

METHODS OF GOOD PROBLEM SOLVERS

What characterizes a good problem solver? The characteristics have been studied by researchers; their conclusions are summarized here in five sections.

1. POSITIVE ATTITUDE

First of all, good problem solvers have a strong belief that academic reasoning problems can be solved through careful, persistent analysis. Poor problem solvers, by contrast, frequently express the opinion that "either you know the answer to a problem, or you don't know it, and if you don't know it, you might as well give up or guess." Poor problem solvers haven't learned that a problem may at first appear confusing—that the way to work the problem may not at first be obvious—but that through carefully breaking the problem down, by pinpointing first one piece of information and then another, a difficult problem can be gradually analyzed. Poor problem solvers lack both confidence and experience in dealing with problems through gradual (sometimes lengthy) analysis.

2. CONCERN FOR ACCURACY

Good problem solvers take great care to understand the facts and relationships in a problem fully and accurately. They are almost compulsive in checking whether their understanding of a problem is correct and complete. By contrast, poor problem solvers generally lack such an intense concern about understanding. For example, good problem solvers sometimes reread a problem several times until they are sure they understand it. Poor problem solvers, on the other hand, frequently miss a problem because they do not know exactly what it states. Quite often they could have found out if they had been more careful, if they had reexamined and thought about the problem analytically. But poor problem solvers have not learned how important it is to try to be completely accurate in understanding all of the ideas of a problem. (Remember, experienced problem solvers reread sections of the problem to be sure they understand them fully, and recheck even their simplest calculations.)

3. BREAKING THE PROBLEM INTO PARTS

Good problem solvers have learned that analyzing complex problems and ideas consists of breaking the ideas into smaller steps. They have learned to attack a problem by starting at a point where they can make some sense of it, and then proceeding from there. In contrast, poor problem solvers have not learned to break a complex problem into sub-problems—you will see many examples of how complex problems can be worked one step at a time.

4. AVOID GUESSING

Poor problem solvers tend to jump to conclusions and guess answers without going through all the steps needed to make sure that the answers are accurate. Sometimes they make intuitive judgments in the middle of a problem without checking to see whether the judgments are correct. At other times they work a problem part of the way, but they give up on reasoning and guess on an answer. Good problem solvers tend to work problems from beginning to end in small, careful steps.

The tendency of poor problem solvers to make more errors—to work too hastily and sometimes skip steps—can be traced to the three characteristics already discussed. First, poor problem solvers do not strongly believe that persistent analysis is an effective way (in fact the only way) to deal with academic reasoning problems. Thus their motivation to persist in working an entire problem precisely and thoroughly—until it is completely solved—is weak.

Second, poor problem solvers tend to be careless in their reasoning. They have not developed the habit of continuously focusing and checking on the accuracy of their conclusions. And third, they have not learned to break a problem into parts and work it step-by-step. As a result of these hasty responses as they work academic reasoning problems, students make errors in both simple computations and in logic.

5. **ACTIVENESS IN PROBLEM SOLVING**

The final characteristic of good problem solvers is the tendency to be more active than poor problem solvers when dealing with academic reasoning problems. Put simply, they do more things as they try to understand and answer difficult questions. For example, if a written description is hard to follow, a good problem solver may try to create a mental picture of the ideas in order to "see" the situation better. If a presentation is lengthy, confusing, or vague, he will try to pin it down in terms of familiar experiences and concrete examples. Furthermore, he will ask himself questions about a problem, answer the questions, and "talk to himself" as he clarifies his thoughts. He may also count on his fingers, point to things with his pen, write on the problem, make diagrams or use other physical aids to thinking. All in all, good problem solvers are active in many ways that improve their accuracy and help them get a clearer understanding of ideas and problems.

Source: Lochhead, Jack, and Arthur Whimbey. *Problem Solving and Comprehension*. Philadelphia: The Franklin Institute Press, 1980.

Revised Summer 2003

STUDENT LEARNING ASSISTANCE CENTER (SLAC)

Texas State University-San Marcos