

Facilitating Reading Comprehension for Students on the Autism Spectrum

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Joshua is a 12-year-old student diagnosed with autism. He is very interested in the Civil War and knows many facts about the battles, uniforms, and weapons used, and he collects Civil War memorabilia. Although he is a voracious reader of this era, he has difficulty comprehending other topics during language arts class. Although he appears to understand story lines, he has difficulty understanding character motivation, perceiving foreshadowing, and appreciating event integration within a story. As a result, he avoids reading fiction and becomes easily frustrated with literature tasks.

Jamie is a second-grade student with a diagnosis of pervasive developmental delay (PDD). He has been a precocious decoder since preschool and is a fluent reader. He reads smoothly, often with appropriate prosody in his voice. It would seem that he understands what he is reading, but his fluency masks his lack of reading comprehension. Jamie thinks that reading stops with decoding and becomes visibly distressed when he is required to slow down and discuss what he reads.

Michelle is a fifth-grade student diagnosed on the autism spectrum. She

attends school in a fifth-grade general education classroom and receives individualized and small group support with a special educator. She has difficulty understanding social situations but enjoys working with her small group. Her word recognition skills are almost at grade level and with assistance and individualized attention, she understands what she reads. However, when left on her own, she has trouble understanding even the lowest level material.

Deficits in reading comprehension of children with autism spectrum disorder (ASD) are becoming increasingly highlighted in literature (Hale & Tager-Flusberg, 2005; Nation, Clarke, Wright, & Williams, 2006; O'Connor & Klein, 2004; Wahlberg, 2001). Smith-Myles et al. (2002) investigated the reading skills of children with Asperger's syndrome and found poorer silent reading skills than oral reading skills as well as significant differences between factual and higher order, inferential comprehension. Patterns of higher word reading skills accompanied by poor reading comprehension is often termed *hyperlexia*. The incidence of hyperlexia in the ASD population is increasingly being noted (Grigorenko, Klin, & Wolkmar, 2003; Newman et al., 2007).

It is a challenge for children with ASD to integrate language, social understanding, and emotional intent of messages to understand their social world (Quill, 2000). They often have deficits in language and social cognition and difficulty interpreting and labeling emotions and incorporating or integrating each of these aspects of communication to gain meaning in social situations. As in social situations, the task and importance of understanding and interpreting various cues is necessary for effective comprehension of narrative texts. To obtain reading comprehension, students must understand the author's vocabulary, style of writing, and story structure as well as characters' social experiences and how these contribute to the development of motivations, goals, and actions within a story setting. Students need to develop sensitivity to the emotions of characters and how these emotions play a role in characters' choices. Intuiting the motivation of characters and appreciating their intent are higher level comprehension skills which may be difficult for children with ASD.

Quill (2000) notes that "children with ASD tend to focus on details and interpret information in a fragmented manner; they misperceive the intentions of others and become 'stuck' in one mode of thinking and behaving" (p. 20). These characteristics predispose children with ASD toward difficulty understanding narrative text found in stories. Others

Figure 1. Strategies for Higher Order Reading Comprehension Skills

1. Priming background knowledge
2. Picture walks
3. Visual maps
4. Think-alouds and reciprocal thinking
5. Understanding narrative text structure
6. Goal structure mapping
7. Emotional thermometers
8. Social stories

speculate that the difficulty with narrative is in *theory of mind* (Sterling, 2002). Baron-Cohen (2001) suggests that theory of mind, the ability to infer the full range of mental states of others and the ability to reflect on one's own and other's actions, is a core deficit of ASD and often determines one's course of action. Baron-Cohen cites sources showing that children with ASD have difficulty understanding what others are thinking; understanding deception, metaphors, sarcasm, jokes, and irony; and developing one's imagination which may contribute to the difficulty with higher order understanding of narratives. Westby (2004) suggests that children with ASD often show deficits in theory of mind tasks which may result in difficulties in a variety of tasks regarding reading comprehension including (a) recognizing and understanding emotions, (b) incorporating pragmatic language skills, (c) determining character goals in stories, (d) recognizing false beliefs, and (e) understanding trickery. Even a simple fairy tale requires theory of mind skills, as most typical 4-year-olds will say, "Little Red Riding Hood *thinks* that it's her grandmother, but it's really the wolf" (Baron-Cohen). One can imagine the impact that deficits in theory of mind have on understanding more advanced stories.

Strategies for Higher Order Reading Comprehension Skills

There are a variety of strategies based on proficient reader research that can help children with ASD develop higher

order reading comprehension skills and that can also be tailored to the cognitive characteristics of children with ASD. These strategies include priming background knowledge, picture walks, visual maps, think-alouds and reciprocal thinking, understanding narrative text structure, goal structure mapping, emotional thermometers, and social stories (see Figure 1). Incorporating visually cued instruction, such as graphics and color, with these strategies provides tangible and concrete information important for focusing on relevant parts of the story. Visually cued instruction also helps students remember what to do or say, decrease reliance on other prompts, and increase independence. As children become more automatic in responses, fade visual prompts.

Using a popular children's novel, *Sarah, Plain and Tall* (MacLachlan, 1985), helps demonstrate the strategies for higher order reading comprehension skills. This novel, routinely taught in fourth- and fifth-grade general education classrooms is part of interdisciplinary units within the United States. It is on many recommended reading lists and is included in curriculum frameworks in many states and school districts. Figure 2 provides a summary of the book.

Priming Background Knowledge

Priming background knowledge, an important strategy to focus reading as a thinking activity, develops a mental set for an activity so that students connect what they know to new information and skills. Using tools such as picture walks and visual maps provides support to ensure that text is easier to understand. The more readers know about a topic, the easier it is to connect the text with background knowledge (Harvey & Goudvis, 2000). Although studies show that priming background knowledge is often helpful to children, they also indicate that when background knowledge is inaccurate, comprehension can be disrupted (Brody, 2001). And likewise, when children are given pertinent, accurate background knowledge, reading comprehension is enhanced (Brody). Many children with ASD have language deficits that result in a lack of

Figure 2. Summary of *Sarah, Plain and Tall* (MacLachlan, 1985)



Anna Whitting has taken care of her brother, Caleb, since her mother's death. She has also been responsible for the chores of their house on the prairie. Caleb, Anna, and their father, Jacob, continue to mourn the loss of their mother. Jacob puts an advertisement in the newspaper for a new wife. Sarah, a plain woman from Maine, answers the ad and prepares to move to the prairie.

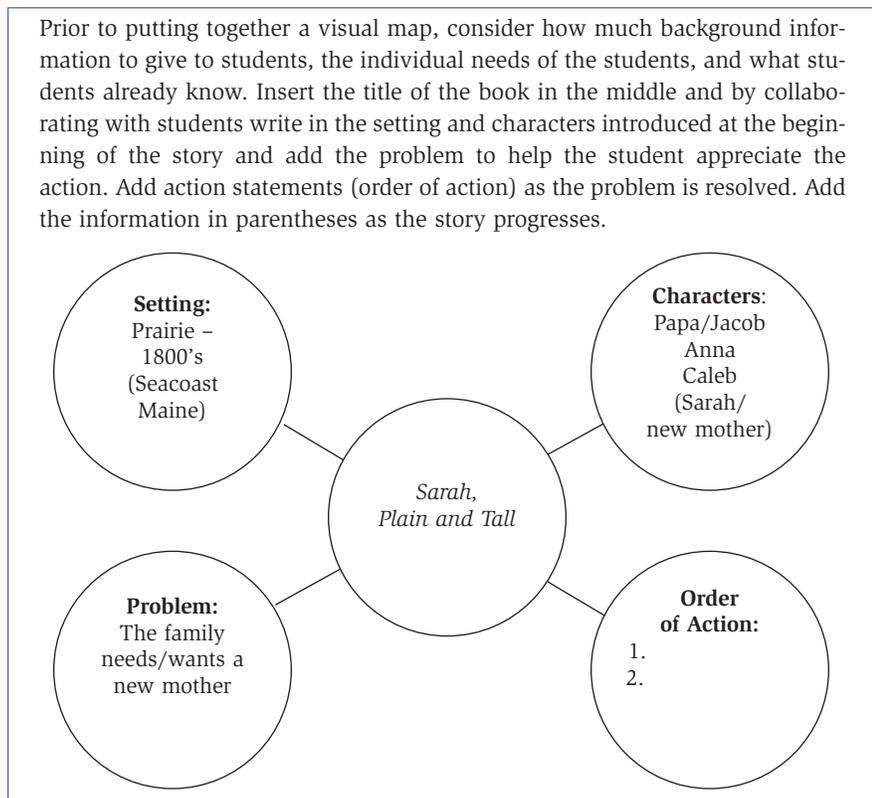
general knowledge. This deficit has been shown to cause difficulty in accessing relevant knowledge and integrating it with what is in the text (Westby, 2004). As a result, while priming background knowledge, it is important that information be given that helps anchor thinking in the correct direction of the text.

The more readers know about a topic, the easier it is to connect the text with background knowledge.

Picture Walks

To conduct a traditional picture walk, survey illustrations of a story, make predictions about the story, and confirm the predictions (Zimmerman & Hutchins, 2003). Engaging children in picture walks is an effective technique for struggling readers and helps children develop positive expectations about what might occur in a story. Prior to reading the story, review the pages of the book with the students while they think about the story and facilitate students' thinking by directing toward an accurate preview of the story. To ensure that incorrect assumptions are repaired and not reinforced while conducting picture walks with children with ASD, it is essential to maintain a more struc-

Figure 3. Visual Map for *Sarah, Plain and Tall*



tured picture walk than may be needed for typically developing peers. Focusing children with ASD on pictures satisfies their tendency to learn visually and is more effective than simply talking or reading a summary of the book jacket. Beware that contradictory relationships between text and illustrations may occur (Serafini, 2004) and therefore care must be taken to select illustrations that enhance the text.

Visual Maps

When there are no pictures to use to prime background knowledge, using visual maps to set up stories is an effective alternative. One type of visual map is a simple story map. This helps students get “primed” for what they will read by giving information about characters, setting, and the problem faced by the characters. As seen in Figure 3, include story elements that are introduced at the beginning of *Sarah, Plain and Tall* in the beginning of the lesson. Enhance the graphic as new details develop such as when Sarah is introduced into the story, the characters enter a new setting (e.g., the seacoast of

Maine), or the characters engage in additional action sequences. Collaborate with the students as the visual map is developed. Enlarge the “order of action” bubble so that students write down the action as it occurs in the story.

Think-Alouds and Reciprocal Teaching

Think-alouds is another way to model thinking about text to students. Used in reciprocal teaching (Palinscar & Brown, 1985), think-alouds help students with disabilities learn four strategies: predicting, questioning, clarifying, and summarizing. Think-alouds are recommended for children having difficulty with the meta-cognitive aspects of reading (Reutzel & Cooter, 2001). Use think-alouds (Tovani, 2000) by carefully selecting a passage based on the strategy modeled. In reciprocal teaching, explicitly teach students the four strategies by modeling thinking through the story with the students. As the passage is read aloud, stop often to share thoughts, often the exact thought of that moment relating to the story. The

shared thoughts should be explicit; that is, point out to the students the words that specifically trigger the thoughts. For example, “When I read the words XYZ, I thought about ABC” or “I’m confused about ABC. Let’s see how I can figure this out.” Explicit teaching helps students gradually assume responsibility for using the four strategies. Eventually, have students talk about their own thinking, answer direct questions, develop questions to ask other students, or make comments to share with group members. This mediated scaffolding is essential to help students become independent in their ability to understand text.

Westby (2004) notes that poor comprehenders do not build mental models and are less skilled at integrating information from different parts of text in order to make relevant inferences. The information processing deficits of children with ASD highlights their difficulty with integration and their tendency to over select and focus attention to one detail at a time (Quill, 2000). Adding color coding and using props adds visual cues that help students remember the four strategies as well as enhance overall instruction. Another way to provide visual cues to aid different ways to think about and make the text concrete is to write thoughts about the story on colored post-it notes.

Understanding Narrative Text Structure

Understanding narrative text structure is another technique to help students improve comprehension skills and organize narrative text into a coherent whole. Basic understanding of narrative starts with discovering who the main character of the text is and what he did. Teaching basic actor words (e.g., man, woman, Jane, Bill, grandparents, dogs, and relatives) and basic action words (e.g., ate, jumped, cried, slept, and ran) and then combining the two words to make a complete thought helps develop text structure. Use simple sentences and pictures at the beginning of this instruction and eventually students learn to identify who-did-what as they are repeatedly asked questions such as, “Who ran?” or “What did the girl do?”

Figure 4. Simple Who-Did-What Sequence

Who	Did What
1. Anna's mother	died.
2. Anna	takes care of family.
3. Father	writes newspaper ad.
4. Caleb	waits and hopes.
5. Sarah	answers the ad.

When reading a simple story, develop a sequence of who-did-what events and have students list these events in simple story frames (see Figure 4). Events of the story can be written on sentence strips, organized by the students, and then matched to the cues in the story frame. Sequencing these events can be a subsequent activity and color coding the who-did-what frames adds a visual cue to help students develop the narrative text. As the skill of identifying the sequence of action by listing who-did-what is developed, students can be shown how to insert transitional words to help write series of who-did-what sentences by modifying the simple story frames (see Figure 5).

Goal Structure Mapping

Once children understand the who-did-what structure and how a series of who-did-what-statements creates a narrative, introduce goal structure mapping. Developed by Sundbye (1998), goal structure mapping uses shapes, lines, and arrows to organize stories so that students understand how events of one character may influence the actions of another character. To prime students to use good structure mapping, in a modified form of goal structure mapping, introduce students to a basic graphic which depicts who-did-what. Add additional actions to the graphic showing who-did-what as the story develops. Once graphics for the goal and the resolution of the goal/story are added, the students may begin to use Sundbye's Goal Structure Mapping Program to follow the story line. Basic level visual maps are shown in Figure 6. From this frame, have students use simple color-coded organizers to develop a story summary which includes the character's goal, his actions to achieve that

goal, and a conclusion noting if the character attained his goal.

Basic understanding of narrative starts with discovering who the main character of the text is and what he did.

Once students master how to understand the major events of the story, draw arrows to introduce the concept that one character's action may influence another character's action. A goal structure map for *Sarah, Plain and Tall* is developed with the students in a sequential fashion. It shows how the action of one character influences the action of another with arrows. This aspect of goal structure mapping is quite helpful to students with ASD because it not only shows the order of action but also helps the students to see the relationship of actions between the characters. It is another step toward helping students with ASD think about why characters do what they do. Sometimes they act because of another character's influence. This is often difficult for students with ASD to grasp. Although the final product may look complicated, it is developed with the student in a sequential fashion. Making goal structure maps for each chapter or sequence of events helps students keep the storyline organized.

Emotional Thermometers

Helping students understand feelings and emotions of characters is important in enhancing student's appreciation of why characters make certain choices. Using emotional thermometers (Westby,

Figure 5. Transferred Data to Story Frame

Give the story frame (in bold) to students to fill in with information transferred from the who-did-what phase (see Figure 4).

This story is about Caleb and Anna.

First, Anna's mother died.

Then, Anna take cares of her family.

Next, Father writes a newspaper ad.

After that, Caleb waits and hopes for a new mother.

Finally, Sarah answers the ad.

I liked the story.

2004) with color and varied vocabulary helps children gain a sense of various intensities of feelings (see Figure 7). Gray (1994) suggests that color connotes emotions and can be used to help children with ASD understand and describe feelings and emotions for themselves as well as characters in stories. For example, she suggests that green connotes good ideas and happy feelings whereas red connotes bad ideas or angry feelings. Shades of color can be used to (a) help children "see" the intensity of feeling in a concrete manner, (b) identify characters' feelings, (c) show the difference between protagonists and antagonists, (d) show how characters' feelings may change with different events, (e) and show how feelings often affect characters' choices.

Figure 6. Goal Structure Mapping

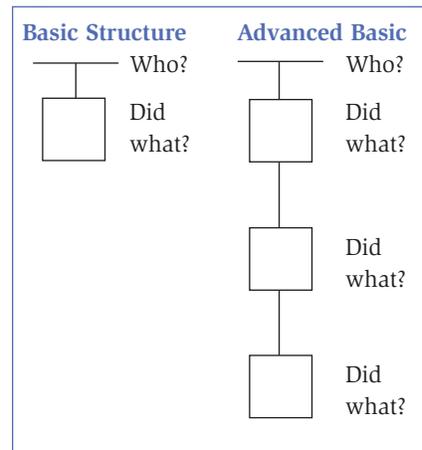


Figure 7. Emotional Thermometer

Using the color blue, direct students to point varying shades to express the level of sadness that Papa is feeling.

How sad was Papa after his wife died?



Gray (1994) also uses colors in comic strip conversations which further differentiates characters' thoughts from actions by using cartoon bubbles (see Figures 8 and 9).

Social Stories

Understanding characters' actions in reading requires understanding various thinking perspectives, which is often difficult for children with ADS. Gray (2003) uses social stories to help children consider perspectives of others in social situations and help consider perspectives of various characters. For example, a social story about Caleb's feelings in *Sarah, Plain and Tall* are analogized to a student's similar feelings in a different situation, helping the student gain a higher level of appreciation and understanding of the story.

I am reading *Sarah, Plain and Tall*. It is a story about a family who lives on a prairie. Caleb is the little boy in the story. His mother died when he was born. Caleb misses his mother. I can tell this because Caleb keeps asking his sister Anna to tell him about his mother. When I think about Caleb missing his mother, I can think about missing my brother who is at college. I am sad when my brother leaves for college. This helps me to know how Caleb feels in the story.

Social stories can also help students understand language which may seem contradictory to a character's actions.

When Sarah writes a letter to the family, Caleb reads the letter "so

many times that the ink begins to run and the folds tear." Caleb is not trying to ruin the letter. He is very interested in the letter, so he reads it over and over. Sometimes I get very excited about something and I talk about it over and over. This is what Caleb is doing in the story. This tells me that Caleb is very interested in Sarah and he is hoping she will come to live with the family and be his mother.

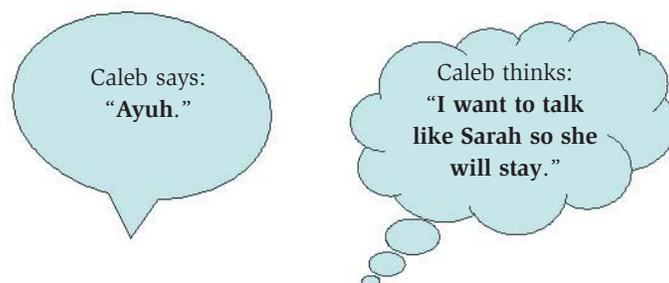
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Social stories help students understand text and may be used to help reduce any difficulty using any of the strategies previously mentioned. In the following social story, the student is directed to use the same strategies as his classmates to help him understand what he reads.

When my classmates read *Sarah, Plain and Tall*, they look for clues that help them understand how Caleb feels and what he wants. This is a good idea. Sometimes they find the clues and sometimes they can't find the clues. The teacher can help them understand about Caleb. Sometimes I miss the clues too. This is ok. The teacher and my classmates can help me understand about Caleb and the other characters.

Figure 8. Cartoon Bubbles

Sometimes characters say one thing and may mean another. Use cartoon bubbles to help differentiate between what a character thinks and what a character says.



Social stories assist students to make important connections to characters that they otherwise might overlook or misinterpret. They can also be tailored to the individual child and the individual strategy that needs to be learned using the student's curriculum.

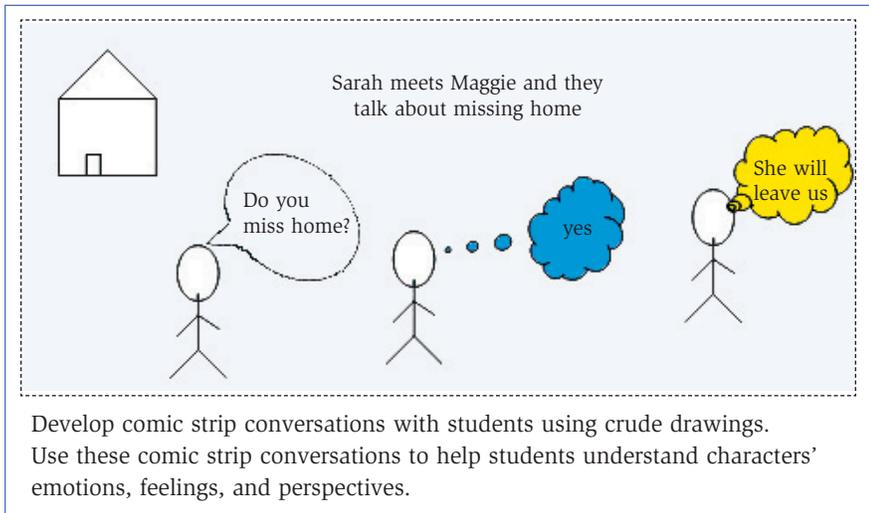
Conclusion

For Joshua, Jamie, and Michelle many of the techniques discussed may be effective in assisting reading comprehension. Using shaded color strips to show varied states of emotion, social stories to connect character emotional states to personal experiences, and using thought bubbles to differentiate thoughts from actions may help Joshua facilitate understanding why characters take various actions in narrative text. Making predictions and reading to validate those predictions and teaching story structure with visuals and color may also improve Joshua's ability to anticipate the storyline.

For Jamie, who has difficulty focusing on reading as a meaningful activity, modeling strategies and developing a set procedure for reading may be an effective way to help him with reading comprehension. Jamie might be taught to first focus on who-did-what sequences in stories and gradually build graphics to think about character problems and potential solutions.

Although Michelle may also benefit from many of the strategies recommended in this article, she primarily needs assistance developing self-guided strategies for reading comprehension. Giving Michelle a color-coded system reminds her to look at pictures, make predictions, and focus on who-did-what

Figure 9. Cartoon Bubbles in Comic Strips



sequences as she reads. Using goal structure mapping techniques may also give her the visual cueing system needed for reading comprehension. In addition, she may also profit from instruction that builds in scaffolding so that she is increasingly expected to respond to questions on her own.

Priming background knowledge, using think-alouds to develop strategies for understanding, learning story structure, and using comic strip bubbles and social stories enhanced by visual graphics and color help students with ASD anticipate action, follow narration, and think about character emotions and intent. The strategies are easy to implement and can be easily taught to general education teachers and paraprofessionals. Using these strategies with all students in the general education classroom will not only benefit students with ASD within general education classrooms, but can enhance the instruction of all students.

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TEACHING Exceptional Children, Vol. 40, No. 3, pp. 40–45.

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