Self-Explanation

Why Is This Strategy Useful?

Self-explanation is a teaching and learning strategy that aims to facilitate in-depth learning. Self-explanation usually refers to generating explanations of correct material by oneself, rather than explaining one’s own, potentially incorrect, solutions or adopting explanations provided by others. Several studies have found that prompts to self-explain, when compared with no-prompts, lead to immediate improvement in procedural learning and learning transfer. This strategy is appropriate for mathematics students of all levels and abilities.

Description of Strategy

Teachers should model self-explanation strategies on specific problems to help students build an integrated understanding of the process of reflection. Study guides or advance organizers should be integrated into classroom materials to prompt students to reflect on their learning. Teachers should use questioning strategies to prompt reflective thinking, specifically getting students to respond to why, how, and what specific decisions are made. Social learning environments aid organizing collaborative work with peers, teachers, and experts. Classroom experiences should involve enjoyable, concrete, and physical learning activities whenever possible to ensure proper attention to the unique cognitive, affective, and psychomotor domain development of students.

Research Evidence

At least one study supports the use of this strategy. In this study, 85 third- through fifth-grade students learned to solve mathematical equivalence problems under one of four conditions based on crossing two factors: (a) direct instruction versus discovery learning and (b) prompts to self-explain versus no prompts to explain. Learning was assessed using three outcome measures (procedural learning, procedural transfer, and conceptual knowledge) immediately and after a 2-week delay. Conceptual and procedural knowledge were assessed using a pretest, an immediate posttest, and a delayed posttest. Findings indicated that prompts to self-explain led to greater learning and transfer that was maintained over a 2-week delay, regardless of instructional condition. Moreover, direct instruction, rather than invention alone, led to better procedural learning that was retained over the delay.

Sample Studies Supporting this Strategy


Explaining new ideas to oneself can promote transfer, but how and when such self-explanation is effective is unclear. This study evaluated whether self-explanation leads to lasting improvements in transfer success and whether it is more effective in combination with direct instruction or invention. Third- through fifth-grade children (ages 8 – 11; n=85) learned about mathematical equivalence under one of four conditions varying in (a) instruction on versus invention of a procedure and (b) self-explanation versus no explanation. Both self-explanation and instruction helped children learn and remember a correct procedure, and self-explanation promoted transfer regardless of instructional condition. Neither manipulation promoted greater improvements on an independent measure of conceptual knowledge. Microgenetic analyses provided insights into potential mechanisms underlying these effects.
Additional Resources


Sample Activity


The teacher can begin the math class by asking students to write an explanation for a math question. The students can read the question and then discuss it with their peer group. The teacher can quickly walk around the classroom to monitor student engagement. The students then write their explanatory answer following a rubric they were provided. They are encouraged to include evidence, use their mathematics vocabulary, and to use reasoning to link the evidence to their claim. Once students finish writing their explanations, the teacher encourages two or three volunteers to read their explanations to the class. He or she follows each explanation with a brief discussion of the primary points and misconceptions. Students save their work in their mathematics notebook.