Teachers Support Content Learning with a Range of Scaffolding Approaches

Within both teacher-initiated and child-initiated learning opportunities, early childhood educators support content learning using different types of scaffolding and a range of approaches. These include providing materials that support content learning, asking questions that provoke children's thinking, introducing vocabulary as part of play, and modeling how to use materials. Some new concepts need explicit teaching, while for other ideas, play experiences can form the intuitive, implicit conceptual foundation for later learning. For example, when teachers invite children to explore and play with math manipulatives (e.g., dinosaur or bear counters) before asking them to solve problems with the manipulatives, the children are more successful and more creative—at all ages (Bruner 1985; De Holton et al. 2001).

Let's consider an example of how scaffolding supports children's math learning. For example, 4-year-old Abby plays with the notion of counting "missing" objects (subtraction):

4.3 Math Play with Trains

Abby is playing with three of five identical toy train engines. Passing by, her teacher notices and stops to speak with her.

Teacher: How many engines do you have?

Abby: Three.

Teacher: Hmm. Where are the other ones?

Abby: Oh, we got five of those. *(Points to each engine she has and continues.)* You are *one, two, three*. I'm missing *four* and *five*!

Teacher: Engines four and five?

Abby: Yes, those two. No, I changed my mind. . . I have *one, three,* and five. I'm missing *two* and *four*.

As Abby figures out how many toys she is missing, she is using math in her play. Her teacher's simple scaffolding prompts, intended to probe whether Abby could figure out a subtraction situation, inspired abstract and powerful thinking in the context of play.

In literacy as well, teachers can offer a range of support for children's play. Scaffolding strategies can include providing literacy materials (e.g., pencils, paper, clipboards, menus, maps, order forms, magazines, and books) in sociodramatic play centers (e.g., Neuman & Roskos 1992) and modeling for children how and when to use these materials. Another strategy is scaffolding children's writing when they want to write as part of their play, as in the previous example with the tomatoes, where the teacher helps the child fill out an order form.

In the following example, Sonya uses 18-month-old Todd's understanding of dogs to help him build new knowledge about horses.

4.4 A Dog and a Horse Are Different

Todd points to a picture of a horse and says, "Dog." Sonya says, "I can see why you think it's a dog. It has four legs, pointy ears, and a tail. But let's look closer. This animal is much bigger than a dog and look, this part of its face, the muzzle, is much longer than a dog's." She points to the nose as Todd watches intently. Sonya says, "This animal is called a horse. Let's say 'horse.'" Todd says "horse" along with Sonya. "Yes, that's a horse," she says. "Now let's look for a picture of a dog." She flips through the book and finds a picture of a dog. "See, here's a dog. It's much smaller than a horse. Let's look at them together." She folds the page so Todd can see the pictures side by side, allowing time for him to look at both pictures. As Todd points again, Sonya says, "Yes, here's the horse and here's the dog—they look different. The horse is much bigger, his legs are longer, and he has a longer muzzle, which is another word for nose." Sonya pauses again while Todd points to the animals. She names them as he points. Then she says, "They also make different noises." Todd eagerly joins Sonya in saying "Woof!" and "Neigh!" as Sonya points to the respective animals. Sonya finishes by saying, "The horse and the dog are both animals, but they are different types of animals."

(Adapted from Dean & Gillespie 2015)

Sonya offers explicit information that helps Todd to extend his understanding of the terms *horse* and *dog* and to begin to develop a mental picture of the two animals. The teacher is skillfully connecting what the child knows to what he doesn't quite yet know (Dean & Gillespie 2015).

Another important way to scaffold children's play is to introduce new vocabulary. In the following example, the teacher is pretending to cook with children in the kitchen area and she introduces the new word *spatula* as part of the play:

4.5 Introducing Vocabulary as Children "Cook"

Teacher: I think I need the spatula. Jinsook, can you pass me the spatula?

Jinsook: *(Looks unsure.)*

Teacher: *(Picks up the spatula.)* The spatula is this tool here. *(Holds it up.)* I can use it to get all of the cookie dough out of the bowl. *(Pretends to use the spatula to scrape out the bowl.)* Do you want a turn to use the spatula?

Jinsook: *(Takes the spatula and mimics the teacher's action, then turns to Mateo.)* You need the spatula for cake?

Mateo: No, I'm doing eggs.

Teacher: Sometimes at home, I use a spatula to cook eggs for my daughter.

Children benefit when teachers use a range of scaffolding strategies. Teachers can introduce completely new ideas and concepts through books ("Let's read a book about animals that live deep in the ocean"), conversations ("Let's think about the sound that the letter *b* makes"), and direct experiences ("Next week, we'll take a trip to the recycling center"). Children's independent play serves as an important entry point for educators to support learning, as the teacher does when she helps Jinsook and Mateo to learn the word *spatula* while the children are pretending to bake cookies in a dramatic play center, or as Abby's teacher does when she gently prompts Abby's thinking about missing train engines. Or as a teacher helping an infant develop an understanding of cause and effect might say, "When you shake your hand, the toy makes a rattling sound." Such strategies stretch learning experiences for each child and make learning achievable.

Content Instruction Includes Both Teachable Moments and Intentional Approaches

As illustrated in the vignettes above, spontaneous teachable moments, when handled well, are wondrous and satisfying; the teacher carefully observes children and identifies elements in the emerging situations that can be used to promote learning (Ginsburg, Lee, & Stevenson-Boyd 2008). However, capitalizing on teachable moments can be challenging for teachers. For example, teachers may not have language and concepts at the ready when these moments occur (Ginsburg, Lee, & Stevenson-Boyd 2008; Moseley 2005). Even if teachers spend a lot of time observing children during play, it can be hard to know when to join in and when to step back and let the play continue to develop. This is one reason that well-developed and researched curricula are useful guides to ensure that children have the experiences they need to support their development of content knowledge (Wright & Neuman 2009). (For more on well-developed curricula, see pages 218–219 in Chapter 10 and the discussion on learning trajectories later in this chapter.)

Refer to "Appendix B: Digging Deeper into Knowledge" for additional resources on curriculum.

Overall, there is substantial evidence that in addition to supporting content learning through teachable moments, planned learning opportunities for young children are important (see "Vocabulary Opportunities for All"). For example, higher-quality interactions around interactive read-alouds are more likely to occur when teachers plan for them—deciding which book to read, which ideas to discuss, and how to explain new words in child-friendly ways—than when they spontaneously choose a book off the shelf to read to children (T.S. Wright 2019). Likewise, intentional use of curriculum materials that are culturally and linguistically relevant creates engaging and playful opportunities for children to learn new content. Well-developed and researched curricula are adaptable and make a substantial contribution to best practices in teaching and in children's learning (e.g., Clements & Sarama 2011).

In a similar vein, effective teachers go beyond simply setting out materials for children to explore. They also interact with children and guide them on how, when, and why the children might use these materials (e.g., Bingham, Quinn, & Gerde 2017; Gerde, Wright, & Bingham 2019; Hanley et al. 2009; Nayfeld, Brenneman, & Gelman 2011). In science, for example, teacher interactions extend children's use of materials from simple, isolated activities to deeper engagement as they work with and act *on* the materials, investigating their attributes and posing and answering questions about them. That is, effective teachers guide children to investigate the properties of materials, consider science questions as they explore, make meaning, and come up with explanations for what they notice (Rudd et al. 2008). (See "One Interdisciplinary Approach to Science and Literacy in K–2" on page 76 for an illustration.) In learning writing content, interactions with teachers encourage children to use writing materials in meaningful ways as they play (Gerde, Wright, & Bingham, forthcoming) and during teacher-initiated activities.

In sum, effective teachers support children's thinking as ideas come up, and they also create planned opportunities to ensure that many new ideas, and the words that represent those ideas, are part of all children's experiences in their early learning settings.

Teaching of Content Is Based on an Understanding of Children's Thinking and Learning

Children are not blank slates. Teaching of content is guided by an understanding of children's thinking at every age. This includes general knowledge as well as the focus here: knowledge of content and the progression children typically follow to learn specific content, such as learning trajectories. When based on a solid understanding of how young children think and learn, efforts to improve content learning help to support children's play and their cognitive, linguistic, social, intellectual, and academic development (Clements & Sarama 2021a). Such understanding includes awareness that all development and learning occur within specific contexts (e.g., social, cultural, linguistic, and historical) and that differences in those contexts contribute to unique processes of learning and development for each individual child (NAEYC 2020a). Just as important is an understanding of the cultural and family contexts that contribute to children's funds of knowledge, which help build educators' insights into children's thinking and support their learning (Civil 2016; Moll et al. 1992). Learning trajectories ideally support *formative assessment*, or adjusting interactions with children based on knowledge of their thinking and learning. In all content areas, this approach helps children build strong, conceptually based, *creative* knowledge and skills (NRC 2007). Children with such fluent and adaptive competencies, rather than mere efficiency, can pose questions or problems, make connections, and then figure out answers to their questions in ways that make the connections visible.

The most effective and exciting teaching, then, is guided by learning trajectories based on both research on children's thinking and learning (NRC 2007) and the wisdom of expert practice (e.g., Huss-Hage 2019). When teachers understand the progression of children's thinking and sequence and individualize activities based on these understandings, they support effective learning of content for all children.

Vocabulary Opportunities for All

Teachable moments alone may not provide equitable opportunities for all children to learn. For example, in a study in kindergarten classrooms (Wright & Neuman 2014), educators engaged in teaching the meanings of new words only during teachable moments, with no planned vocabulary supports for young children. In this study, teachers were more likely to engage in vocabulary teachable moments if they worked in schools serving a more economically affluent student population and were significantly less likely to engage in vocabulary teachable moments if they worked in schools serving a higher percentage of students from families with low income. In contrast, research demonstrates that educators can support all children's learning by planning to support children's vocabulary development in developmentally appropriate ways across content areas (Neuman & Wright 2014; Wright 2020).

A learning trajectory has three components: a goal, a developmental progression, and instructional practices and activities (Sarama & Clements 2009b). For example, to attain a certain competence in a given topic or domain (the goal), children progress through several levels of thinking (the developmental progression), aided by intentionally planned environments, interactions, experiences, and challenges (the instructional practices) designed to build the mental actions that enable thinking at each higher level (Clements & Sarama 2004). Therefore, to support children's development across content areas, teachers need to understand the goals for children's learning, children's current thinking in reference to those goals, and how to design learning opportunities to move children from their current understandings toward the learning goal. Further, teachers need resources, such as empirically validated curricula that are based on learning trajectories (Clements & Sarama 2008).

Assessing, understanding, and teaching with learning trajectories is especially important for children with disabilities (Clements & Sarama 2019). They might be operating at different levels of skill or understanding from their peers and also may be at quite different levels in one topic (say, counting) than in others (such as spatial relations). Learning trajectories offer different ways to introduce math topics such as arithmetic (e.g., counting, subitizing, or partitioning), so children can build on their individual strengths. Learning trajectories' levels are clusters of ideas and processes, not just skills. So, children can both learn and show competence using a variety of modalities and representations—all the hundred languages of children (Edwards, Gandini, & Forman 1993). Finally, learning trajectories can be aligned with formative assessment and the Individualized Education Program (IEP) or the Individualized Family Service Plan (IFSP) process (Clements & Sarama 2019).

4.6 Understanding Concept of Word: A Learning Goal

Ms. Meminger wants to know if the 4-year-olds in her pre-K class understand the concept that a word written in text represents a word spoken in oral language. She knows that observing children's behavior is one of the best ways to learn about what they know in reference to this learning goal. So, she lets children take turns pointing to the words while she reads aloud from familiar books and nursery rhymes. Ms. Meminger asks children to point to each word on the page as she reads it aloud. Sometimes, she also asks questions like "Can you point to just one word on this page?" and "How do you know that is a word?" She learns more about what the children understand by encouraging them to share their thinking.

Some children move accurately to the next word as Ms. Meminger reads it aloud. She knows that these children understand the concept of a word as a unit of text. Some children move their finger back and forth across the lines of text; others move from left to right and then correctly to the left side of the next line, but they aren't pointing to the word as Ms. Meminger reads it. She knows that these children need more opportunities to learn about the concept of a word.

Understanding where children are in their understanding lets Ms. Meminger plan appropriate instructional supports for helping children achieve this learning goal. She plans to engage the children in read-aloud with print-referencing (Justice & Ezell 2002), a research-based instructional strategy for drawing children's attention to print as the teacher reads aloud. (For an example of a print-referencing read-aloud, see the video "Pre-K Essential 2, Bullets 1–5 Sample" at https://youtu.be/5AqZiroHNaw.)

Consider another example of how understanding children's thinking helps teachers support their learning in the following story of one child's development of an essential math concept. Juanita (known as Nita) was supported by her parents and teachers, who knew about young children's power to *quantify*—an essential concept for math and science—and used their understanding to support her learning along the way. This example illustrates that a learning trajectory for *subitizing* (from Latin for "sudden")—that is, children quickly recognizing the number in a set without counting—includes the goal for children to become aware of, recognize, and name quantities without counting. The beginning of this developmental progression is children's sensitivity to numbers from birth, known as the approximate number system, or ANS. (See videos of all the levels, or steps, at www.learningtrajectories.org.)