CHAPTER 34

PROBLEM-SOLVING TRAINING: IMPLICATIONS FOR REMEDIAL AND PREVENTIVE TRAINING

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How people cope with their personal problems and process information—how they think, feel, and behave when grappling with a real-life problem—is a complex and dynamic process that has defied simple descriptions. In spite of the importance of these issues, prior to 1980 researchers had not yet developed a technology for assisting people with their decision-making and problem-solving. While our sophistication in problem-solving training has increased in the last decade, the technology is still developing. The lack of a technology is most likely tied to the fact that little is known about how people cope with their real-life personal difficulties (Sternberg, 1982).

The purpose of this chapter is to examine and discuss the problem-solving training literature. First we will provide a definition of problem-solving that will set the parameters for the chapter. Next we will examine the evidence for the relationship between stress, problem-solving, and psychological health; in essence, we will conclude that there is sufficient empirical support to link problem-solving and psychological health. It is not surprising, then, to find considerable interest in problem-solving training for both remedial and preventive strategies for the mental health problems of modern society. In the third section of the chapter, we briefly describe and review the problem-solving training literature for adults. Finally, in the last section, we will discuss future directions for research on problem-solving training by suggesting additional variables and new perspectives on this topic.

PROBLEM-SOLVING

Problem-solving is a topic that has been the focus of inquiry for many years in psychology. During that time many conceptions of the problem-solving process have been proposed, ranging from various learning approaches (Gagne, 1964; Kendler & Kendler, 1962; Skinner, 1974) to traditional cognitive gestalt approaches (Ascher, 1963; Kohler, 1925; Maier, 1970; Sheerer, 1963), and also including computer simulation and mathematical models (Feigenbaum & Feldman, 1963; Newell, Shaw, & Simon, 1958; Newell, Shaw, & Simon, 1963; Restle & Davis, 1962). Differences
in conceptions of the problem-solving process have sharply divided psychologists. On the one hand, investigators such as Gagne (1964) and Skinner (1974) have focused mainly on the past experience of the individual as the most important variable in problem-solving. Other investigators (e.g., Kohler, 1925; Maier, 1970) have maintained that it is largely the individual's perception of the situation that is of utmost importance in solving a problem.

The primary focus of this chapter is on real-life personal problem-solving, which is to be distinguished from either laboratory problems (e.g., anagram tasks) or hypothetical, impersonal problems (e.g., physics problems). Although we acknowledge that there is considerable overlap between laboratory and real-life problem-solving activities, we believe that it is important at this time to distinguish between laboratory and real-life problem-solving (see Wicklegren, 1974). In this chapter, problem-solving is conceptualized as a complex and dynamic process as described by Heppner and Krauskopf (1987):

Real-life personal problem solving is defined as a goal-directed sequence of cognitive and affective operations as well as behavioral responses for the purpose of adapting to internal or external demands or challenges. Problem solving and coping are considered synonymous in this article. In a way, problem solving is the regulation of one's cognitive, affective, and behavioral responses. Problem solving refers to successful and unsuccessful activities, as well as conscious and unconscious activities aimed at approaching or avoiding a problem. Problem solving is not simply the rational, logical, cognitive processing of information. Rather, real-life problem solving is further conceptualized as being a complex, dynamic, highly interactive and intermittent process (rather than a linear, stage-sequential process). It is dynamic and interactive in that initial problem-solving responses affect later responses, alter initial perceptions, and goals often change over time. Problem solving is intermittent in that different problem-solving processes occur at various intervals, often without a specified sequence. Personal problem solving is also a highly complex process in that a typical problem might be solved immediately or might involve innumerable decisions, have multiple possible solutions, and be so ambiguous as to hamper evaluation. (p. 375)

In essence, real-life personal problem-solving is a very broad activity and involves rational and irrational processes, conscious and unconscious processes, as well as cognitive, affective, and behavioral processes.

**Stress, Psychological Health, and Problem-Solving**

Although the concept of stress has been around for centuries (Lazarus & Folkman, 1984), there is still no universally accepted definition. Definitions of stress fit primarily into three categories: stimulus-based definitions, intervening-process definitions, and response-based definitions (Houston, 1987). Stimulus-based definitions focus on stimuli that disrupt the individual, such as the death of a loved one (e.g., Holmes & Rahe, 1967). Stress, in this view, consists of stressful events. Intervening process definitions focus on the processes that occur between some stimulus and responses of the individual; Lazarus and Folkman (1984) proposed such a model that focuses on the interactive relationship between the person and environment, and particularly the balance between the person's resources and the environmental demands. Response-based definitions focus on the condition of being disturbed, such as the General Adaptation Syndrome described by Selye (1956). Houston (1987) extended the response-based definitions by distinguishing between physical stress and psychological stress. From this perspective, stress consists of physical and psychological outcomes. Regardless of the specific definition of stress, it is becoming increasingly clear that stress is a major factor in adaptational outcomes, such as physical and psychological health (e.g., Fisher, 1986; Houston, 1987; Lazarus & Folkman, 1984; Selye, 1983).

In essence, problem-solving, or coping, is a broad set of activities for responding to life situations, and especially stressful events. It also has been suggested for some time that ineffective problem-solving results in stressful outcomes and psychological maladjustment (D'Zurilla & Goldfried, 1971; Goldfried & D'Zurilla, 1969; Goldfried & Goldfried, 1975; Howard & Scott, 1965; Luchton, 1974; Mahoney, 1974; Mechanic, 1968, 1974; Scott & Howard, 1970; Spivack, Platt, & Shure, 1976; Spivack & Shure, 1974). As Durlak (1983) has noted, it is easy to accept the utility of effective problem-solving skills; it makes intuitive sense that "good problem-solvers . . . are flexible and adaptable in different social circumstances, able to deal effectively with stress, and able to develop suitable methods to attain
personal goals and satisfy their needs" (p. 31). Conversely, ineffective problem-solvers are less able to adequately respond to problems, and in essence, deal less effectively with their environment.

One must ask, however, how much empirical support there is for linking problem-solving and psychological health. In this vein, the last several years have witnessed an abundance of research that has examined the relationship between stress and problem-solving or coping efforts aimed at alleviating stress. For example, investigators have made efforts to describe and assess coping efforts (Coyne, Aldwin, & Lazarus, 1981; Heppner & Petersen, 1982; Platt & Spivack, 1975; Worden & Sobel, 1978), identify coping resources (Antonovsky, 1979; Barefoot, Dahlstrom, & Williams, 1983; Brown, Brady, Lent, Wolfert, & Hall, 1987; Kobasa, Maddi, & Kahn, 1982), and identify stress precursors and correlates (Eysenck, 1983; Forsythe & Compas, 1987; Lazarus & Folkman, 1984; Selye, 1983; Snyder & Ford, 1987). The upshot of the last decade of research is that it is becoming increasingly clear that problem-solving or coping does play a role in adaptational responses to stress. We will briefly review two lines of research; both suggest a link between problem-solving and one particular adaptional outcome—psychological health.

Cognitive Deficit

Perhaps one of the earliest lines of research within the parameters of real-life problem-solving to link problem-solving and psychological maladjustment was that which examined cognitive deficiencies within problem-solving thinking. Specifically, George Spivack, Myrna Shure, and their associates have examined the relationship between psychological maladjustment and the following cognitive component skills within problem-solving: (a) problem sensitivity, (b) alternative solution thinking, (c) means-end thinking, (d) consequential thinking, and (e) causal thinking. The major assessment instrument used in this line of research has been the Means-Ends Problem Solving Procedure (MEPS; Platt & Spivack, 1975). These researchers have identified deficits in problem-solving cognition across several populations, such as poorly adjusted preschool children from disadvantaged environments (Shure, Spivack, & Jaeger, 1971), emotionally disturbed 10- to 12-year-old children (Shure & Spivack, 1972), institutionalized impulsive teenagers (Spivack & Levine, 1963), adolescent psychiatric patients (Platt, Altman, & Altman, 1973), youthful incarcerated heroin addicts (Platt, Scura, & Hannon, 1973), and adult psychiatric patients (Platt & Spivack, 1972a, 1972b). Although the validity of the MEPS has been questioned and criticized (e.g., Butler & Meichenbaum, 1981; D'Zurilla, 1986), this line of research has shown that adaptive thinking ability as measured by the MEPS has differentiated between various adjusted and maladjusted groups. For more information about this line of research, readers are referred to Butler and Meichenbaum (1981), D'Zurilla (1986), D'Zurilla and Nezu (1982), Kendall, Pellegrini, and Urbain (1981), and Spivack, Platt, and Shure (1976).

Problem-Solving Appraisal

Another line of research has provided evidence that a person's beliefs or appraisals of his or her problem-solving capabilities are related to psychological adjustment. This research has been spawned by the notion of higher order or meta-cognitive variables in various cognitive processes (e.g., Brown, 1977; Flavell & Wellman, 1977; Meichenbaum & Asarnow, 1979). Metacognition refers to an individual's awareness of the processes that affect the efficient use of cognitive skills, such as the awareness of one's own cognitive abilities and the monitoring and regulation of cognitive processes. The focus is not on "the specific knowledge or processes that individuals may apply directly to the solution of problems, but with higher order variables that affect how (and whether) they will solve problems" (Butler & Meichenbaum, 1981, p. 219).

Butler and Meichenbaum hypothesized that one such variable, an individual's appraisal of his or her problem-solving ability, will affect problem-solving performance. Several other writers have suggested that one's appraisal of ability seems to be related to coping with stress (e.g., Antonovsky, 1979; Coyne & Lazarus, 1980; Kobasa, 1979). For example, Kobasa proposed that "hardiness" as a constellation of personality characteristics involves self-appraisal activities that mediate reactions to stressful life events and subsequent physical and psychological health (see Kobasa, 1982; Kobasa, Maddi, & Kahn, 1982; Maddi, Hoover, & Kobasa, 1982).

Heppner and Petersen (1982) have developed a measure of such self-appraisal, the Problem Solv-
ing Inventory (PSI). Factor analysis of the PSI revealed three factors: (a) problem-solving confidence, (b) approach-avoidance style, and (c) personal control (Heppner & Petersen, 1982). People who perceive themselves as effective problem-solvers (having confidence, personal control, and approaching problems; low PSI scores) differ significantly from those who perceive themselves as ineffective (lacking confidence and personal control, and avoiding problems; high PSI scores) on a range of cognitive, affective, and behavioral variables.

Several studies have examined the relationship between the PSI and several indices of psychological health. Briefly, results show that, when compared to those who scored high on the PSI, those who scored low reported (a) a more positive self-concept, and fewer dysfunctional thoughts and irrational beliefs (Heppner, Reeder, & Larson, 1983); (b) less social anxiety (DeClue, 1983); (c) less trait anxiety, more intuitive and dependent decision-making styles, and more interperson al assertiveness (Neal & Heppner, 1982; Larson, 1984; Phillips, Pazienza, & Ferrin, 1984); (d) fewer physical health symptoms (Tracey, Sherry, & Keitel, 1986), and (e) better psychological adjustment as measured by the Minnesota Multiphasic Personality Inventory (MMPI) and SCL-90 (Heppner & Anderson, 1985; Heppner, Kampa, & Brunning, 1987).

In addition, considerable research has examined the relationship between problem-solving and depression. Initially, research found that perceived ineffective problem-solvers reported higher levels of depressive symptoms than did perceived effective problem-solvers (e.g., Heppner & Anderson, 1985; Heppner, Baumgardner, & Jackson, 1985; Heppner et al., 1987; Nezu, 1985; Nezu & Ronan, 1985; Nezu, Kalmar, Ronan, & Clavijo, 1986). More recent research, however, suggests that problem-solving appraisal moderates depressive symptoms in relationship to stressful events (Nezu & Ronan, 1988; Nezu, Nezu, Saraydarian, Kalmar, & Ronan, 1986). Specifically, it appears that perceived effective problem-solvers (as measured by the PSI) under high levels of stress reported significantly lower levels of depressive symptoms when compared with perceived ineffective problem-solvers under similar levels of high stress (Nezu, Nezu et al., 1986). Similar results were found utilizing the MEPS with both prospective and cross-sectional analyses (Nezu & Ronan, 1988). These results provide strong support for the links between problem-solving, stress, and psychological health.

**TRAINING LITERATURE**

Much of the applied problem-solving research has conceptualized the problem-solving process as a constellation of relatively discrete, cognitive abilities (e.g., Feldhusen, Houtz, & Ringenbach, 1972) or thought processes (e.g., Spivack, Platt, & Shure, 1976). Most often the various thought processes have been conceptualized into problem-solving models that consist of five or more problem-solving stages (e.g., Dewey, 1933; D'Zurilla & Goldfried, 1971).

D'Zurilla and Goldfried's (1971) five-stage model has received considerable attention: general orientation (the cognitive and motivational set with which one approaches and recognizes problems in general), problem definition and formulation (the delineation of a problem into concrete and specific terms and the identification of specific goals), generation of alternatives (the production of an exhaustive list of appropriate solution possibilities), decision-making (the systematic evaluation of the range of alternative solutions regarding consequences and the selection of the most optimal choices), and solution implementation and verification (the monitoring and evaluation of the actual solution outcome after its implementation). One training approach has been to teach cognitive skills within a specific stage in a brief training session (e.g., generating alternatives). A more common approach has been to teach all five stages over an extended period of time. A third approach has been to combine problem-solving skill training with some other intervention, such as anxiety management. These three approaches will be briefly summarized; for additional information, the reader is referred to earlier reviews by D'Zurilla (1986), D'Zurilla and Nezu (1982), and Heppner, Neal, and Larson (1984).

**Teaching Specific Component Skills**

Several training studies have taught specific cognitive skills within a particular problem-solving stage. The studies follow a similar format. The treatment groups receive brief training (e.g., 45 minutes) in some specific problem-solving skill. Both the treatment and control groups are then asked to respond to hypothetical problems using the problem-solving skill under examination. The
results from several investigations show that the treatment groups outperformed the control groups on problem-solving activities applied to hypothetical situations when given training on (a) problem definition (Nezu & D’Zurilla, 1981a, 1981b), (b) generation of alternatives (D’Zurilla & Nezu, 1980; Nezu & D’Zurilla, 1981b), (c) decision-making (Nezu & D’Zurilla, 1979; Nezu & D’Zurilla, 1981a), and combinations of the above components (Cor- mier, Otani, & Cormier, 1986).

This line of research has provided solid evidence that specific problem-solving skills can be taught in a relatively brief training session. Additional research is needed to examine the generalization of the problem-solving training to the participants’ real-life personal problems, maintenance of these skills over time, and effects of such training on other variables involved in the problem-solving process (e.g., confidence in one’s problem-solving skills).

Teaching Problem-Solving Models

A common approach in problem-solving training has been to teach the entire D’Zurilla and Goldfried (1971) five-stage model of problem-solving. Training typically consists of didactics and practice in each of the five stages across several sessions, followed by applied integration of the model and continued practice of the different skill components (Nezu, 1986). Training is usually conducted in small groups that include 6 to 10 sessions that often span 6 to 10 weeks. Training that has been based on or is similar to the five component areas in D’Zurilla and Goldfried’s (1971) model has been effective in a wide variety of target populations and training goals: psychiatric patients (Edelstein, Couture, Cray, Dickens, & Lusebrink, 1980; Hansen, St. Lawrence, & Christoff, 1985), alcoholism (Intaglia, 1978), depression (Hussain & Lawrence, 1981; Nezu, 1986), academic underachievement (Richards & Perri, 1978), and anger control (Moon & Eisler, 1983). One study that examined vocational indecision (Mendonca & Sless, 1976) did not support the effectiveness of training based on the component skills within the five stages.

The above studies provide encouraging support for the utility of problem-solving training based on the component skills of D’Zurilla and Goldfried’s five stages. One study in this group provides particularly strong support for training based on the five component skills. Nezu (1986) randomly assigned 26 clinically depressed community adults to one of three conditions: (a) problem-solving therapy (PST) based on the five component skills; (b) problem-focused therapy (PFT), which was a more general problem-oriented group therapy; and (c) a waiting-list control. Both therapy conditions were conducted in a group setting over eight weekly sessions. Nezu selected four dependent measures that not only assessed the subjects’ target problem, depression, but also broadened his assessment to include a more general problem-solving appraisal and locus of control as well. Specifically, his dependent measures included the Beck Depression Inventory (BDI; Beck, 1972), the depression scale of the MMPI (MMPI-D; Dahlstrom & Dahlstrom, 1980), the PSI (Heppner & Petersen, 1982), and the Internal-External Locus of Control Scale (I-E; Rotter, 1966). He used these instruments as pretest, posttest, and as 6-month follow-up measures. The results indicated that the PST condition resulted in greater reductions in depression (which were maintained at the 6-month follow-up). In addition, the PST condition increased subjects’ appraisal of their problem-solving effectiveness and also changed their locus of control orientation from external to internal. Thus, the training seemed to not only affect the target problem, but also more global but generalized constructs that appear to be important in the coping process.

Teaching Component Skills in Conjunction with Other Interventions

Another strategy in problem-solving training has been to develop new training programs designed to emphasize one or more problem-solving component skill in conjunction with other interventions such as communication skills, stress management skills, or study skills. Problem-solving training in these instances often consists of didactic information, practice, homework assignments, identifying problems, self-monitoring, analyzing obstacles, planning, encouragement, and brainstorming.

Three studies that developed new problem-solving training programs targeted ineffective coping in general. For example, Sarason and Sarason (1981) developed a problem-solving training program for problems typically encountered by high school students. Training consisted primarily of modeling and role-playing effective problem-solving behavior and cognitive processes (e.g., exam-
Training resulted in better performance on two problem-solving tests and a job interview, and fewer problem behavior referrals. Likewise, Dixon, Heppner, Petersen, and Ronning (1979) developed a general problem-solving training program for college students based on didactic presentations, group discussions, directed practice, and homework assignments covering a broad range of problem-solving skills. The results revealed that training resulted in higher quality (not quantity) of responses, less impulsivity in solving problems, but no differences in decision-making skills.

Heppner, Baumgardner, Larson, and Petty (1988) also developed a generic problem-solving training program for college students that emphasized self-management principles in coping, such as self-reinforcement and self-punishment processes, approach and avoidant behaviors, irrational beliefs, self-statements, and effective reactions. The results indicated that problem-solving training was effective at enhancing students’ problem-solving appraisal, and that the self-report changes were maintained at a 1-year follow-up. In particular, training seemed most useful for students who initially appraised their problem-solving very negatively.

Three other studies developed training programs aimed at alleviating stress and anxiety. Tableman, Marciniak, Johnson, and Rodgers (1982) developed a stress management training program for low-income women supported by public assistance. Their training program focused on providing training in four coping skills: (a) increasing belief in one’s personal power and potential, (b) life planning and goals, (c) problem-solving aimed at changing the negative aspects of one’s life, and (d) techniques for stress reduction. The results indicated that treatment resulted in important gains on a variety of inventories measuring psychological distress, such as depression and anxiety.

Likewise, Petty, Moeller, and Campbell (1976) used problem-solving discussions that emphasized brainstorming to treat elderly people experiencing stress and anxiety related to the aging process. The results indicated that subjects increased their awareness of events affecting physical and psychological discomfort, and learned new coping behaviors to deal with these symptoms. Toseland (1977) designed a problem-solving training workshop to improve the general coping skills of senior citizens, particularly for problems requiring assertive behavior. Training consisted of teaching several traditional problem-solving skills (e.g., generating alternatives) as well as analyzing one’s cognitive and affective processes. The results suggested that training resulted in positive gains in both self-report of assertiveness and a problem-solving performance test.

Several other investigators examined the efficacy of problem-solving training on marital and family problems. Ewart, Taylor, Kraemer, and Agras (1984) developed a communication and problem-solving training program for hypertensive patients experiencing marital conflicts. The results revealed that patients who learned effective problem-solving techniques engaged in fewer hostile exchanges and had greater reductions in blood pressure. Jacobson (1977a, 1977b; 1978) assessed problem-solving training and contingency contracting as a treatment for married couples. The problem-solving and contingency contracting group reported higher marital adjustment scores and better problem-solving scores than a control group or a nonspecific marital therapy group. Likewise, Robin and colleagues developed a problem-solving communication training program for treating parent-adolescent conflicts. Training consisted of teaching specific problem-solving and communication skills to individual mother-adolescent dyads by a therapist. Three outcome studies revealed that training tended to result in improvements in observational measures of problem-solving behavior in actual communications, and improvements in conflict resolution at home (Foster, Prinz, & O’Leary, 1983; Robin, 1981; Robin, Kent, O’Leary, Foster, & Prinz, 1977).

At least two studies investigated the effects of problem-solving training on weight-control problems. Black and his colleagues have developed a seven-step problem-solving training program that complements behaviorally oriented weight-control methods; Black’s problem-solving approach focuses on identifying problems, generating alternatives, decision-making, and evaluating progress. Black and Scherba (1983) initially found that subjects who contracted to practice problem-solving (vs. behavioral weight control) lost significantly more weight following the completion of a weight-loss program. In another study, Black and Threlfall (1986) found that those subjects who complied with the requirements of the problem-solving training program lost significantly more weight than those who complied poorly.
Three other problem-solving training studies examined treating agoraphobia, psychiatric patients, and cigarette smoking. Jannoun, Munby, Catalan, and Gelder (1980) compared problem-solving training with programmed practice for the treatment of agoraphobia. Problem-solving training consisted of identifying relevant life problems and discussing general ways of reducing stressors. The results showed that the treatments were equally effective in reducing anxiety and phobic severity. Bedell, Archer, and Marlowe (1980) developed a didactic training program to help psychiatric patients understand problem-solving concepts and practice-oriented activities, such as role-playing and homework assignments, to facilitate skill enhancement. The training group (vs. a control group) improved significantly more on two problem-solving self-report measures. A final study (Karol & Richards, 1978) found that couples in problem-solving training combined with a buddy system compared with a behavioral treatment group (e.g., self-monitoring, stimulus control, and alternative behavior planning) were smoking less at the end of treatment and at the 2-month, 4-month, and 8-month follow-ups.

FUTURE DIRECTIONS

After extensively reviewing the problem-solving literature, D'Zurilla (1986) concluded that taken together, the results of these studies have produced "very promising results" (p. 210). These results constitute support for the use of problem-solving training as a clinical intervention approach for a variety of clinical problems. It appears that problem-solving training "contributes not only to immediate treatment effects but to the maintenance of treatment effects as well" (D'Zurilla, 1986, p. 211). However, D'Zurilla (1986) and D'Zurilla and Nezu (1982) noted several methodological problems that qualify some of the results.

1. Problem-solving training is conducted as part of a treatment package that includes other treatments, and thus it is hard to isolate the problem-solving training effects.
2. Some studies do not include the necessary experimental control to eliminate extraneous variables.
3. Some studies do not include the necessary control groups to isolate the effects of nonspecific factors associated with treatment.
4. Some studies failed to include any measures of problem-solving among the outcome measures.
5. Some studies only used a problem-solving outcome measure without including any measures of adjustment, psychopathology, or maladaptive behavior.
6. Some studies do not include any follow-up evaluations.

We agree that much more is known about problem-solving training since D'Zurilla and Goldfried's (1971) landmark article, although we still have not developed a technology for helping people solve their problems. The purpose of this section is to stimulate both practitioners and researchers to think about problem-solving training for adults. Although the training in problem-solving skills is becoming more sophisticated and successful, there is a great deal that we do not know about problem-solving (Heppner, 1989) and, subsequently, problem-solving training.

Our central thesis is that problem-solving training can be enhanced by greater attention to more microscopic problem-solving processes. First, we need a greater understanding of the specific processes used in real-life problem-solving. This includes a more minute microscopic understanding of the cognitive and noncognitive processes used in coping and problem-solving. The second area concerns the generalizability of the training outcomes. Specifically, greater consideration needs to be given to understanding how problem-solving training programs generalize to real-life problems, across various types of problems, over time, and across individual differences. We will discuss these points subsequently in six sections: (a) descriptions of real-life problem solving, (b) cognitive processes, (c) noncognitive processes, (d) training generalizability over time, (e) problem types, and (f) individual differences.

Descriptive Information About Real-Life Problem-Solving

As Sternberg (1982) has noted, little is known about how people cope with their real-life personal difficulties. We need to attend more closely to and describe in more detail how people process information as they attempt to cope with these troublesome problems. In particular, we believe that problem-solving training needs to examine in greater detail clients' existing knowledge bases, how they process information, and how they use...
their knowledge bases to regulate their cognitions, affect, and behavior with specific problems.

It is also important to note that the models for problem-solving training were typically derived from research conducted in the well-controlled environment of the laboratory using mathematics or physics problems (what Simon [1973] calls "well-structured" problems) compared with the less defined, "ill-structured" problems of everyday life. These problems contain clear information and established solution paths. Ill-structured problems have ambiguous problem information, solution paths, and solution goals.

Real-life problems are far more complex and are never as neatly packaged and presented as those in the laboratory. Nor are the problems typically as simple and clear as they are when used in problem-solving training sessions. The result is that clients may be able to solve an overly simplified problem in the structure of the training setting but be unable to solve the problem when it occurs in a more complex real-life environment in part because of inadequate models of how people solve real-life problems.

Our clients need to know how to solve the ambiguous problems of real life, which may entail using something other than these laboratory models. Research on the solution of ill-structured problems suggests that individuals need skills to structure these poorly defined problems, translating them into smaller, and more clear, well-structured subproblems (Greeno, 1978). At present, however, we know little about this structuring process with real-life problems.

In short, we recommend that researchers in applied problem-solving training (a) describe in greater detail how people process information as they cope with real-life, troublesome problems, and (b) develop accurate, descriptive models of the real-life problem-solving process.

Cognitive Processes

We firmly believe that research in applied problem-solving could benefit from a more microscopic analysis of relevant cognitive processes within problem-solving activities. We suggest that three cognitive processes need consideration: (a) memory use, (b) acquisition and organization of problem-relevant knowledge, and (c) acquisition of problem recognition skills. These three will be briefly explored.

It is commonly noted in laboratory research that memory is a key cognitive component in problem-solving (e.g., Glaser & Chi, 1988). Learning new skills is cognitively laborious. Information related to new skills is often clumsily recalled in a highly inefficient process. The length of time necessary to learn new cognitive skills is directly related to the availability and efficiency of memory resources (e.g., Frederickson, 1984). Memory capacity and use also is affected by client mood or anxiety level (e.g., Gagne, 1985). In order to optimally use memory capacity, it has been suggested that memory skills be taught (Fredericksen, 1984) or external aids developed to reduce the burden on memory resources (Perkins, 1987). In short, we recommend that researchers in applied problem-solving examine the utility of memory skills or aids in problem-solving training.

Effective problem solvers need both skills in how to solve problems as well as problem-relevant knowledge stored in memory. The importance of one's knowledge base in problem solution has long been acknowledged (Simon & Hayes, 1976). We need to understand the kind of knowledge base necessary for demonstrating particular problem-solving competencies in a given area. For example, what kinds of knowledge do nonassertive clients need about themselves, others, and interpersonal interactions in order for the clients to combine this knowledge with problem-solving skills in order to competently solve assertiveness problems.

The type of knowledge may not be as important as the way this knowledge is organized (in what have been called "knowledge structures" or "schemas"). More competent problem-solvers have their knowledge organized in highly efficient, easily accessible, and complexly organized patterns (e.g., Glaser & Chi, 1988). We have little understanding of this organization in specific problem domains.

In short, we recommend that researchers in applied problem-solving training give more attention to clients' existing knowledge bases and how that information is structured or organized (also see Heppner & Krauskopf, 1987). For a client, existing knowledge structures may need to be altered or new structures acquired apart from acquiring new problem-solving skills. We believe it is important for us to understand how this knowledge organization can be facilitated, how new information can be added to existing structures, and how clients can "learn to learn" how to alter structures. Flexibility in the acquisition and use of these structures seems to be an important ingredient.
(see Neves & Anderson, 1981). However, many clients exhibit considerable cognitive rigidity and do not demonstrate this flexibility. Perhaps it would be useful in training to explicitly focus on the role of existing knowledge bases (and how knowledge is organized) to facilitate self-management processes.

Finally, clients need to be able to accurately identify problem areas in which they have difficulty. Real-life problems often appear in a confusing, unclear manner. Thus, clients may have difficulty in recognizing problems and initiating their newly acquired problem-solving skills.

Research has shown that recognizing specific types of problems and problem features, sometimes referred to as pattern recognition skills, are important in problem-solving and can be taught if there are recurrent and constant patterns (Fredericksen, 1984). However, in the confusing and poorly defined problems of everyday living, pattern recognition becomes more complex. The knowledge necessary for the solution of poorly defined problems may be so broad that it does not fit an efficient and easily organized pattern that then can be used to recognize relevant problem features. The use of general pattern recognition heuristics or metacognitive skills (i.e., training clients to ask themselves if this is a problem) may be useful in this context. In short, because problem recognition plays such a critical role for later problem-solving activities, we recommend that researchers examine the specific activities involved in identifying and defining problems. We suspect that interventions aimed at the pattern recognition processes will be helpful to many clients.

Noncognitive Processes

The primary emphasis in most problem-solving training programs has been on cognitive skills and processes. We especially believe that the role of affect has received less attention than it deserves in problem-solving training, particularly the so-called "intuitive" process (Brammer, in press) as well as the negative states people try to regulate. Often when clients enter therapy, their presenting problem centers on negative emotional states. If our goal is to help clients with affective problems and processes, we need to focus specifically on affective processes in training.

People are often very rational, logical, and systematic in their thinking. But it is important to note that often people think in very irrational, illogical, and unsystematic ways. Subsequently, we believe that how people distort information is a critical process in problem-solving, and therefore it is an essential topic for training (Heppner, 1989; Strohmer & Blustein, in press).

Emotions may have a substantial impact on how information is processed during coping or problem-solving (Heppner & Krauskopf, 1987). Many times emotional reactions are ambiguous and difficult for clients to understand; furthermore, at times one's emotions become so painful that strong avoidant patterns or defenses are developed, such as denial or overcompensation. The outcome of such strong emotional reactions is that it is difficult for a person to cognitively process relevant information pertaining to the emotional reactions or problem. In short, a substantial portion of clients' problem-solving involves widely ranging affective reactions to problems that can inhibit, enhance, or distort cognitive and behavioral processes (Heppner, 1989).

We strongly recommend that researchers increase their attention to the regulation of affective processes within problem-solving and aim problem-solving interventions at increasing clients' understanding and effective regulation of their affective processes.

Training Generalizability

One of the issues that has hindered problem-solving training has been the apparent limited transfer of skills to new situations ("transfer-of-training"; Belmont, Butterfield, & Ferritti, 1982). In essence, problem-solving training research has had difficulty demonstrating that problem-solving skills acquired in a particular treatment setting are generalized to real-life or non-treatment settings, both immediately after training as well as over time. In part, the limited transfer of training exhibited in problem-solving training reflects an inconclusive debate among researchers and clinicians as to whether individuals should be trained in general or situation-specific knowledge about problems (Glaser, 1984).

It is clear from past laboratory research that individuals have difficulty in generalizing the specific problem-solving skills that they have learned (e.g., Glick, 1986) to new or novel problems. Concomitantly, when individuals are trained in more general problem-solving skills, they have difficulty learning how and when to apply this general knowledge to specific problem situations.
It is also important to carefully consider our clientele. To help a person become a better problem-solver is often not a small task, especially if the person has severe problem-solving deficits and has not consistently adapted well to his or her environment for several years. It is erroneous to assume that three or four sessions with problem-solving training will make much of a difference with a chronically poor problem-solver. It is important to remember that often clients have spent years learning maladaptive problem-solving styles, that these maladaptive styles usually serve some psychological function for the client, and that it will be difficult for training to erase these maladaptive styles.

Transfer issues may have implications for how training programs are formulated. Perkins and Solomon (1986) suggest that transfer can occur either consciously or spontaneously. Conscious transfer occurs when an individual identifies some aspects of a new problem (problem cues) that are similar to the trained problem, and then uses (transfers) existing skills. Transfer may occur spontaneously when a particular skill is practiced to the point that performance is automatic. A specific problem cue, occurring in a new or novel problem, may then serve as a stimulus for the automated performance of the specific skill.

Further, the bulk of the research has focused on the positive effects of training transfer. Little is known about negative transfer of training (Lohman, 1986). As a result, we presently have little knowledge about the detrimental effects of problem-solving training on the individual’s existing problem-solving abilities and solutions.

The transfer issue is particularly important considering that practice with feedback is essential for skill acquisition to the point of automated performance. The importance of practice in attaining high levels of competence in skill usage has only recently been understood (Fredericksen, 1984). For example, practice entails long periods of exposure to problem tasks; Chase and Simon (1973) suggest over 10,000 practice hours are necessary for acquisition of chess expertise.

No problem-solving training program provides clients with this type of practice. At best, it is typically assumed that clients will continue to utilize the problem-solving skills acquired in the programs, practicing the skills correctly, and eventually obtaining sufficient levels of competence. However, it is unclear what our clients are practicing and learning. In short, we know little about the type of feedback that best facilitates skill acquisition during problem-solving training, and how practice following training, without expert feedback, affects skill acquisition. As part of understanding transfer, we need to know more about how clients practice, how performance is affected by in-session versus out-of-session practice, and how client performance is affected by the sparse, and possibly inaccurate, feedback clients obtain about performance.

Further, there is the issue of the long-term effects of training. We believe training outcomes need to be broadened considerably to more adequately evaluate training. Outcomes of training might include (a) traditional outcomes such as problem-solving component skills or problem-solving appraisal, as well as how clients (b) process information and (c) regulate their cognitive, affective, and behavioral processes (see Baron, Baron, Barber, & Nolen-Hoeksema, in press).

In short, we recommend that researchers give more attention to the extent that clients use their newly acquired problem-solving skills. We believe that problem-solving training needs to focus more directly on the issue of skill transfer or generalizability. In order for training programs to demonstrate the positive outcome of problem-solving training, we need to better understand how to facilitate this transfer process (see Fredericksen, 1984).

**Problem Types**

It is becoming increasingly clear that different types of problems lead to different problem-solving activities (e.g., Heppner, Hibbel, Neal, Weinstein, & Rabinowitz, 1982; Perri & Richards, 1977) and may affect skill transfer. Thus, a second generalization issue pertains to different types of problems. Thus, experimental researchers have proceeded to examine how problem-solvers respond to domain-specific problems, such as chess problems (Chase & Simon, 1973), math problems (Marshall, 1982), or anagram problems (Davis, 1966). At present, it is unclear how people might organize or group personal problems into particular domains or categories. Heppner and Krauskopf (1987) have suggested several dimensions on which personal problems may vary, which might help explain how people organize personal problems (e.g., cause of the problem, problem difficulty).

The way in which clients organize problems
may be affected by the verbal component and subjective interpretation of interpersonal problems. Groen and Patel (1988) have noted that verbal comprehension constitutes an important, and unresearched, part of problem solution. This verbal component may make problems open to multiple interpretations. Thus, one client may interpret a problem in one manner, grouping it in one problem category, whereas another client will have a very different interpretation. Training in specific problem-solving skills, algorithmic approaches, may not be appropriate (Glaser, 1988). Rather, complex verbal tasks may require the acquisition of metacognitive skills rather than specific pattern-recognition skills (see Brown & Campione, 1986). Rather than learning specific comprehensive strategies, it may be more important to learn metacognitive skills that can be used to check comprehension and understanding. For example, it might be helpful to teach clients metacognitive skills that allow them to double-check ambiguities or unclear problems and problem features rather than specific pattern-recognition skills.

In short, we recommend that researchers give more attention to problem type during problem-solving training. While it is obvious that different types of problems lead to different problem-solving activities, we need to know more specifically how different problem characteristics affect the problem-solving process. In addition, the role of the client's verbal comprehension of particular problems merits attention.

Individual Differences

For many years it was assumed that clients seeking psychotherapy were a rather homogeneous group and would respond in similar ways to therapeutic interventions. Kiesler (1971) coined this assumption the "uniformity myth" and suggested that researchers must examine important differences across clients. Within problem-solving training, researchers seem to assume that participants are a homogeneous group, all having similar strengths and deficits, and all needing the same interventions to enhance a common set of problem-solving skills. However, different people most likely will have different skill deficits. Normally, and more so under stress, individuals tend to emphasize the cognitive skills that they feel comfortable with and deemphasize the areas in which they feel deficient (Cronbach & Snow, 1977; Krauskopf & Davis, 1973). Clients in therapy already have a well-rehearsed repertoire of skills and some type of organized knowledge base that is used in problem-solving. However, these skills and knowledge bases, often the source of their problem behavior, prove to be inadequate.

A critical part of our training efforts needs to involve identifying the role of individual differences variables in problem-solving in general, and especially in relationship to problem-solving training (see Heppner & Krauskopf, 1987; Larson, in press). Cronbach and Snow (1977) noted the significance of individual aptitude in interacting with treatment outcomes. Understanding a client's pre-existing cognitive aptitude, knowledge bases, and skill deficits has implications for the course of problem-solving training. Another feature is level of problem-solving expertise. Clients with little competence in problem-solving require a different training format than clients with greater expertise.

In short, we recommend that researchers attend more to the role that individual differences play within problem-solving in general, but in particular within problem-solving training interventions. How clients process information in the coping process is very directly related to a number of personality variables (Heppner & Krauskopf, 1987). Given the diversity of skills across clients, we suspect that the effectiveness of problem-solving training also could be enhanced by attending more to particular skill deficits within clients.

CONCLUSION

Problem-solving training has focused on a wide range of skills, from specific component skills (e.g., generating alternatives) to general problem-solving models. Training has been successful with a wide range of target problems, from study skills to depression. The results of these studies have produced "very promising results" (D'Zurilla, 1986, p. 210), and clearly support continued examination of problem-solving training as a clinical intervention for promoting physical and psychological health.

Obviously, problem-solving training holds considerable appeal for remedial interventions, which has been the focus of much of the previous research on problem-solving training. It is abundantly clear that stress is related to physical and psychological health. It also is becoming increasingly clear that problem-solving, or coping, plays a role in how one responds to stressful events.

Moreover, problem-solving training also could
be used proactively to augment the effectiveness of well-functioning high school and college students. Problem-solving training could be viewed as providing a generic set of self-management skills that could enhance students' coping abilities with regard to personal, career, and academic problems. In a way, it is startling to realize that a complex society such as ours does not provide systematic problem-solving training for the myriad of applied problems that its members will undoubtedly face. In a similar way, Sternberg (1985) has argued that our educational institutions fall dramatically short in teaching students about the complex process called problem-solving.

There is evidence that college students who function well in their environment benefit from problem-solving training. For example, one study (Heppner & Reeder, 1984) found that even resident assistants who were selected for having leadership and interpersonal skills and who had appraised themselves as effective problem-solvers benefited from brief problem-solving training. Besides increasing their awareness of how they solve problems, training also had a positive impact on how they later reported solving problems on their residence hall floors, both immediately after training and in a 4-month follow-up. Another group of college students who initially appraised themselves as very effective problem-solvers reported fewer personal problems after participating in eight 1½-hour problem-solving training sessions (Heppner et al., 1989). In addition, the effective problem-solvers reported higher levels of satisfaction with the training than did students who initially appraised themselves as very ineffective problem solvers. We suspect that because of the complexity of applied problem-solving, even those people who report being effective problem-solvers can receive substantial benefits from training.

While considerable progress has been made within the last 15 years with regard to problem-solving training, it is clear that much remains unknown about how to facilitate or enhance clients' coping and problem-solving efforts. More information is needed about real-life problem-solving processes and the effects of problem-solving training on specific microprocesses, for both remedial and preventive interventions.

REFERENCES


Butler, L., & Meichenbaum, D. (1981). The as-


Kobasa, S. C. (1979). Stressful life events, person-


Mechanic, D. (1974). Discussion of research programs on relations between stressful life events and episodes of physical illness. In B. S. Dohrenwend & B. P. Dohrenwend (Eds.),
Stressful life events (pp. 87–97). New York: John Wiley & Sons.


