scientific phenomenon under investigation in Centers Time and put it in their Science Journal.

Literacy Invitation: Children will be invited to take photographs of the insides of seeds while engaging in the guided inquiry *What's in a seed?* activity during Centers time. They will be asked to put the photographs in their science journals and to write captions for the photos describing the phenomenon captured in the image. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of photographs and captions. In addition, I will demonstrate taking a photograph and writing a caption in my own science journal. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: See Schickendanz & Dickinson, 2005, p. 19.

Literacy tools: My science journal; science journals, informational texts, digital camera, photograph printer, markers and crayons; *From Seed to Plant* (Fowler, 2001)

Small Groups: *Looking closely at seeds to group them and representing our observations* (Chalufour & Worth, 2003, p. 71)

Science Objectives: There is great diversity and variation amongst living things. Living things are diverse as they need to adapt to their environments in order to survive.

Content Literacy Objectives: Children will understand that photographs convey information and are further explained through captions. Children will also take a photograph that appropriately represents the scientific phenomenon under investigation in Small Groups and put it in their Science Journal.

Literacy Invitation: Children will be invited to take photographs during the experiment that include pictures of different seeds and groupings of seeds. They will be asked to put the photographs in their science journals and to write captions for the photos describing the phenomenon captured in the image. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of photographs and captions. In addition, I will demonstrate taking a photograph and labeling it in my own science journal. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: See Chalufour & Worth, 2003 page 69.

Literacy tools: My science journal; informational texts; digital camera; photograph printer; markers and crayons

Let's Find Out About It: *Science Talk: Looking closely at the seeds in cut fruit* (Chalufour & Worth, 2003, p. 70)

Science Objectives: All living things grow, develop and reproduce.

Content Literacy Objectives: Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will learn that science journals are tools used by scientists in inquiry. They will understand the functional purpose of the journal as a means to document and record observations of seeds in different varieties of cut fruit.

Literacy Invitation: I will introduce children to the Science Journal through a Big Book Science Journal that I have created. I will demonstrate how to use the science journal through taking a photograph of the seeds in cut fruit and affixing it to the journal. Then, I will write a caption that describes the picture. Lastly, I will show children photographs from informational texts that have captions.

Tools: Chart paper; digital camera; my science journal; informational texts; photograph printer; markers and crayons

Week One: Day Two

Centers: *Plant Center: What's in a seed?* (Schickendanz & Dickinson, 2005, p. 19)

(Continued)

Small Groups: *Looking closely at seeds to group them and representing our observations* (Chalufour & Worth, 2003, p. 71) *(Continued)*

Read Aloud: Informational Texts: *Seeds Sprout* (Wade, 2009)

Science Objectives: All living things grow, develop and reproduce.

Content Literacy Objectives: Children will learn that informational texts serve a functional role in scientific inquiry. Children will understand that photographs convey information and are further explained through captions.

Literacy Invitation: I will engage children in an interactive read aloud of the informational text. I will introduce the text as a tool in our scientific inquiry about plants. As I read, I will discuss the content of the book but also make explicit connections between the content and the photographs through modeling think-aloud strategies that make observations and ask questions about photographs and captions.

Tools: Seeds Sprout (Wade, 2009)

Week One: Day Three

Centers: *Plant Center: What's in a seed?* (Schickendanz & Dickinson, 2005, p. 19) *(Continued)*

Small Groups: *Looking closely at seeds to group them and representing our observations* (Chalufour & Worth, 2003, p. 71) **(***Continued)*

Week Two: Day One

Centers:

Science Activity: Plant center: Planting grass seeds (Schickendanz & Dickinson, 2005, p. 51)

Science Objectives: In order to sustain life-to grow, develop and reproduce-living things need water, food and proper living conditions.

Content Literacy Objectives: Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon. Children will draw surface diagrams in their science journals.

Literacy Invitation: Children will be invited to draw surface diagrams that accurately represent observations while engaging in the guided inquiry during Centers time. They will be asked to draw the diagrams in their science journals. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of diagrams. In addition, I will demonstrate drawing a diagram that accurately represents my observation. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: See Schickendanz & Dickinson, 2005, p. 51

Literacy tools: My science journal; science journals, informational texts, markers and crayons

Small Groups: *Germinating seeds and transplanting seedlings and representing our observations*

(Chalufour & Worth, 2003, p. 63)

Science Objectives: In order to sustain life-to grow, develop and reproduce-living things need water, food and proper living conditions.

Content Literacy Objectives: Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon. Children will draw surface diagrams in their science journals.

Literacy Invitation: Children will be invited to draw diagrams during the experiment that illustrate their observations of the roots on the seedlings. They will be asked to put the diagrams in their science journals and to write labels describing the phenomenon captured in the diagram. During this time, I will provide various supports to the student as they write which include the referencing of informational texts. In addition, I will demonstrate drawing a diagram in my own science journal. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: Chalufour & Worth, 2003, p. 61

Literacy tools: My science journal; informational texts; digital camera; markers and crayons

Let's Find Out About It: *Science Talk: What do plants need to grow?* (Schickendanz & Dickinson, 2005, p. 63)

Science Objectives: In order to sustain life-to grow, develop and reproduce-living things need water, food and proper living conditions.

Content Literacy Objectives: Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon.

Literacy Invitation: I will invite the children to participate in an Interactive writing lesson using the Big Book Science Journal that I have created. The children and I will draw diagrams of the growing grass in the Big Book Journal. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of diagrams. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: See Schickendanz & Dickinson, 2005, p. 63.

Literacy tools: My Science Big Book journal; informational texts; digital camera; markers and crayons

Week Two: Day Two

Centers: *Plant center: Planting grass seeds* (Schickendanz & Dickinson, 2005, p. 51) (*Continued)*

Small Groups: *Germinating seeds and transplanting seedlings and representing our observations*

(Chalufour & Worth, 2003, p. 63) *(Continued)*

Read Aloud: Informational Texts: *From Seed to Plant* (Gibbons, 1991); *So Many Kinds of Plants* (Wade, 2009)

Science Objectives: In order to sustain life-to grow, develop and reproduce-living things need water, food and proper living conditions.

Content Literacy Objectives: Children will read surface diagrams and also understand that surface diagrams should accurately represent an object or phenomenon.

Literacy Invitation: I will engage children in an interactive read aloud of the informational text. I will introduce the text as a tool in our scientific inquiry about plants. Specific attention will be given to the diagrams of the shoot. As I read, I will discuss the content of the book but also make explicit connections between the content and the surface diagrams through modeling think-aloud strategies that make observations and ask questions about the surface diagrams.

Tools: From Seed to Plant (Gibbons, 1991); *So Many Kinds of Plants* (Wade, 2009)

Week Two: Day Three

Centers: *Plant center: Planting grass seeds* (Schickendanz & Dickinson, 2005, p. 51) (*Continued)*

Small Groups: *Germinating seeds and transplanting seedlings and representing our observations*

(Chalufour & Worth, 2003, p. 63) *(Continued)*

Week Three: Day One

Centers: *Plant center: Grouping different types of leaves* (Chalufour & Worth, 2003, p 59)

Science Objectives: All living things grow, develop and reproduce.

Content Literacy Objectives: Children will understand that labels convey information about the image (photograph or diagram) in the text. Children will put photographs or diagrams in their science journals with labels.

Literacy Invitation: Children will be invited to either take photographs or draw diagrams of leaves while engaging in the guided inquiry blocks activity during Centers time. They will be asked to put the photographs or diagrams in their science journals and to write labels for the images. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of photographs and diagrams with labels. In addition, I will demonstrate the labeling of images in my own science journal. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: Chalufour & Worth, 2003, p 59.

Literacy tools: My science journal; science journals, informational texts, digital camera, photograph printer, markers and crayons

Small Groups: *Comparing leaves* (Chalufour & Worth, 2003, p 59) & representing observations

Science Objectives: There is great diversity and variation amongst living things. Living things are diverse as they need to adapt to their environments in order to survive.

Content Literacy Objectives: Children will understand that labels of photographs and diagrams convey information about the image in the text. Children will put photographs or diagrams in their science journals with labels.

Literacy Invitation: Children will be invited to take photographs or draw diagrams while comparing leaves in small groups. They will be asked to put the photographs in their science journals and to write labels for the photos and diagrams describing the phenomenon captured in the image. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of photographs and diagrams with labels. In addition, I will demonstrate taking a photograph or diagram and labeling it in my own science journal. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: See Chalufour & Worth (2003, p. 59)

Literacy tools: My science journal; informational texts; digital camera; photograph printer; markers and crayons

Let's Find Out About It: Science talk: Comparing leaves of a bean plant at different stages of development (Chalufour & Worth, 2003, p 59)

Science Objectives: All living things grow, develop and reproduce.

Content Literacy Objectives: Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will understand that labels of photographs and diagrams convey information about the image in the text.

Literacy Invitation: I will invite the children to participate in an Interactive writing lesson using the Big Book Science Journal that I have created. We will take a photograph and draw a diagram of the growing bean plants at different stages. Then, we will label the diagrams or photographs in the Big Book journal.

Tools:

Chart paper; digital camera; my Science Big Book journal; informational texts; photograph printer; markers and crayons

Week Three: Day Two

Centers: *Plant center: Grouping different types of leaves* (Chalufour & Worth, 2003, p 59) *(Continued)*

Small Groups: *Comparing leaves* (Chalufour & Worth, 2003, p 59) & representing observations *(Continued)*

Read Aloud: Informational Text: *Plants Grow* (Wade, 2009)

Science Objectives: All living things grow, develop and reproduce.

Content Literacy Objectives: Children will learn that informational texts serve a functional role in scientific inquiry. Children will read labels and also understand that labels should accurately identify certain parts or features of an object or phenomenon.

Literacy Invitation: I will engage children in an interactive read aloud of the informational text. I will introduce the text as a tool in our scientific inquiry about plants. During the read aloud, I will define labels for children and point out numerous examples in the text. As I read, I will discuss the content of the book but also making explicit connections between the content and labels through modeling think-aloud strategies that make observations and ask questions about the labels.

Tools: Informational text

Week Three: Day Three

Centers: *Plant center: Grouping different types of leaves* (Chalufour & Worth, 2003, p 59) *(Continued)*

Small Groups: *Comparing leaves* (Chalufour & Worth, 2003, p 59) & representing observations *(Continued)*

Week Four: Day One

Centers: *Plant center: Grouping different types of flowers* (Chalufour & Worth, 2003, p 66)

Science Objectives: All living things grow, develop and reproduce.

Content Literacy Objectives: Children will understand that headings signify important information regarding what text will be about on the page. Children will use headings in their science journals to categorize their photographs or diagrams.

Literacy Invitation: Children will be invited to either take photographs or diagram flowers while engaging in the guided inquiry activity during Centers time. They will be asked to put the photographs or diagrams in their science journals. Children will be encouraged to use a heading that names the phenomena on their journal entry. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of headings. In addition, I will demonstrate the use of headings in my own science journal. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

For Science tools: See Chalufour & Worth (2003, p. 66)

Literacy tools: My science journal; science journals; informational texts; digital camera; photograph printer; markers and crayons; think markers for bold words

Small Groups: *Looking closely at cut flowers and representing our observation* (Chalufour & Worth, 2003, p. 66-67)

Science Objectives: There is great diversity and variation amongst living things. Living things are diverse as they need to adapt to their environments in order to survive.

Content Literacy Objectives: Children will understand that headings signify important information regarding what text and images will be about. Children will use headings in their science journals to categorize their photographs or diagrams.

Literacy Invitation: Children will be invited to take multiple photographs or draw multiple diagrams during the experiment that include images of the various flowers. They will be asked to put the photographs and diagrams in their science journals and to use headings for the photos and diagrams categorizing the objects captured in the images. During this time, I will provide various supports to the student as they write which include the referencing of informational texts for examples of headings. In addition, I will demonstrate taking a photograph or diagram and using headings. Depending upon the student, I might also think aloud about my own writing and co-author the text with them by providing various scaffolds such as letters, words or whole messages.

Tools:

Science tools: See Chalufour & Worth (2003, p. 66-67)

Literacy tools: My science journal; informational texts; digital camera; photograph printer; markers and crayons

Let's Find Out About It: *Science Talk: Looking closely at bean plants in different stages of development (budding, flowering, forming seed pods)* (Chalufour & Worth, 2003, p.67)

Science Objectives: All living things grow, develop and reproduce.

Content Literacy Objectives: Children will participate in interactive writing as they create a journal page with the Big Book Science Journal. Children will understand that headings signify important information regarding what text and images will be about.

Literacy Invitation: I will invite the children to participate in an Interactive writing lesson using the Big Book Science Journal that I have created. We will take multiple photographs or draw multiple diagrams of the bean plants in varying stages of development. Then, we will put the heading *A Growing Bean Plant* at the top of the journal page and discuss why this is an accurate heading for this page.

Tools: See Chart paper; digital camera; my Science Big Book journal; informational texts; photograph printer; markers and crayons

Week Four: Day Two

Centers: *Plant center: Grouping different types of flowers* (Chalufour & Worth, 2003, p 66)

(Continued)

Small Groups: *Looking closely at cut flowers and representing our observation* (Chalufour & Worth, 2003, p. 66-67)

(Continued)

Read Aloud: Informational Text : *How Plants Grow* (Royston, 1999); *Flowers Bloom* (Wade, 2009)

Science Objectives: All living things grow, develop and reproduce.

Content Literacy Objectives: Children will learn that informational texts serve a functional role in scientific inquiry. Children will read headings and understand that headings should accurately identify the information presented on that page of the text.

Literacy Invitation: I will engage children in an interactive read aloud of the informational text. I will introduce the text as a tool in our scientific inquiry about plants. During this read aloud, I will define headings for children and point out the examples in the text. As I read, I will discuss the content of the book but also making explicit connections between the content and headings through modeling think-aloud strategies that make observations and ask questions about the headings.

Tools: Informational text

Week Four: Day Three

Centers: *Plant center: Grouping different types of flowers* (Chalufour & Worth, 2003, p 66) *(Continued)*

Small Groups: *Looking closely at cut flowers and representing our observation* (Chalufour & Worth, 2003, p. 66-67) *(Continued)*

Appendix D:

Informational Text Interview Protocol

Task Name and Description	**Script**	**Materials**
Introduction	SAY: I am going to be reading you a book today about caterpillars. I am going to be asking you some questions as I read the book to you. Sometimes you might know the answer and other times you might not. If you don't know, it is ok to guess or to tell me that you don't know. If you want me to read a certain page again or to ask a question again, just let me know.	Text: *Caterpillar* (Hartley, Macro, & wade, 2006) Response sheet
Knowledge of informational text features: Photographs	SAY: The title of this book is *Caterpillar*. *Read text until page 8.* SAY: On this page the person who wrote this book wrote, [*point to words as you read*], "How Big Are Butterflies? Caterpillars are tiny when they hatch out of their eggs. They grow very quickly." What picture would the author want to put here?" *Point to covered photograph on page 8.*	
Understanding of features and how they relate to texts: Photographs	*Read text until page 10.* SAY: This page is about how caterpillars are born. These words say, "Female butterflies and moths lay tiny eggs on the leaves of plants. Caterpillars hatch from these eggs. They eat the leaves." Is there anything new you can learn from the photograph? *[Point to photograph on page 10.]*	
Knowledge of informational text features: Labels	*Read text until page 12.* SAY: This page is about how caterpillars grow. These words say, "Caterpillars grow quickly. They soon become too big for their skin. The skin splits and the caterpillar crawls out." And this is a photograph of a caterpillar. What do you think this label says here? *[Point to label, "Old skin."]* What does this label say? *[Point to label, "New skin."]* Why is this line here? *[Point]*	

Understanding of features and how they relate to texts: Labels	*Read text until page 15.* SAY: These words say, "Caterpillars have very strong jaws for eating quickly." What do you think this label should say? *[Point to covered label]* *If child answers say,* Why would the author of the book make a label with a line here saying, "Jaw?"	
Knowledge of informational text: Headings	*Read text until page 18.* SAY: These words say, "Caterpillars move by using their legs. They use their front and back legs for different things. The front legs have claws for holding food. The other legs have suckers for clinging to smooth surfaces. Some caterpillars make a loop with their bodies when they move. " On this page *[point to covered heading on page 18]*, we need a heading that tells what these words and photographs are all about. What would be a good heading to put at the top of this page?	
Understanding of informational text: Headings	*Read text until page 20.* SAY: The heading at the top of this page says, "Where do caterpillars live?" What do you think the words on this page say? *Read pages 20-21 and then skip until page 30.*	
Understanding of features and how they relate to texts: Surface diagrams	SAY: This is a surface diagram of a caterpillar. Is there anything new that we can learn about the caterpillar from looking at this diagram?	
Knowledge of informational text features: Surface diagrams	SAY: These labels say, "Eyes, breathing holes, back legs with suckers, front legs with claws, jaws." What do you think this covered label says? *Point to label of "head."*	

Appendix E:

Informational Text Interview Coding Document

Student:_______________________

Question 1: Photographs

"I don't know" indicated verbally or nonverbally	Response includes ambiguous or incorrect attribute	Response includes a semantically accurate attribute ——— More than one	Response includes a semantically ambiguous or inaccurate actor/object	Response includes an actor/object who is in the semantic ballpark	Response includes a semantically accurate actor/object ——— More than one	Response includes a non-characteristic event	Response includes a characteristic event ——— More than one

Question 2: Photographs

"I don't know" indicated verbally or nonverbally	Response includes ambiguous or incorrect attribute	Response includes a semantically accurate attribute ——— More than one	Response includes a semantically ambiguous or inaccurate actor/object	Response includes an actor/object who is in the semantic ballpark	Response includes a semantically accurate actor/object ——— More than one	Response includes a non-characteristic event	Response includes a characteristic event ——— More than one

Question 3a: Scale

"I don't know" indicated verbally or nonverbally	"Yes" indicated verbally or nonverbally	"No" indicated verbally or nonverbally

Question 3.b: Scale-Purpose

"I don't know" indicated verbally or nonverbally	Response is semantically inaccurate and may include an inaccurate use of size	Response describes attributes, characteristic events, actors or objects that are semantically accurate, i.e., "butterfly" or "caterpillar"	Response reflects the personal preference of the author, i.e., "because he wanted to"-**not relating to informing.**	Response includes a reference to increase in size or "to make big"	Response refers to author's intention to change the image to help the reader in some manner , i.e., "To help us see better"

Question 4a: Labels

"I don't know" or "no" indicated verbally or nonverbally	Response names attributes, actors, actors or characteristic events that are semantically inaccurate.	Response names attributes, actors, actors or characteristic events that are semantically accurate.	Response describes an **inaccurate** function or purpose for the labels	Response describes the function or purpose of the labels, i.e. "showing people what to point at" and may include an alternative name for labels, i.e., "stem" or "lines"	Response includes the proper use of the term label or phrase to label

Question 4.b: Labels-Function

"I don't know" indicated verbally or nonverbally	Response names attributes, actors, or characteristic events that are **not** semantically accurate	Response names attributes, actors, actors or characteristic events that are semantically accurate "new skin" or "old skin" *No mention of relation to label or text*	Response provides a function for the line (not semantically accurate), i.e. "it's holding it" or "to collect that" or "the thing turns to go with it" or "that's where the people point at"	Response provides a purpose for the use of the label, i.e. "so people know about it" or "so they know where to put it" or "to show you the word" or to show you the parts" *No mention of actors or attributes in photo*	Response names an attribute or actor or object that is semantically accurate like "new skin" but also makes a connection between the label and the image in the photo, i.e., "showing new skin" Uses the term label correctly

Question 4.c: Labels-Purpose

"I don't know" indicated verbally or nonverbally	Response names attributes, actors, actors or characteristic events that are semantically inaccurate	Response names attributes, actors, actors or characteristic events that are semantically accurate, i.e.,"new skin" or "at the caterpillar"	Response discusses visual features of the label, i.e. "a line go here and a line go right here"	Response reflects the personal preference of the author, i.e. "because they want to do that" or "they trying to be silly" or "because he was sick" *No indication about the intent to inform*	Response indicates author's intent to inform the reader, i.e., "so people know about it" or "to show where skin is"

Question 5a: Headings

"I don't know" indicated verbally or nonverbally	Response names an attribute, object, actor, or characteristic events in the photograph, i.e. "pointy things" or "insects"	Response generally describes the aesthetic of the heading i.e. "words" or "dark" or "bigger and darker"	Response provides an alternative name for the heading, i.e. "illustrator" or "labeling"	Response includes the proper use of the term heading

Question 5b: Headings

"I don't know" indicated verbally or nonverbally	Response names attributes, actors, actors or characteristic events that are **not** in the semantic ball park, i.e., "venus fly trap" or "cricket" or "bites on the bug"	Response includes attributes, actors, or objects that describe caterpillars but are not related to how the caterpillar moves, i.e., "caterpillar" or " a pokey caterpillar" or "insect"	Response includes characteristic events of how caterpillars move, i.e. "crawling," "climbing on rocks"	Response includes some variation of the phrase, "How caterpillars move"

Question 5c: Headings

"I don't know" indicated verbally or nonverbally	Response names an attribute, object, actor, or characteristic event **not** semantically accurate.	Response names an attribute, object, actor, or characteristic event that is semantically accurate, i.e., "the caterpillar is turn to this" *Does not relate to "where caterpillars live"*	Response indicates text needed but no knowledge of how to answer i.e., "a word"	Response indicates knowledge of meaningful connection between heading and body text but no example given.	Response provides a heading-like statement but it is inaccurate, i.e. "how caterpillars grow"	Response provides a characteristic event about where caterpillars live, i.e., "caterpillars live on leaves."	Response provides a correct heading-like general statement, i.e. "it's about where caterpillars live" or "caterpillars are everywhere"

Question 6a: Cross-section Diagram

"I don't know" indicated verbally or nonverbally	Names an attribute, actor, object or physical characteristic that is not semantically related	Names an attribute, actor or object that is not in the diagram but is semantically related, i.e., "a butterfly" or "a worm" or "a bug" or "snake"	Response names a characteristic event of caterpillars semantically related but not exact, i.e., "a slithering caterpillar" or "a bug eating mud" or a "snake hiding under the ground."	Response names an attribute, object or actor in the diagram, i.e., "a caterpillar" or "dirt"	Response names the correct actor and characteristic event semantically matching the text, i.e., "A caterpillar hiding under the ground."

Question 6b: Cross-section Diagram

"I don't know" indicated verbally or nonverbally	"Yes" indicated verbally or nonverbally	"No" indicated verbally or nonverbally

Question 6c: Cross-section Diagram-Purpose

"I don't know" indicated verbally or nonverbally	Response is semantically not related to the question, i.e.,"the author."	Response names an attribute, object, actor, or characteristic event that is semantically accurate or related but does not provide the author's purpose, i.e. "Because he trying to eat it"	Response reflects the personal preference of the author, i.e., "because they're being silly." *Not related to informing*	Response indicates a general understanding of author trying to convey information i.e., "so people can look at it" or "cause they wanted to show everyone this [pointing to photo]" or "because he drawed all the pictures" *No mention of to inform about caterpillars*	Response informs or shows where caterpillars can be found, i.e., "cause caterpillars are supposed to be underground" or "Because caterpillars are too little to see but, because they're underground eating"	Response indicates the need for the author to show the caterpillar underground in this manner because the cross-section diagram allows us access to something we wouldn't normally see. "To show underground

Question 7a: Surface Diagram

Response declines any new information can be learned	"I don't know" indicated verbally or nonverbally	Response gives attribute, object and/or characteristic event of something semantically inaccurate, i.e., "the worms are trying to go away"	Response describes the diagram but in a way that is not related to the content, i.e., "the strings hold the caterpillar up" or naming letters present on the page	Response gives characteristic event of caterpillar or physical attributes of the caterpillar, i.e., "we can learn about caterpillars move" or "cause he very long" *Not specific to the diagram*	Response gives a physical attribute of the caterpillar-naming the possible body parts. ——— More than one physical attribute	Response gives a sense of the diagram's purpose by labeling but does not include any attributes of the caterpillar.	Response gives a physical attribute of the caterpillar-naming the possible body parts but also provides a purpose for the diagram, i.e., "we can learn that it has all a whole bunch of labels. And, and showing what the caterpillars face is"

Question 7b: Surface Diagram

"I don't know" indicated verbally or nonverbally	Response is not semantically related, i.e., "the title page"	Response is a letter or nonsense word *Indicates child is attending to print*	Response is an actor/object that is semantically related, i.e., "a bug" or "moth."	Response gives a physical attribute or characteristic event of the caterpillar. *Not appropriate for body label*	Response is the correct actor, i.e., "caterpillar"	Response is the correct physical attribute of the caterpillar or an acceptable alternative, i.e. "head" or "front" or "neck" or "mouth"

Question 7c: Surface Diagram-Purpose

"I don't know" indicated verbally or nonverbally	Response lists physical attributes or characteristic events of the caterpillar, i.e., "the front legs"	Response provides a function for the diagram that is not semantically accurate, i.e., "to hold him up"	Response reflects the personal preference of the author, i.e. "because they being silly" or "because they need to" *No indication of purpose to inform*	Response indicates a general understanding of author trying to inform i.e., "Because he drawed the picture like that" or "because he wanted to put labels on it" or "so we can learn" or "because he wants us to see it like that" *Not a mention of to inform about caterpillars*	Response indicates author's intent to teach about characteristic events or attributes associated with caterpillars.	Response indicates author's intent to teach parts of the caterpillar body.

Appendix F

Journal Process Coding Constructs

Constructs for Coding
(Used in constant comparative analysis)

Demonstration: An intentional way of showing how something is done.

Formal demonstration: A planned demonstration where time is set aside to so how something is done. Others watch while the demonstration is being given. There is typically an obvious beginning and ending.

Parallel demonstration: A demonstration that is completed alongside others who are completing their own task. It is not necessarily planned and can stop and start at numerous times throughout the journal writing session.

Citation demonstration: A demonstration in which an author cites the work of another. The work cited may or not be discussed at length.

Invitation: Invitations are made for the express purpose of asking someone to engage in a social practice.

To draw: An invitation where a child is asked, encouraged or told to draw a genre feature.

To write: An invitation where a child is asked, encouraged or told to write a genre feature.

To read: An invitation where a child is asked, encouraged or told to read a genre feature.

To discuss: An invitation where a child is asked, encouraged or told to discuss a genre feature.

Appendix G

Journal Products Coding Document

Type of Genre Feature

Circle one of the following:

Photograph Diagram with Message	**Photograph Diagram**	**Photograph with Message**	**Drawing Diagram with Message**	**Drawing Diagram**	**Drawing with Message**
Journal has a photograph with one or more labels identifying a feature of photograph and an accompanying message.	Journal has a photograph with one or more labels identifying a feature of photograph.	Journal has a photograph with an accompanying message.	Journal has a drawing with one or more labels identifying a feature of drawing and an accompanying message.	Journal has a drawing with one or more labels identifying a feature of drawing.	Journal has a drawing with an accompanying message.

Use the appropriate scale for the genre feature indicated in the scale above. Circle only one code per category.

Photograph Diagram with Message

Labels

Use of Label	Label name matched the identified object	Label name was semantically related to the object identified	Label name was not semantically related to object or incomplete

Message Meaning

Message semantically matched photo	Message was semantically related to the photograph but might have used terms inaccurately or emphasis was on an alternative object	Message did not semantically match the photograph

Message Type

Message was a personal statement	Message described the photo by naming a feature of the photograph	Message named a characteristic event associated with the topic of the photograph	Message described the photo in semantic ballpark but used terms inaccurately	Message described the marks made

Photograph Diagram

Labels

Use of Label	Label name matched the identified object	Label name was semantically related to the object identified	Label name was not semantically related to object or incomplete

Photograph with Message

Message Meaning

Message semantically matched photo	Message was semantically related to the photograph but might have used terms inaccurately or emphasis was on an alternative object	Message did not semantically match the photograph

Message Type

Message was a personal statement	Message described the photo by naming a feature of the photograph	Message named a characteristic event associated with the topic of the photograph	Message described the photo in semantic ballpark but used terms inaccurately	Message described the marks made

Drawing Diagram and Message

Labels

Use of Label	Label name matched the identified object	Label name was semantically related to the object identified	Label name was not semantically related to object or incomplete

Message Meaning

Message semantically matched drawing	Message was semantically related to the photograph but might have used terms inaccurately or emphasis was on an alternative object	Message did not semantically match the drawing

Message Type

Message was a personal statement	Message described the drawing by naming a feature of the drawing	Message named a characteristic event associated with the topic of drawing	Message described the photo in semantic ballpark but used terms inaccurately	Message described the marks made

Drawing Diagram

Labels

Use of Label	Label name matched the identified object	Label name was semantically related to the object identified	Label name was not semantically related to object or incomplete

Drawing and Message

Message Meaning

Message semantically matched drawing	Message was semantically related to the drawing but might have used terms inaccurately or emphasis was on an alternative object	Message did not semantically match the drawing

Message Type

Message was a personal statement	Message described the drawing by naming a feature of the drawing	Message named a characteristic event associated with the topic of the drawing	Message described the drawing in semantic ballpark but used terms inaccurately	Message described the marks made	Message's content was not related to the drawing