Younger children are enthusiastic problem solvers, like these two children, who are building a tower with nesting blocks.

and self-confidence but less persistence. Older children are more persistent and flexible, and are likely to propose their own ideas and solutions (Flavell, Miller, & Miller, 2001). Self-regulation also plays a role. Studies of *executive function* (also called *effortful control)* show that older children are better able to regulate their attention and apply their cognitive skills in problem-solving situations (Zelazo, Muller, Frye, & Marcovitch, 2003). The years between three and five are especially important in the development of these executive functions because of concurrent changes in brain development, particularly in the frontal cortex, which is responsible for regulating and expressing emotion (Shore, 2003).

Teaching Strategies That Support Problem Solving

Adults can encourage children to solve problems on their own in the following ways.

Encourage children to describe the problems they encounter

When you see a child having a problem, hold back to let the child recognize and describe the situation. This first step helps children develop the ability to arrive at a solution. Children may not see problems in the same way as an adult, but it is more important for them to have the opportunity to view and describe it in their own words. In doing so, they begin to trust their skills as observers and analyzers. Not only is this process central to positive emotional development, it also lies at the heart of scientific thinking and reasoning, as demonstrated by Cole's description of his problem with the computer:

Cole comes to his teacher Jackie and says, "The computer's not working." She asks him to tell her how it isn't working and follows him back to the computer. "See, it keeps going back to where I started," he explains. When Jackie asks Cole what he wants the computer to do, he says, "Go to the next part of the game." She looks at the screen, points to the arrow icons, and says, "I wonder what these do?" Coles tries clicking on the icons. When he clicks on the → icon, the game advances. Cole says, "Now I got it working!"

Early in their development, children may not be able to identify or verbalize problems. They may only have a vague sense that something is preventing them from carrying out their intentions. In such cases, simply state the problem for the child. If you use phrases such as "So the problem is…," children will eventually get the idea of identifying a problem in order to figure out a solution:

At work time in the house area, Ariel's teacher says, "It looks like you want to wear your neck-lace. So the problem is that it's too short to fit over your head." Ariel's eyes light up and she says, "Yeah. Maybe I can add some more yarn to make it bigger — bigger like my head."

Give children time to come up with their own solutions

Just as HighScope adults wait patiently for children to identify problems, they also hold back so children can figure out how to solve them:

At work time in the art area, when Hank's glue bottle is clogged, Alison (another child) tries squeezing it very hard. She tries unclogging the bottle with a nail, then finally gets a new glue bottle for Hank.

❖

At work time in the block area, when Matthew wants the big two-sided ramp that someone else is using, he makes his own ramp by taping two single ramps together.

While the adult's solution may be more efficient or effective, simply giving it to the child would deprive the child of an opportunity to learn and develop confidence in his or her problem-solving abilities.

Talk with children about what is and is not working

To help children move from trial and error to more systematic attempts at problem solving, adults can encourage them to describe and think about the results of their actions. They can make comments and ask open-ended questions to help children consider other alternatives. It is just as important for children to be aware of when a solution works as it is for them to

recognize when a different approach is needed, as shown in this conversation between Peter and his caregiver Neenah:

Peter is doing a puzzle. He has most of the pieces in place, but no matter how he turns the remaining ones, he cannot make them fit the spot for the elephant's ear. "You tried all the pieces and none of them fit," says his caregiver Neenah. "I turned and turned them," says Peter with a sigh. "I wonder if you have all the pieces," says Neenah, spotting one on the floor behind him. They search together. "Look what I found," says Peter. He slides it into the empty spot. "I did it!" he proudly tells Neenah. "Yes, you found the missing piece," she says.

Conversing with children about what they did and why it did (or did not) solve the problem helps to establish a cause-and-effect connection in their mind. Once they have this mental association, they are more likely to apply a solution to similar problems in the future.

Assist children who are frustrated

Sometimes children do need adult help, especially when their inability to solve a problem keeps them from moving forward with their plans. HighScope teachers are alert to when children have tried to solve a problem and run into roadblocks they cannot get past on their own. At this point, adults step in to provide just enough assistance for children to either continue with a solution on their own or proceed to carry out their intentions. Teachers provide a brief explanation in such cases so children can learn from the experience and perhaps use the information on their own later:

While Ashlyn is in the woodworking area, the drill bit comes off the drill she is using. She pushes it back in place, but it keeps falling out.

These two children are trying to make a bucket pulley.

Their teacher talks with them about what is and is not working with the pulley.

The children problem-solved together to make a real working bucket pulley!

Ashlyn brings it to her teacher, Chris, and asks her to "fix it." Chris tightens the bit in the drill and says, "Sometimes I have to tighten it like this for it to stay." Ashlyn proceeds with her plan to make a dinosaur bed.

For developmental examples of problem solving, and how adults can scaffold young children's learning in this key developmental indicator (KDI), see "Ideas for Scaffolding KDI 4. Problem Solving" on page 51. Use the additional ideas in the chart to support and gently extend children's problem-solving skills as you play and interact with them throughout the daily routine.

Once children have experience problem-solving with adult support, they often will use the same problem-solving strategies with their peers, such as working together to build a tall tower of Legos that won't fall down.

Ideas for Scaffolding KDI 4. Problem Solving

Always support children at their current level and occasionally offer a gentle extension.

Earlier	Middle	Later
Children may	*Children may*	*Children may*
• Ignore (not recognize or not acknowledge) a problem with materials.	• Recognize a problem with materials and ask for help solving it.	• Describe a problem with materials either spontaneously or when asked.
• Play with materials until a problem arises (i.e., not anticipate potential problems).	• Anticipate potential problems in play (e.g., there may not be enough big blocks to build the skyscraper).	• Anticipate solutions to potential problems (e.g., "If there's no room at the computers, I'll do a puzzle until it's my turn").
• Express frustration in words or gestures when encountering a problem with materials (e.g., throw materials on the floor, cry, walk away).	• Try one or two ways to solve a problem with materials.	• Solve or try three or more ways to solve a problem with materials.
To support children's current level, adults can	*To support children's current level, adults can*	*To support children's current level, adults can*
• Help children identify problems (e.g., "It looks like the string is too short to reach to the other side").	• Encourage children to describe the problem (e.g., "Show/tell me what isn't working").	• Encourage children to elaborate (e.g., "Show/tell me which buttons you pushed and what happened").
• Label problems for children when they arise in play.	• Acknowledge when children anticipate problems (e.g., "You think there may not be enough").	• Encourage children to think of challenges they might face in carrying out their plans and how they could prevent or solve them.
• Acknowledge children's feelings; be alert to signs of frustration, and offer help before they become upset.	• Offer suggestions (e.g., "Sometimes when I have the same problem, I turn it like this").	• Acknowledge children's problem-solving attempts, whether or not they succeed (e.g., "You tried three kinds of tape before you found one strong enough to hold it in place").
To offer a gentle extension, adults can	*To offer a gentle extension, adults can*	*To offer a gentle extension, adults can*
• Encourage children to provide more information about the problem (e.g., "Which part isn't working?").	• Encourage children to turn to one another for assistance (e.g., "Maybe Jada can show you how she got the computer to play the song").	• Encourage children to explain what they think is causing the problem.
• Encourage children to identify potential problems when they plan (e.g., "Do you think you'll have enough red stickers to go all the way around?").	• Ask for children's ideas to solve potential problems (e.g., "What could you do if that happens?").	• Ask children why they think their proposed solution will work.
• Add vocabulary words (e.g., frustrated, out of patience, annoyed it's not working) to help children describe and express their frustration.	• Ask what else children might try (e.g., "What else could you use?" "Could you do something else with it that might work?").	• Ask children to explain why what they tried did or did not work.