Strategy/Implicit Instruction and Mathematics

What Is Strategy/Implicit Instruction?

Strategy/implicit instruction is a student-centered method for learning. The focus of strategy instruction is primarily on the rules and the processes or global skills required to learn the required concept. According to Swanson (2001), strategy instruction has several components:

--Advanced organizers (a mental scaffolding on which to build new understanding)
--Organization (having students assess their understanding from time to time)
--Elaboration (connecting new material to information already learned),
--Generative learning (making sense of new information by summarizing)
--General study strategies (outlining, questioning, discussions with peers, and underlining).

Direct Instruction, Strategy Instruction, and Learning Strategies: What's the Difference?

Direct instruction is teacher centered and focused on helping students learn basic skills and information. Strategy instruction is student centered and teaches students how to learn information and then retrieve that information when it is needed. Learning strategies are taught during strategy instruction as ways of organizing information so that it can be retrieved. All three could and should be found in the same lesson because they complement one another, and strategy instruction and direct instruction are very similar.

Also included is teaching students to evaluate and control their thinking process and to evaluate the effects of a strategy.

Criteria for Strategy Instruction

- Elaborate explanations (systematic explanations, elaborations, and/or plan to direct task performance)
- Modeling from teachers (verbal modeling, questioning, and demonstration from teachers)
- Reminders to use certain strategies or procedures (cues to use taught strategies, tactics, or procedures)
- Step-by-step prompts or multi-process instructions
- Dialogue (teacher & student talk back and forth)
- Teacher asks questions
- Teacher provides only necessary assistance (Swanson, 2001, p. 4)

Strategy instruction follows a sequence of events. Teachers state the objective, review the skills necessary for the new information, and present the new information. In addition, teachers question students about events, provide time for group instruction and independent practice, and give performance assessments (Swanson, 2001). Swanson's seven criteria associated with strategy instruction are in the box above. If any three of these criteria are present within the lesson, the teacher is using strategy instruction. Often, students who are at risk or who have a disability are poor problem-solvers. Strategy instruction helps them in this area because it

shows them how the internal dialogue works.

What Does Strategy/Implicit Instruction Look Like for Mathematics?

The object of strategy instruction is to teach students to use higher-order thinking skills, to problem solve, and to use techniques that they can generalize into other areas. Teachers introduce the strategy and then model it. They model it several times and then assign problems to students to see whether they have learned the strategy. A variety of problems are assigned; in some, students may not need the strategy; in others, the strategy will make the problem easier to solve. At this point, teachers allow students to explore so that they develop an understanding of the strategy. For example, a teacher wants students to learn how to subtract 7 from a number in the teens. He demonstrates 15 – 7.

Strategy Instruction Dialogue

When subtracting the number 7 from any number in the teens, look at the number in the ones place, add 3 to that number, and drop the 1 from the tens place. So, if I have:

15	I take the 5 from the ones place and add 3 to it	15
– 7	5 + 3 = 8	+ 3
	Then I make the 1 in the tens place disappear!	8

The answer is 15 – 7 = 8!

Now, I'll subtract 7 from 13.

13	The number in the ones place is 3	13
– 7	I add 3 to the 3 in the ones place.	+ 3
	That equals 6.	6
	I make the 1 in the tens place disappear!	

The answer is 13 – 7 = 6!

The teacher models this problem several times, talking his way through each problem so that students hear his thinking process. Students work problems, using the same thinking process. The teacher expands the lesson further, for example, by asking students how that strategy works when subtracting 7 from numbers larger than 19.

Other important mathematical strategies include how to solve word problems and how to check for the reasonableness of an answer to any problem. As teachers model the steps to solve word problems, they demonstrate the process that students should follow. Here is an example of a problem; the teacher's think-aloud problem-solving process is in the box at the right:

Teacher Self-Dialogue

What do they want me to find out? Hmmm… Does Sara have enough money to buy the necklace? How much does she need for the necklace? $5.00. I'll write that down here. OK, she needs $5.00. How much did she start out with? Oh, $12.85. Well, she had enough to start out with, but she spent some of it. How much did she spend? She bought an ice cream cone for $1.75, and she spent $4.50 in the arcade. What do I do now? I guess there are two ways I could do this. I could subtract one amount from $12.85 and the other amount from what she had left, or I could add both of the amounts she spent and then subtract the total from $12.85.

Sara saved $12.85 from her allowance. At the beach, she spent $1.75 for an ice cream cone and $4.50 in the video arcade. She wants to buy a necklace that costs $5.00. Does she have enough money left to buy the necklace?

The teacher then works the problem both ways to show that the answer is the same. He also demonstrates the thought process of checking for the reasonableness of his answer.

The teacher demonstrates other similar problems, talking his way through each one. Students should have an opportunity to work some problems of their own, perhaps by working in groups and talking through the problems as they work them. Students who are at risk or who have a disability benefit from an exercise like this because they are part of the solution process and are hearing the words from their peers.

How Is Strategy/Implicit Instruction Implemented?

Teachers can implement strategy instruction in mathematics in many ways. Most of the skills learned in mathematics are used throughout the students' mathematics courses and are threaded through other content areas. Any strategy that can be taught and generalized is an important skill to learn because students will spend less time trying to decide how to work each problem. Teachers should review the material before instruction to determine whether certain strategies could help students master and generalize the content more easily. Learning strategies such as using mnemonics, taking notes, outlining, and talking through problems help students succeed. Often, the process of determining a strategy to offer students is as simple as self-reflection. When teachers understand how they remember information, they can teach those strategies to students. Ellis (1993) offers instruction to teachers about ways to integrate strategy instruction into lessons rather than use it to enhance lessons. Some computer programs also demonstrate strategies to help students remember what they have learned. Math programs and textbooks often incorporate strategies into their lessons.

According to researchers and the results of several meta-analyses (Ellis, 1993; Karp & Voltz, 2000; Swanson, 2001), using a combination of direct instruction and strategy instruction has a greater positive effect than either method alone. Teachers should consider ways to use both direct instruction and strategy instruction in each lesson to gain the maximum benefit from these approaches. Teaching basic skills to students through direct instruction and then teaching them strategies to store and retrieve the information may ensure a successful educational experience for all students. However, for students with disabilities and students who are at risk, these approaches are crucial for the retention of new skills.

References and Resources

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