FOSTERING INFERENCE GENERATION WITH EMERGENT AND NOVICE READERS

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The foundations of reading comprehension begin well before school entry. The comprehension of videos and aurally presented narratives in preschool are correlated with general reading comprehension at age 8 (Kendeou, Bohn-Gettler, White, & van den Broek, 2008). Although foundational skills are specified in the Common Core State Standards, comprehension trumps all in breadth, depth, and volume of attention beginning with the prekindergarten standards. Putting comprehension at the forefront in the primary grades calls for a shift in the curriculum and classroom discourse.

Reading comprehension requires understanding not only what appears in text, but also the ability to think beyond the words of text to generate inferences. Local inferences include but are not limited to identifying pronoun referents, inferring the meanings of unfamiliar words or connotations of words specific to a context, and filling in unstated information. Global inferences include analyzing how pieces of text relate to the cohesive whole, recognizing how characters' states develop or influence text episodes, and evaluating the validity of information in a text.

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The Reading Teacher Vol. 67 Issue 5 pp. 384–388 DOI:10.1002/trtr.1230

Among children with similar decoding skills, the ability to generate inferences distinguishes elementary school-age children who comprehend successfully and those who score poorly on assessments of reading comprehension (Bowyer-Crane &Snowling, 2005; Cain & Oakhill, 1999). One study that traced a group of children from age 7 to age 11 determined that inference generation, monitoring, and knowledge of story structure persisted as consistent predictors of more general reading comprehension (Cain & Oakhill, 2012).

Young children engage in many of the same inference-generation processes as sophisticated readers (Kendeou et al., 2008; van den Broek et al., 2005; van den Broek, Kendeou, Lousberg, & Visser, 2011). The implications of this research extend the possibility that by strengthening comprehension instruction during the primary school years, we can do the following:

- Provide rich and consistent opportunities for developing comprehension of texts and videos
- Identify students who are at risk for comprehension difficulties before it becomes muddled with decoding
- Identify students who are at risk for comprehension difficulties before it becomes muddled with content complexity
- Provide informal intervention for children who display signs of difficulty with narrative comprehension even before they begin to read in traditional ways

Developmental Considerations

Because most studies of emerging readers have been conducted using narratives in nonreading contexts, a great deal is known about how teachers of young children can use storybook experiences to provide a strong foundation for later reading comprehension (Kendeou et al., 2008; Sulzby, 1985; Tompkins, Guo, & Justice, 2013; van den Broek et al., 2005; van den Broek et al., 2011). Teacher read-alouds, videos, and student reading of wordless picture books are good instructional starting points that have strongly grounded research foundations.

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Prekindergarten and kindergarten children most frequently make inferences about the concrete activities of characters and character states, emotions, and dialogue as part of a wordless picture book narration and in response to questions (Tompkins et al., 2013). First-grade children tend to be able to recall the events of a story in the correct temporal order, but their description of characters' intentions and internal motivations is still less common (Stein & Glenn, 1979). However, it is the generation of goals, actions leading to the accomplishment of goals, and characters' states of mind that most strongly predict general comprehension because they propel the causal sequence of the story (Kendeou et al., 2008; Tompkins et al., 2013). Because young children are not as likely to generate these powerful inferences spontaneously, instructional modeling and scaffolding are needed.

Planning for Instruction

In planning for instruction, it is important to analyze the stories (text, video, wordless picture book) before reading or showing them to children. The generation of inferences is always related to and reliant on prior knowledge. Therefore, the first step is to ascertain whether the children have the basic conceptual knowledge required to understand the story. The implementation of integrated disciplinary units supports the ability of children to generate inferences because you can be confident that the children have been exposed to the conceptual background that they will need to call on during the retrieval process.

No matter how experienced one is as a teacher, it is a good idea to develop a script or "cheat sheet" to rely on during instruction (van Kleeck, 2008). Time is a teacher's most valuable asset, and distractions abound in a busy classroom. Planning ahead increases the likelihood of student engagement because you have been deliberate in choosing what aspects of a story merit time and attention. Having the cheat sheet ensures that you have crafted the wording of the most valuable questions, both literal and inferential, that will be embedded within the read-aloud.

The literal questions serve as the stepping-stones to the high-level thinking. A good analysis identifies the goals of the character, how those goals drive the causal sequence of events, how the evolution of the plot and character's mental state are related, and how episodes contribute to the macrostructure of the text. As sophisticated readers, most of the inferences that we generate are retrieved automatically, so this story

Table 1 Inferential Questioning

Question type	Sample questions
Causal	
Initiating event/problem	What is the story about? What is the character's problem?
Internal response	How does the character feel? What is the character thinking? What makes you think that?
Goal	What does the character want to happen/to get?
Attempts/episodes	What will happen next? What makes you think that? Why is this important to the story? What will the character do to solve the problem/achieve the goal?
Consequences of each attempt and internal response	Did what the character tried work? Why or why not? What caused the change? What does (*literal*) tell you about (*inference*)?
Outcome/resolution	Did the character achieve the goal?
Informational	
Setting	Where and when did the story take place?
Characters	Who is the story about?
Elaborations	What do you know about____?
Definitions	What does *word* mean? What does the author mean by *phrase*?
Value	
Evaluation	Did the character do the right thing? What life lesson can we learn from this story?

Note. Adapted from van Kleeck, 2008; Warren et al., 1979.

deconstruction increases our awareness of what might *not* be automatic for our young, inexperienced students. Creating a detailed story map of links connecting story episodes (not the generic graphic organizer) will help you think-aloud to model the identification of relationships within the text and to external sources. See Table 1.

Reflective analysis is required to determine whether the children's answers to the questions require bridging information within the text, linking the text to world knowledge, or linking the text to other texts. Particularly for young children, questioning *during* reading is crucial in making causal connections (van den Broek et al., 2011). The goal should be to prompt thoughtful responses that deepen your students' understanding of the text, not to create generic questions that mindlessly call for students to "provide text evidence" (the newest catchphrase) or to parrot what kind of connection they are making. Recording notes on possible think-alouds will also save time during the read-aloud and help you articulate your inference-generation process. These planning notes can be used year after year.

Modeling our thinking as we read aloud to children and asking questions during and after the read-aloud make public the thinking that is required for inference retrieval and generative processes. Explicit attention should be drawn to the characters' internal states and goals. It is important for the discussion to address how episodes are linked to create a cohesive story. Deep understanding also calls for children to generate informational inferences and evaluation inferences (Warren, Nicholas, &Trabasso, 1979).

Large- and small-group guided practice should include opportunities for children to describe the chain of events to each other with additional scaffolding by you. As teachers, we often ask individual children to respond to isolated questions about our read-alouds or to participate in a collaborative retell of a story. When we only ask individual children to be responsible for responding to a bit of a story or to identify the beginning, middle, and ending, we may be missing opportunities to teach the causal connections that are essential comprehension building blocks.

Working With Emergent Readers

These activities fit seamlessly into small-group teacher read-alouds in prekindergarten and kindergarten or as part of a whole-class read-aloud in first grade. Verbal engagement with children tends to decrease as group size increases, so it is important to work in small-group contexts as often as possible (van Kleeck, 2008). Using video examples and modeling to train parents how to conduct conversational read-alouds increases student opportunities for one-on-one interactions.

Evidence indicates that inference processing is similar whether in response to an aurally presented story or in response to a story in video format (Kendeou et al., 2008; Kendeou et al., 2006).Therefore, the same procedures described previously are equally effective when implemented using storybooks, videos of stories, or wordless picture books.

Use Videos

Particularly with the youngest children, using short 5- to 10-minute videos of stories that have fully developed plots can be an effective comprehension instructional technique (see Hall & Stahl, 2012). A video presents information through both verbal and visual, nonverbal channels. This enhances cognitive processing and is highly engaging.

Table 2 Sample Kindergarten Lesson for *The Frog Prince*

Day 1	Students watch video of *The Frog Prince* in a small-group context. Stop video and discuss at each time marker indication.
00:35 02:16	Why is the princess crying? What is the princess' problem? Why did the frog agree to help the princess? Do you think the princess will keep her promise? What makes you think that? Explain what Princess means when she says, "The frog is talking nonsense. Life in a castle is not for him"
03:16	What just happened? What is the frog thinking? Why is the king telling Princess that she must let the frog inside? What will happen next?
04:55	What caused the princess to change her mind about the frog? What will happen next? What makes you think that?
05:16	What lessons do you think the storyteller wanted us to learn from the story?
Day 2	In small group, children watch the story uninterrupted. Partner 1 retells the story to partner 2. Then each child draws a "quick pic" of five story scenes on a story frame worksheet. Finally, partner 2 shares pictures and retells the story to partner 1.
Day 3	Optional: Students watch the video. Follow-up discussion with the teacher focuses on the frog's point of view.

Note. Video lesson: *The Frog Prince* (www.youtube.com/watch?v=P6KzfK35ufU).

Consequently, student attention is preserved for high-level questioning and discussion after the viewing. See Table 2 for a sample lesson plan that engages children in dialogue during the video to maximize awareness of the causal connections (van den Broek et al., 2011).

Use Wordless Picture Books

The use of wordless picture books is also a powerful, underused vehicle for teaching and observing a child's ability to create a cohesive oral narrative (Paris & Paris, 2003). Because it is a productive task, it is more difficult than responding to a narrative that was viewed or read by another. A teacher might begin by leading the whole class in a collaborative story generation using a wordless picture book. This can be followed by small-group work that engages children in collaboratively creating cohesive oral narratives for wordless picture books. Questions that prompt children to integrate personal experiences and emotions as they develop the text character and formulate connected plot episodes serve as a model for the integrative processes that are the foundation of reading comprehension.

Working With Novice Readers

When children begin reading on their own, the little books that they are reading are not likely to have fully developed, complex narrative structures like those found in the high-quality storybooks that they enjoyed as teacher read-alouds. Although we want to hold children accountable for activating prior knowledge, making justifiable predictions, and creating a cohesive retelling, it is important that these texts not be stretched beyond what exists. They are simplistic. High-level comprehension instruction is still dependent on more complex texts beyond the readability levels of most students. Until children are reading texts at around early second-grade reading level, most deductive inferences will be based on texts that you read to them.

In late first grade through second grade, shared reading of stretch texts (Lexiles 300–500) provides the necessary scaffolded opportunities for novice readers to apply the inferencing skills during their own reading that they previously applied without the burden of decoding (see Stahl, 2012). At this developmental level, it is crucial for children to have their eyes on the texts and apply repeated reading of the text for both fluency and familiarity with the text that will yield inference generation. When they begin reading complex texts at this developmental stage, it is not surprising for children to have setbacks making connections across the story, identifying how the character changes over time, putting key elements throughout the story together to formulate the macrostructure, or identifying the theme.

Therefore, it is a good idea to spend a few days on each complex story that is part of the classroom shared reading routine. Although children may have become skilled at generating inferences during nonreading activities, their word-recognition skills are not yet fully automatic and will share the same mental space required for inference generation. Additionally, the stories are longer and more complex, so the task demands have increased.

Because the orchestration of word recognition and comprehension is cognitively challenging for the novice reader, we want to have confidence that before the child is responsible for reading books at this level of complexity,

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strong inference-generation skills are in place when he or she is not responsible for the reading task. This is a premise that is in some ways opposite to how reading is often taught. We often wait until this developmental crossroad to begin an aggressive approach to comprehension instruction, when in fact, competence generating basic inferences should be firmly established when the child reaches this level of reading ability.

Tracking the Development of Comprehension

As children develop, increases in working memory capacity, attention span, and world knowledge enhance the efficiency of general comprehension and inference generation. In nonreading tasks, performance improves as children get older. However, throughout the primary grades efficiency of *reading* comprehension is strongly influenced by word recognition. Therefore, it is useful for the teachers in the primary grades to keep parallel records of comprehension performance in both nonreading and reading tasks. The activities described in this article may be standardized and used as formative assessments (McKenna & Stahl, 2009; Paris & Paris, 2003; Sulzby, 1985).

Documenting early narrative comprehension behaviors is useful for informing instruction and tracking developmental changes over time. Diagnosing and remediating comprehension difficulties in third grade and beyond can often feel like aiming at a moving target. When comprehension difficulties are identified before formal reading instruction has begun, intervention may include conducting read-aloud discussions in smaller settings, shifting to more supportive formats (e.g., video, experiential), and supporting parents in their efforts to conduct effective read-alouds at home.

Conclusions

Inference generation makes a strong, unique contribution to reading comprehension. Time and deliberate attention to nurturing these developing abilities must be an important part of the daily routine in the early childhood classroom. Intervening early during nonreading activities will increase the likelihood of creating successful, thoughtful readers.

REFERENCES

Bowyer-Crane, C., & Snowling, M.J. (2005). What do tests of reading comprehension measure? *British Journal of Educational Psychology, 75*(2), 189–201. doi:10.1348/000709904X22674

Cain, K., & Oakhill, J.V. (1999). Inference making and its relation to comprehension failure. *Reading and Writing, 11*(5–6), 489–503. doi:10.1023/A:1008084120205

Cain, K., & Oakhill, J. (2012). Reading comprehension development from seven to fourteen years: Implications for assessment. In J.P. Sabatini, E.R. Albro, & T. Reilly (Eds.), *Measuring up: Advances in how to assess reading ability* (pp. 59–76). New York, NY: Rowman & Littlefield.

Hall, M., & Stahl, K.A.D. (2012). Devillainizing video in support of comprehension instruction. *The Reading Teacher, 65*(6), 403–406. doi:10.1002/TRTR.01061

Kendeou, P., Bohn-Gettler, C., White, M.J., & van den Broek, P. (2008). Children's inference generation across different media. *Journal of Research in Reading, 31*(3), 259–272. doi:10.1111/j.1467-9817.2008.00370.x

Paris, A.H., & Paris, S.G. (2003). Assessing narrative comprehension in young children. *Reading Research Quarterly, 38*(1), 36–76.

McKenna, M.C., & Stahl, K.A.D. (2009). *Assessment for reading instruction* (2nd ed.). New York, NY: Guilford.

Stahl, K.A.D. (2012). Complex text or frustration level text: Using shared reading to bridge the difference. *The Reading Teacher, 66*(1), 47–51. doi:10.1002/TRTR.01102

Stein, N.L., & Glenn, C.G. (1979). An analysis of story comprehension in elementary school children. In R.O. Freedle (Ed.), *New directions in discourse processing* (Vol. 2, pp. 53–120). Norwood, NJ: Ablex.

Sulzby, E. (1985). Children's emergent reading of favorite storybooks: A developmental study. *Reading Research Quarterly, 20*(4), 458–481.

Tompkins, V., Guo, Y., & Justice, L.M. (2013). Inference generation, story comprehension and language in the preschool years. *Reading and Writing, 26*(3), 403–429.

van den Broek, P., Kendeou, P., Kremer, K., Lynch, J., Butler, J., White, M.J., & Lorch, E.P. (2005). Assessment of comprehension abilities in young children. In S.G. Paris & S.A. Stahl (Eds.), *Children's reading comprehension and assessment* (pp. 107–129). Mahwah, NJ: Erlbaum.

van den Broek, P., Kendeou, P., Lousberg, S., & Visser, G. (2011). Preparing for reading comprehension: Fostering text comprehension skills in preschool and early elementary school children. *International Electronic Journal of Elementary Education, 4*(1), 259–268.

van Kleeck, A. (2008). Providing preschool foundations for later reading comprehension: The importance of and ideas for targeting inferencing in storybook-sharing interventions. *Psychology in the Schools, 45*(7), 627–643. doi:10.1002/pits.20314

Warren, W.H., Nicholas, D.W., & Trabasso, T. (1979). Event chains and inferences in understanding narratives. In R.O. Freedle (Ed.), *New directions in discourse processing* (Vol. 2, pp. 23–52). Norwood, NJ: Ablex.