

USING ACTION RESEARCH FOR SOLVING PROBLEMS

Teachers are constantly challenged with a variety of problems for which they are required to develop solutions. Teachers who engage in action research projects become more flexible in their thinking, more receptive to new ideas, and thus better able to solve problems as they arise (Dinkelman, 1997). Problem solving consists of three elements: finding the problem, finding a solution, and testing the solutions. This chapter examines the use of action research in problem solving.

FINDING THE PROBLEM

Problems cannot be solved unless they are first identified and defined. Identifying the problem occurs when the situation is observed and there is a recognition that things could be done better. Defining the problem involves seeking to understand the nature of the situation and discovering the possible causal factors. You look to see why things are as they are. For example, why are students not learning? Why are behavior problems occurring on the playground? Why does Suzanne have problems getting her work in on time? Why has Steven been acting the way he has? As stated in previous chapters, action research can be used to help see what is happening in a school or classroom or to identify and define problems.

FINDING SOLUTIONS

A variety of strategies can be used to find a solution. Two are described next: creative problem solving and means-end analysis.

Creative Problem Solving

Creative problem solving (CPS) begins by defining the problem and generating ideas for solutions. The key to successful implementation of this strategy is to produce as many ideas as you can. No evaluation of these initial ideas should be

FIGURE 3.1 Thinking Frame for CPS

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1. Define the problem.
 2. Generate as many solutions as possible.
 3. Choose a solution that seems the best.
 4. Elaborate and refine.
 5. Implement the solution.
 6. Review, evaluate, and refine as necessary.
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made as this would prevent the full range of possibilities from being explored. Sometimes when a new idea is put forth at a meeting or in a committee, individuals immediately respond by telling why that idea will not work. This only serves to preserve the status quo and prevents new and creative solutions from being considered. It is most effective to get all the ideas generated and listed, then engage in an evaluative discussion to choose the one that seems to be the best. Often two or three ideas can be combined for a solution. This would not be possible had you not first generated a number of ideas. The final steps are to refine, implement, and review and evaluate the solution. The CPS steps are listed in Figure 3.1.

Means-End Analysis

Means-end analysis (MEA) begins with a description of the desired outcome or end state. Where would you like to be? What outcome would you like to bring about? The next step is to define the goals necessary to bring about this end state. Goals are the global objectives, traits, skills, behaviors, or specific conditions of which your desired outcome is comprised. Goals are important in the eventual evaluation of your solution. That is, you can tell whether your solution is successful by ascertaining whether the goals are realized. Once the goals are described, the next step is to assess and describe the current situation. This is followed by an analysis of the means necessary to reach the end state. Finally, a plan is constructed to get from point A (current state) to point B (end state). And just like CPS, solutions need to be reviewed, evaluated, and refined after implementation. You may recognize that this problem-solving strategy is very similar to the process used in designing new curricula. The MEA steps are listed in Figure 3.2.

FIGURE 3.2 Thinking Frame for MEA

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1. Describe the desired outcome.
 2. Define the goals necessary to reach the end state.
 3. Describe the current state.
 4. Analyze the means necessary to get the desired outcome.
 5. Construct and implement a plan.
 6. Review, evaluate, and refine the plan.
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Problem-Solving Strategies in the Classroom

We cannot assume that students know how to solve problems effectively unless they first have been taught how to do so. The two problem-solving strategies just described can be taught to students in the form of thinking skills. This will improve their ability to solve problems and also enhance learning (Johnson, 2000). I recommend starting with CPS as this is usually easiest for most students. You may want to simplify some of the steps for younger students.

You can teach problem-solving strategies in six steps. First, use the thinking frames in Figures 3.1 and 3.2 to create a poster to display in the classroom as a teaching aid. A thinking frame is a concrete representation of a particular cognitive process broken down into specific steps and used to support the thought process (Johnson, 2000; Perkins, 1987). Second, identify the problem-solving strategy and describe each step. Third, model the problem-solving strategy by thinking out loud as you go through the steps to solve a problem. Fourth, use guided practice to solve a problem together. Fifth, create problems for students to solve by themselves or in small groups. And finally, embed problems into all aspects of the curriculum. For example, in reading or literature use problems found within stories for students to solve. These can be interpersonal problems, problems that need the invention of a new product or process, or organizational problems. For social studies, science, and math, use problems that are found in history, society, or real life.

TESTING THE SOLUTION

The final part of problem solving is to implement the solution and test it to see whether it works. Every new plan, program, or solution needs some adjusting during the implementation stage. Action research can be used as formative and summative evaluation. The next section is a description of how I used action research along with the three elements of problem solving to improve my teaching practice.

AN EXAMPLE OF ACTION RESEARCH AND PROBLEM SOLVING

I used to be the gifted education specialist for an elementary school in rural Wisconsin. In my first year in this position I conducted pullout sessions in which I met with small groups of students once a week. (This was several years ago. I would not recommend this as the most effective strategy today.) My students used to love the chance to learn more complex subjects, engage in high-level thinking, and have discussions and debates with like-minded peers. During my third year in the district, my job expanded and I took over the gifted education duties in the middle and high school. I was excited to resume weekly pullout sessions with a group of middle school students with whom I had not worked since my first year. However,

at our first pullout session I found that my formerly eager and excited students were sullen and distant. They sat at the back of the room and rarely spoke or contributed, and when they did, it was with little enthusiasm.

Finding the Problem

A bit of problem finding and defining was needed. Had I tried to address this problem without first trying to understand the situation, I would have missed the whole point and probably made the situation worse. Instead, I gathered data by creating a systematic plan whereby I talked with students individually, talked with their teachers, and observed these students in a variety of classroom situations. I also went back and reread my textbooks on human development. What I discovered was that these young adolescents were reacting negatively to being singled out from their peers. They did not want to be apart from the group or be thought of as somehow different, which was a very normal reaction for students at this developmental stage.

Finding a Solution

Having identified and defined the problem, the next step was to find a solution. I used MEA. The desired outcome was to create meaningful and enriching learning experiences whereby these students could reach their full potential. The goals were to engage these students in enriched content, teach high-level skills, and give them choices so that they could pursue topics of interest to them. The current state comprised three elements: (a) these students were engaged in a classroom curriculum that was far below their capabilities; (b) my pullout sessions were unrelated to their regular curriculum; and (c) a certain amount of social stress was being caused by separating these students from their peers.

It was clear that I had to create a structure that allowed these students to solve problems and create plans or products within their regular classroom experience. The gifted education literature describes a strategy called compacting and differentiation whereby students are able to test out of a unit to free up time to do other projects (Renzulli & Reis, 1997). The advantage of this approach is that it can be made available to all students and thus bypass the need for the formal identification of gifted students. It also reflects Howard Gardner's definition of intelligence, which is the ability to solve problems or create products that are valued within one or more cultural settings (1983).

To implement this plan I worked with classroom teachers to design a structure that allowed students who had met a criterion pretest score to engage in inquiry projects, individually or in small groups, that were related to the curriculum. Contracts were used to define specific goals, steps, and time lines to be met (see Figure 3.3). Instead of conducting weekly pullout sessions, I was in charge of a resource center where students would come to work on their independent projects (see Appendix D). Among other things, I worked with students to teach them the skills necessary to complete their projects.

In looking at Figure 3.3, note that the inquiry projects contain the same elements as a teacher action research project. The research process I am describing in this book can be used and adapted to design inquiry activities for students at all grade levels.

Testing the Solution

Once this structure was in place (it took about 2 months to get it up and running), I designed a systematic plan for collecting data to evaluate the effectiveness of this program. I used student and teacher surveys, recorded field notes related to my

FIGURE 3.3 Contracts for Inquiry Projects

Plan to Investigate

Investigator: _____

BEFORE THE INVESTIGATION

1. What is your question? What are you curious about? What do you want to investigate?
2. Important background knowledge? Use at least two sources to get information about your question. You may want to interview experts, read books or magazines, or use the Internet.
3. How will you collect data?

read ____	observe ____	checklist ____
weigh ____	measure ____	survey ____
interview ____	time ____	create and test ____
listen ____	count ____	other ____

4. When will you present your findings to the class?

AFTER THE INVESTIGATION

5. Organize your data. (Look for groups or patterns, put it in order, or use tables or graphs.)
6. What conclusions can you make or what interesting ideas do you have based on your data?
7. How will you present your data and conclusions or ideas?

lab report ____	video ____	poster ____
photos ____	plan ____	visual art ____
graph ____	story ____	demonstration ____
brochure ____	speech ____	other ____

work in the resource center, and analyzed students' projects. Essentially, I was using action research as a form of program evaluation. This collection and analysis of data helped me to revise and refine this program. Some of my findings included the following: (a) I worked with more students than just those who were formally identified; (b) many students who were not formally identified as gifted created projects that were just as outstanding as those who were formally identified; (c) students enjoyed having choice as well as challenge; and (d) teachers enjoyed having a gifted education strategy that augmented the regular curriculum.

SUMMARY

- Solving problems is an inherent part of teaching.
- Problem solving consists of three parts: finding the problem, finding a solution, and testing the solutions.
- Creative problem solving and means-end analysis are two strategies that can be used to solve problems.
- Problem-solving strategies can be taught to students to improve their ability to solve problems.
- Problem solving can be embedded within a curriculum to enhance learning and reinforce problem-solving strategies.
- Action research can be used to identify and define problems and to evaluate solutions.

QUESTIONS AND ACTIVITIES

1. Find a picture book or a chapter in a trade book that you might use with students. Generate a list of problems associated with each.
2. List 5 to 10 real-life problems related to science or society. Describe where and how these might be integrated into a curriculum.
3. Find a problem related to your daily life in some way. This could be an interpersonal problem, or a problem related to school, work, or some product or process. Use CPS (Appendix E) to generate ideas and find a solution.
4. Find a problem specifically related to education. Use MEA machine (Appendix F) to design a plan.
5. Find a problem in your classroom or personal life situation, then define it. Why is it occurring?
6. Find a solution in your classroom or personal life. How might you evaluate that solution?