



# 11 INNOVATIVE PROBLEM SOLVING IN GROUPS

## New Methods and Research Opportunities

*Scott G. Isaksen*

Despite many difficult obstacles, creativity and innovation are becoming important concepts for individuals, groups, and organizations (Charnes and Cooper 1984; Isaksen 1987a; Kuhn 1985, 1988). The actual study of creativity, from a psychological perspective, is a relatively recent phenomenon. Many writers on creativity identify Guilford's (1950) presidential address to the American Psychological Association as the cornerstone of research and psychological inquiry into this concept. Since this beginning, a substantial body of literature regarding creativity has grown and spread. As Treffinger (1986, p. 19) indicated: "Through more than thirty years of research and development, creativity has continued to be a topic of considerable interest to educators as well as social and behavioral scientists." Although the field seems to be fairly young, creativity research has been reviewed and summarized by various writers (Raina 1980; and Taylor and Getzels 1975). There are also many edited collections of important contributions to the literature (Anderson 1959; Ghiselin 1952; Parnes and Harding 1962; and Rothenberg and Hausman 1976). The purpose of this chapter is to place research and inquiry into creative problem solving in groups within the larger context of creativity research.

### MYTHOLOGY, DEFINITIONS, AND APPROACHES TO CREATIVITY

The definitions of creativity are numerous. Some seem grounded in research or common sense. Others seem to be based on beliefs and

assumptions that need to be questioned or examined. Anyone interested in the concept of creativity must deal with a series of myths in order to make productive and lasting connections. It is essential to deal also with the problem of semantics and the ambiguity that a variety of definitions for the same word will cause.

Creativity has been viewed as a mysterious or mystical phenomenon because no one seems able to offer a universal definition or explanation. People who view creativity in this manner suggest that fruitful inquiry and discussion of it are not possible due to this ambiguity. These critics scoff at the vagueness and looseness of the concept. They recommend the abandonment of this work for more productive, concrete, or tangible lines of thinking. These critics overlook the fact that it is the very nature of creativity to appear to be ambiguous and challenging to study. Those who choose to make progress into understanding the applications of creativity often make their own distinctions and assumptions. For example, Charnes and Cooper (1984, p. xvii), in setting forth the framework for the inquiry into creative and innovative management, indicated:

For purposes of creative and innovative management, we need to begin to drop old distinctions, and the distinction between entrepreneur, manager, and administrator is surely a candidate for elimination. Thus, by creative management, we refer to new conceptions and new ideas, new entities and new methods that can also be used to provide new directions or new modes of operation for already existing organizations and activities. By innovative management we refer to the ability to implement such new ideas and/or to move successfully in such new directions. Making things work successfully is an old and abiding task of management. It is the coupling of this task with new ideas, directions, and the like that makes it innovative and creative. Finally, it is the ability to induce these kinds of activities in others in an organized way that makes it an act of management rather than only the act of an individual.

There are many theories, definitions, and means of assessing creativity. Despite this profusion, there does appear to be some agreement on key attributes of definitions among investigators most closely associated with work in the field. Welsch (1980) reviewed twenty-two sources that presented definitions of creativity. She analyzed the relevant concepts included in these definitions and found considerable agreement on the key elements. The definition that reflects this agreement was (Welsch 1980, p. 110)

creativity is the process of generating unique products by transformation of existing products. These products, tangible and intangible, must be unique only to the creator, and must meet the criteria of purpose and value established by the creator.

The analysis of twenty-two authorities' definitions supports this definition. I am sure that another twenty-two authors could be found who would disagree with an element or two, but the definition does seem to address most of the critical elements of creativity. Creativity is a subject that is complex, multifaceted, and dynamic. If one can look beyond the vapor and clouds created by such complexity, there does appear to be some productive agreement upon which to build.

Not only is there some basic agreement in terms of definition, but when one examines the vast literature of creativity, basic categories of inquiry do appear. For example, many researchers who have analyzed the literature of creativity describe essentially four basic arenas within which inquiry has occurred. The boundaries around these arenas seem permeable. In fact, when considering the larger concept of creativity, the boundaries seem to disappear. However, when examining experimentation and progress at a more exact or empirical level, the relationship to the arenas becomes more clear. The four broad areas include inquiry into

- The characteristics and attributes of the creative person
- Criteria determining the creative product
- Identification and description of the stages of the creative process
- The nature of the creative environment

Much of the creativity research available in the literature seems to fall within these four broad categories. In short, it does appear possible to make conceptual progress through the confusion and complexity. Much more work is needed here, but there is something upon which to build.

Another rather pervasive myth surrounding creativity is that it is something magical. Only a few people in human history have ever been really creative. These few lucky geniuses were given a special gift. In earlier times they were thought to have a muse or to be possessed. This approach to creativity resists temptations to explain or explore, and promotes the notion that creativity should simply be appreciated or held in awe. Further, if creativity is magic, then like most magic it is based on tricks or sleight of hand. So even if you were able to explain it, you would merely expose the trickery.

This area of mythology has a very early start. It seems to promote the view that creativity is a rare attribute possessed by only a few gifted individuals. Of course, history seems to favor those who are very high on "the creativity scale." We seem to focus on those who are of exceptional ability or talent and on those who break down paradigms and provide new ways of doing things. We seem to reject

another entire type of creativity—that which is more widely distributed and focused on doing things better or making adaptive contributions. What appears to be a major difference in “level” of creativity may be more a matter of “style” difference (see Kirton 1987).

An interesting line of work that calls this myth into question is the attempt to have computers recreate scientific discovery. Simon (1985, p. 4) rejects the idea that sparks of genius need to be present in order for creativity to exist.

As long as we refer to acts of creativity with awe and emphasize their unfathomability, we are unlikely to achieve an understanding of their processes. And without such an understanding, we are unlikely to be able to provide usable advice as to how to encourage and enhance them. . . . Today we have a substantial body of empirical evidence about the processes that people use to think and to solve problems, and evidence, as well, that these same processes can account for the thinking and problem solving that is adjudged creative.

Creativity appears to be accessible by everyone with a modicum of ability. There does appear to be an infrequency of extremely high-level creatives; but if a person is able to think and solve problems, then there does appear to be room for creativity.

A final myth surrounding creativity is that in order to be creative a person must be mad. This myth asserts that creativity is based on the psychological processes of neurosis or psychosis, that it is a function of a troubled mind. According to this myth, creativity is something to be avoided like any other form of pathology or sickness.

Although much popular literature seems to focus on creativity as madness, many believe that creativity is related to the natural development of human potential. Releasing creativity is healthy. Maslow (1959, p. 94) described this aspect of creativity as being related to mental health when he stated:

Self-actualizing creativeness is hard to define because sometimes it seems to be synonymous with health itself. And since self-actualization of health must ultimately be defined as the coming to pass of the fullest humanness, or as the “Being” of the person, it is as if self-actualizing creativity were almost synonymous with or a *sine qua non* aspect of . . . essential humanness.

Once it is possible to go beyond the mythology surrounding creativity, various definitions and conceptions can be identified, and means of assessment can be developed. In fact, there is a growing body of literature focused on these issues and supporting the notion that creativity can be reliably and validly assessed (see Gowan 1972; Roweton 1972; Taylor 1976; Treffinger 1986, 1987; and Treffinger, Isaksen, and Firestien 1983).

## CAN WE TEACH CREATIVITY?

If it is possible to identify and assess creativity, it is possible that something can be done to deliberately nurture it. But it is not necessary to wait for a precise, universal definition of creativity; the concept can be approached as a natural human characteristic upon which people differ. As a natural human characteristic it can be deliberately nurtured and developed. As Gowan (1977, p. 89) put it:

Heretofore we have harvested creativity wild. We have used as creative only those persons who stubbornly remained so despite all efforts of the family, religion, education, and politics to grind it out of them . . . as a result of these misguided efforts, our society produces only a small percentage of its potential of creative individuals (the ones with the most uncooperative dispositions). If we learn to domesticate creativity—that is, to enhance rather than deny it in our culture—we can increase the number of creative persons in our midst by about fourfold.

The need to do something deliberate to nurture creativity appears to be supported by many. But what about the evidence? Torrance (1981, p. 99) reported:

A few years ago, it was commonly thought that creativity, scientific discovery, the production of new ideas, inventions, and the like had to be left to chance. Indeed many people still think so. With today's accumulated knowledge, however, I do not see how any reasonable, well-informed person can still hold this view. The amazing record of inventions, scientific discoveries, and other creative achievements amassed through deliberate methods of creative problem solving should convince even the most stubborn skeptic.

The research on the deliberate nurturance of creativity begins with about six studies on the effects of training specific techniques (Taylor 1959). By the early seventies, a number of studies were conducted that took a more comprehensive research approach. The largest single summary included 142 individual research studies on deliberate training and their outcomes (Torrance 1972). These studies were published from 1960 to 1972 and encompassed a wide range of training approaches including facilitating testing conditions, motivation, the creative arts, and the Osborn-Parnes Creative Problem Solving Approach. All the approaches investigated had a better than 60 percent success rate with a range of 67 percent for motivation and 91 percent for the Osborn-Parnes program. Follow-up on this line of investigation has included a metaanalysis of long-term training effects (Rose and Lin 1984). In addition, more comprehensive reviews of more

studies done since the 1972 review have been reported by Torrance (1986, 1987).

One of the most comprehensive studies of the development of creative thinking abilities was the Creative Studies Project. Parnes and Noller (1972) designed a two-year program to enhance the creativity of college students. They hypothesized that those students completing a four-semester sequence of creative studies courses would perform significantly better than control group students on measures of creative application of academic subject matter, non-academic areas calling for creative performance, personality factors associated with creativity, and selected tests of mental ability and problem solving. (For the most comprehensive reports of the results of this line of research, see Parnes 1987; Reese, Parnes, Treffinger, and Kaltsounis 1976; and Torrance 1986, 1987.)

Some of the criticism surrounding this research (see Mansfield, Busse, and Krepelka 1978, for example) raises questions about research methodology, test validity, and the general construct of creativity. Rather impressive explanations have been provided by Torrance and Presbury (1984) and other researchers who indicate the criteria of success can go far beyond tests of ideational fluency.

It seems that we can do something to deliberately improve the skills of creative problem solving. In concluding a report of their metaanalysis of creativity training effects, reported (Rose and Lin (1984, p. 22)

The overall results of this metaanalysis suggest that training does affect creativity. While it seems obvious to state that training and practice develop skills, the obvious often needs to be stated. Creative thinking is at once a skill that can be developed through various teaching methodologies and an innate ability that some individuals have in greater abundance than others. This dual nature of creativity is not a contradiction of human development but an affirmation of the flexibility and malleability of individual potential. Through education and training the innate creative thinking ability of individuals can be stimulated and nourished.

If creativity can be identified and assessed as well as nurtured, then it is important for managers, teachers, or anyone who is responsible for accomplishing tasks or managing resources to develop creative problem solving (CPS) skills in themselves and those with whom they work. This assertion is supported by a study done by Johansson (1975) in which it was found that 7 percent of the corporations surveyed offered training courses in creativity, innovation, problem solving, or related fields. Additional support for expanding this type of activity is provided by Drucker (1985) and Basadur and Thompson (1986).

## THE CREATIVE PROCESS

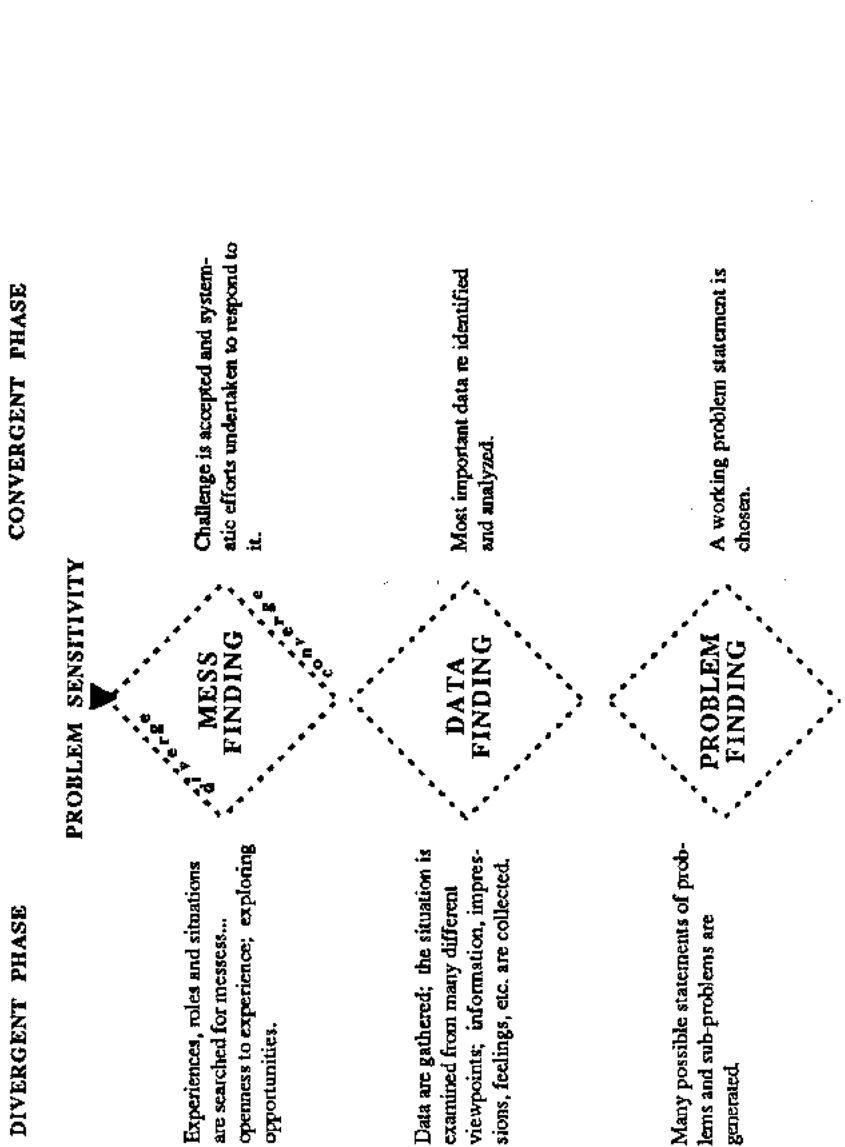
Research into the creative personality has provided information about the motivations, styles, abilities, and other characteristics of highly creative individuals (Guilford 1977; MacKinnon 1978). Creative products have been examined in an effort to determine the criteria differentiating the degree of creativity they manifest. This approach has also provided some promising developments with regard to some basic definitional elements of creativity (Besemer and O'Quinn 1987; Besemer and Treffinger 1981). The environment conducive for creativity has also been the subject of much recent research and inquiry. The focus has been on attempting to understand the attributes of the environment that release and support, as well as hinder or stifle, creative behavior of individuals and groups (Amabile and Sensabaugh 1985; Ekvall and Arvonen 1983). The fourth major category of creativity research, the creative process, provides information into an aspect of creativity that seems to be most amenable to deliberate development.

Early inquiry into the nature and nurture of the creative process began with examinations of the mental activities and processes of highly creative individuals. These studies have yielded a variety of models of the creative process. One model was originally outlined by Osborn (1953) and modified by Parnes, Noller, and Biondi (1977). The current version of the model of creative problem solving is described in Isaksen and Treffinger (1985). The current view of the model is provided in Figure 11-1.

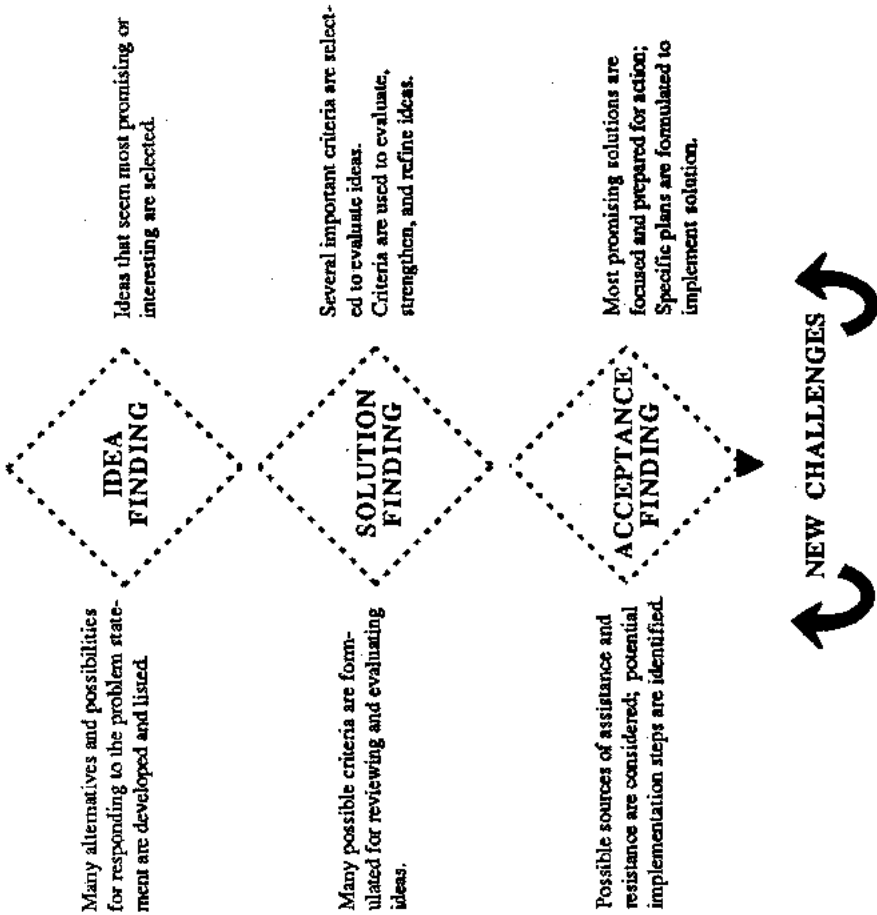
The creative problem-solving process is a model that organizes a variety of specific methods and techniques. When this model is focused on providing acceptable solutions to specific opportunities or challenges it can also be called innovative problem solving. The model, or general system, is based on a series of stages of mental activity consisting of alternating phases of divergent and convergent thinking. Although the graphic depiction of the model may lead to an observation that the process is neat and inflexible, real creative problem solving is rather "messy" and flexible. The user need not sit down and follow this process as though it were a recipe for successful or effective thinking. The actual use and application of the process is quite dynamic, iterative, and expandable. Depending on the specific task and the orientation of the problem solver (among other variables), some aspects of the process will be more fully and appropriately utilized while others may not be used at all (or as much).

In examining the graphic design of the process, it is easy to see that there appears to be an opening up to generate and develop alter-

Figure 11-1. Creative Problem-Solving Process.







natives followed by a selecting, choosing, or narrowing down of the alternatives. In each stage, two complementary types of thinking are necessary. The current model is built on the belief that effective problem solving relies upon both creative and critical thinking. Creative thinking is defined as making and communicating meaningful new connections to

- Think of many possibilities
- Think and experience in various ways and use different points of view
- Think of new and unusual possibilities
- Guide in generating and selecting alternatives

The basic principle underlying this type of mental activity is referred to as critical thinking. Critical thinking is defined as analyzing and developing possibilities to

- Compare and contrast many ideas
- Improve and refine promising alternatives
- Screen, select, and support ideas
- Make effective decisions and judgments
- Provide a sound foundation for effective action.

The basic principle underlying this type of thinking is affirmative judgment. These dynamics, guidelines, and the specific methods and techniques that provide the basic tools for the two different types of thinking are described more completely in Isaksen and Treffinger (1985).

Creative problem solving (CPS) does not mean merely rattling off one novel idea after another without ever judging or evaluating the options. The ability to make novel associations is important, but it is equally important to be able to make good decisions and choices about ideas. Therefore, in learning CPS it is important to learn and use effective methods for generating and evaluating ideas. This suggests a reasonable and delicate balance between creative and critical thinking. This balance also implies the need to see creative and critical thinking as mutually important components of effective problem solving. More detailed information regarding the general rationale for learning creative problem solving is provided in Appendix 11-A.

CPS provides a systematic and deliberate application of thinking strategies to ensure a productive balance between creative and critical thinking, it mediates natural blocks or unproductive patterns of thinking, and it provides a common language to help individuals and groups describe and plan their mental activities. As such it can be learned and used in a variety of circumstances by individuals and

groups. Managers can use CPS skills and methods in a variety of situations with peers, subordinates, and others.

There are at least three different levels of application for CPS. The first is learning the basic tools of divergent and convergent thinking. These tools can be taught in a condition that is removed from the daily, real-life context of the learners. After learning the basic principles and skills, the techniques can be woven together to form some meaningful problem-solving event. This can take the form of simulations, role playing, and practicing the process on presented challenges and opportunities. A third level of use is applying CPS on real challenges and opportunities. The fact that these are real opportunities means that the application of the skills and techniques is embedded in the context of the problem owner. This model of learning CPS is depicted in Figure 11-2.

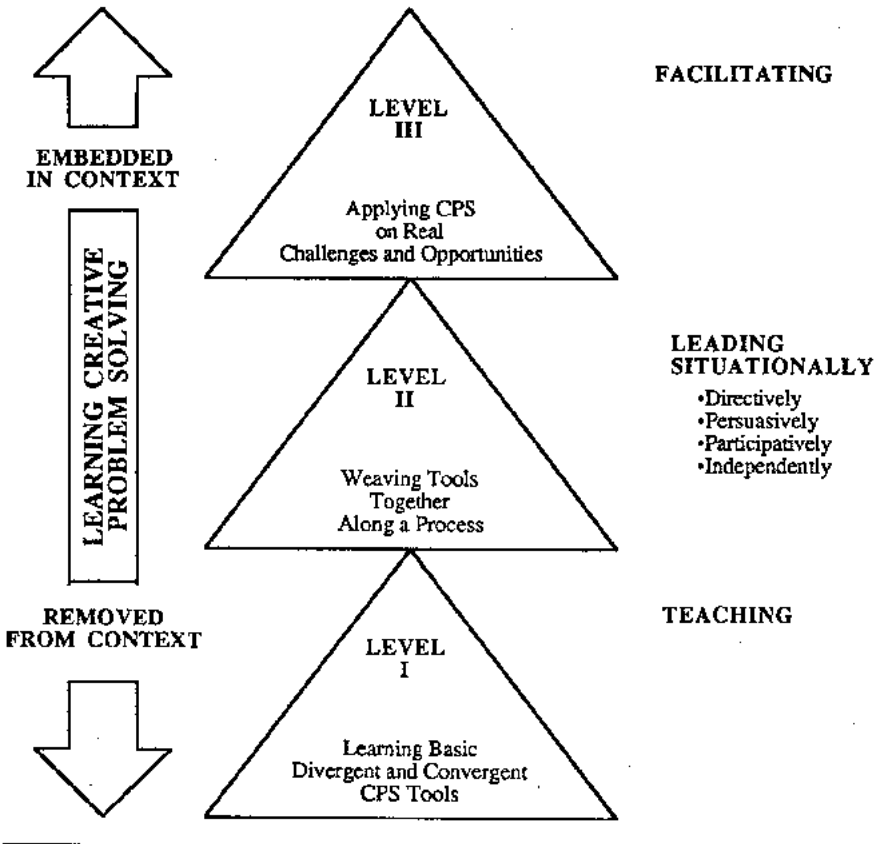
The manager may be seen as a teacher or trainer when providing basic awareness and facility with the tools of divergent and convergent thinking. Managers will need to provide a more situational type of leadership as individuals with whom they work begin to practice these skills as meaningful units. The manager who is involved in real applications will find the role of facilitator to be productive.

If a decision is made to involve a group in real applications of CPS, it is helpful if the style of leadership is consistent with the notion of group participation. It would be counterproductive if the leader were to autocratically order all group members to participate and to insist that they enjoy it. It is also important to understand the unique style and skills necessary for effective facilitation. This special type of group-oriented leadership role focuses on the release and effective utilization of group resources.

During a typical CPS session, a group is led by someone called the facilitator. The facilitator is the person who takes primary responsibility for the process and procedures with which the group will be involved. The facilitator structures and prepares the environment, acts as a catalyst for releasing and focusing the efforts of group members, uses appropriate methods and techniques, and is sensitive to the variety of group dynamics. (For more information regarding the role and responsibilities of the facilitator of a CPS session see Isaksen 1983, 1986, and Parnes 1985. Appendix 11-B provides some helpful information for facilitators of small group CPS sessions.)

It is important for group members to know that their efforts have some meaning and relevance. This can be achieved only if someone within the group has a sincere interest in implementing the solutions the group helps create. Thus, the facilitator interacts with a client. This is the individual (or group in some cases) who has decision-

Figure 11-2. A Model for Learning Creative Problem Solving.



making authority or ownership over a particular situation or challenge. The role of the client in CPS groups supplies content-related expertise and provides convergence and decision making during the session. The client helps to keep the group on track by clarifying the situation, choosing directions and approaches, and participating in the session. In the final analysis, it is the client who needs to have a problem solved or an opportunity reached. Therefore, the role of the client is an important one in determining the effectiveness and productivity of the group's efforts.

Clients need guidance from the facilitator in making choices and judging at appropriate times, and they need to have support for permitting, encouraging, and participating in the divergent activities of the group. For clientship to be present, there must be room for a

new approach or fresh ideas that the client is willing and able to implement. This type of ownership builds commitment to the group process and helps in the development of effective groups. The client's role helps to provide the group access to a clear definition of the task at hand. During the session, for example, the client shares the most important data and provides other information the group needs to know before proceeding. Elements of the client's task must be specified and have clear connection to his or her responsibilities.

The other members of the CPS session are called participants and they function collectively as the resource group. These group members suggest options and provide a wide range of alternatives during the session. Effective resource group members show an interest in the client's content, but do not make decisions for the client. They support the decisions the client makes and provide a divergent range of possibilities from which the client can choose.

Resource group members provide energy, diversity of experience, and a variety of viewpoints. The facilitator's challenge is to capitalize on the group's assets and limit their liabilities by providing the necessary balance of creative and critical thinking processes in meeting the needs or goals of the client.

Another major challenge to the facilitator of CPS sessions is to effectively balance and reinforce the roles of facilitator, client, and resource group. Part of this responsibility includes making these roles explicit for all group members so that everyone knows what is expected of him or her. These three roles provide the basic interpersonal framework for CPS in groups.

All group members need to have some basic information regarding what they are expected to do. Agreement is necessary regarding the procedures and methods used for group activity. It is also very helpful for group members to be aware of their strengths and limitations in using various process technologies, as well as the kinds of blocks to creative thinking that may surface during the session. Some deliberate decisions need to be made regarding the number and type of human resources to be part of the session. Heterogeneity of perspectives and experiences as well as homogeneity of levels of power should be considered. Depending on the purposes of the session, a certain number of participants should be specified for the working group (generally five to seven). Larger groups should provide additional facilitators to allow an equivalent ratio. The facilitator may also want to consider the levels of expertise necessary in dealing with the client's task.

So far this chapter has focused on the definitions and approaches to studying creativity. In addition, some background and description

of the CPS model, roles for group sessions, and some of the dynamics of these sessions have been provided. The following section will provide a few of the implications for future research into using this type of problem solving with groups.

### **SOME RESEARCH IMPLICATIONS**

The emphasis of current research and development surrounding CPS consists of better targeting the methods and techniques toward specific types of people under specific circumstances and for specific types of outcomes. The research literature has already made significant progress in answering the more basic question regarding the teachability of creative thinking skills. In short, we think we can do something to deliberately enhance the creative thinking ability of individuals. The more targeted questions regarding which techniques work best for whom under what circumstances remain to be answered.

#### **Process Strategies: Development and Testing**

Most previous research and development has focused on divergent creative problem solving methodology. There has been much interest, for example, in the brainstorming technique. One frontier for those involved in researching the effectiveness of creative problem solving is the development and testing of convergent CPS methodology. There are many reasons for becoming more concerned with the dynamic balance and complementarity of creative and critical types of thinking. One major reason has been provided by the research surrounding the Creative Studies Project.

The two-year program was very successful for the experimental subjects who stayed with the entire program. The experimental and control subjects who stayed with the program were comparable on nearly all the personality assessments conducted. There were some interesting findings regarding those experimentals and controls who dropped out. They tended to be more directed toward deviancy or culturally disapproved behavior, in closer contact with their primary processes, freer, more impulsive, more likely to drop out of college, less responsible, and more anxious, and they shared other characteristics. Drop-outs seemed to be more interested in artistic forms of creativity and dropped out because of their disappointment in the nature of the course. The implications and more extensive description of the findings of the drop-outs are reported more extensively in Parnes and Noller (1973).

The authors described a possible explanation for the drop-out phenomenon by describing two very different types of people. They used the terms "lines" and "squiggles" in much the same way Juster (1963) did in his book *The Dot and the Line*. The line was described as being straight, rigid, disciplined, responsible, seeking the ability to bend or twist, and to become more free and open. The opposing type of person, the squiggle, was described as undisciplined, unruly, wild, unconventional, original, and uninhibited. In Juster's story, the squiggle loses out to the line who has learned to merge his innate freedom and spontaneity with his self-discipline and responsibility. The drop-outs seemed more like the squiggles; the stay-ins seemed to be more like the lines. The creative studies program seemed better suited to the needs of the lines. The program's emphasis was on learning and applying many divergent techniques of creative problem solving. Perhaps the squiggles had already mastered these skills and needed some assistance with the convergent techniques. The lines were very likely to have been able to recognize the impact of the learning on broadening their repertoire of skills and abilities.

Questions related to this aspect of the development and testing of process strategies include:

- What kinds of convergent process strategies are appropriate for inclusion in the CPS model?
- How might existing or new strategies be developed or modified for inclusion in the CPS model?
- What kinds of convergent techniques are more appropriate for individual (or group) application?
- What convergent tools are most appropriate for which stages of the CPS process?
- Are there nonverbal or nonsemantic convergent (or divergent) techniques that can be useful for CPS?

### **Cognitive Styles: A Means to Target Technology**

Another implication from the drop-out phenomenon from the Creative Studies Project is that different types of people may have different preferences for learning and applying the various CPS process strategies. Those students with certain kinds of cognitive orientation seemed to benefit from and enjoy learning and applying the divergent process strategies the early Creative Studies Program offered.

A line of research supportive of this connection is the work of Gryskiewicz (1982, 1984, 1987). Gryskiewicz used the Kirton Adap-

tive-Innovative Inventory to evaluate the outcomes of three different CPS technologies. He found that Kirton's construct was replicated by his research and developed the targeted Innovation Model which is considered to be a goal-referenced model for targeted CPS. Certain CPS techniques were likely to produce certain types of outcomes. These findings have important implications for practitioners and facilitators of CPS groups.

If it is possible to examine an individual's preference for a particular type of process technology, it would be likely to do a much better job of diagnosing and selecting appropriate techniques for personal development and qualitatively acceptable results. Facilitators could help individuals select techniques that broaden their repertoire of skills or that focus more appropriately on the type of outcome desired. Individuals can decide about the appropriateness of their match between their own stylistic tendency and the situational determinants. Planning the membership of a CPS group could be assisted by knowing the type of outcome needed and the kind of preferences most likely to produce those results. In short, knowing more about a person's orientation to the CPS process and the specific types of techniques contained therein can increase the ability to be more targeted or intelligent about the application of CPS technology.

Some of the questions for research regarding the use of cognitive styles to target CPS technology include:

- What constructs and instrumentation are most appropriate for use within the CPS process? Which instruments have predictive value?
- What types of people have what types of preferences in learning and applying various CPS methods and techniques?
- Do certain styles have strong preferences for certain stages or phases of the CPS process?
- Do certain mixes of styles have qualitatively or quantitatively different outcomes on CPS methods or techniques?
- Do cognitive styles make a difference in how certain individuals behave in the various roles (facilitator, client, resource group) during a CPS session?

### **Climate Variables: Understanding the Context**

A third major area for future inquiry on the subject of using CPS in groups includes concern for the situational contingencies that make a



significant difference in selecting people, process technologies, and solutions for challenges and opportunities.

Ekvall and Andersson (1986) identified the following situational factors that contribute to the generation of a particular working climate: visions and goals, strategies, the style of leadership, the work setting and logistics, the characteristics of the individuals, the type of work, how people organize to get the work done, qualitative features of the context, and the values and norms of the people. Within these broad factors, Ekvall has designed a questionnaire to study the working climate of organizations. He defined working climate as the behaviors, attitudes, and feelings typical of life within the workplace. His instrument seems to be able to discriminate those working climates more favorable to creative and innovative outcomes and climate.

To better understand the context within which CPS exists, it appears that certain climate variables must be identified and described. In addition, the amount of domain-relevant knowledge, the structure of the challenge or opportunity, and the qualitative aspects of the available resources would also be important to consider. It seems reasonable that environmental contingencies like time (how far along the task has come, as well as deadlines), budget, degree of crisis orientation, degrees of freedom within the job, the amount and type of experience individuals and teams have with the task and with each other, and what type of motivation is predominant within the workplace are all important to know about when applying CPS in groups.

- What climate factors are the most significant in relation to the client's ownership of the task and what effects do these have on implementation?
- Should certain factors within the context of CPS play a significant role in selecting and using specific process strategies?
- Do certain diffusion strategies have a stronger likelihood of impact in certain situations? What factors seem to make the difference?
- How might certain domain-relevant knowledge requirements be determined and assessed?
- Which quality, time, cost, or acceptance factors have the most predictive value in determining the approach to CPS (group versus individual; focus on learning the process versus solving a problem) most appropriate for the situation?

## CONCLUSIONS

Some progress has been made in terms of creativity research in general. Despite the increased efforts to study creativity, some important challenges continue to exist. As MacKinnon (1978, p. 187), indicated:

As we have seen, empirical research has shed some light of each of the major facets of creativity—the creative product, the creative process, the creative person, and the creative situation. But its illuminations have been spotty and far from complete. There remain critical issues concerning each of these several aspects of creativity which can only be resolved through the findings of future research.

One of the most important needs for the field is a better conceptual schema of key constructs (see Isaksen, Stein, Hills, and Gryskiewicz 1984). An improved conceptual schema could assist in organizing and evaluating gaps in the literature and could encourage networking among interested researchers.

The focus of this chapter has been primarily on the aspects of the creative process; specifically on innovative or creative problem solving in groups. It would serve the emerging field of inquiry into creative and innovative management well to examine this aspect as well as the other aspects of person, product, and situation in an effort to gain a more comprehensive understanding of the practical implications of creativity theory and research.

## APPENDIX 11-A: RATIONALE FOR LEARNING CREATIVE PROBLEM SOLVING

Creative learning has been described as becoming aware of challenges or opportunities; bringing together available information; defining the difficulty; searching for solutions; perfecting them; and communicating the results (Torrance and Myers 1970). Creative learning is closely parallel to the creative problem solving (CPS) process (Isaksen and Treffinger 1985). The rationale for the importance of learning CPS includes the following (see Isaksen 1987b):

*The Nature of Knowledge.* The accumulation of factual information is growing to the point that total comprehensive awareness is not feasible. More comprehensive states of awareness are possible within selected specific disciplines. This may lead to isolated learning of static information. Data can be “looked up,” skills of creative problem solving cannot.

*The Importance of Creative Thinking Skills.* Since the world is changing so rapidly and it is impossible to predict accurately what knowledge or information will be needed, it is important to focus on the development of skills that help individuals become more adaptable to new and changing circumstances. This focus can help shape alternative images of future circumstances.

*The Greater Transferability of Skills than Knowledge.* The ability and facility of using knowledge are more generalizable and more widely applicable than memorization of data. Skills and abilities are more permanent and related to the process of solving problems.

*The Situational Demand for Creativity.* There are many situations where there is no immediate or single right answer. These frequent real-life conditions clearly call for a creative type of thinking.

*The Enjoyability of Creative Thinking.* Learning that calls for the student to actively produce, rather than passively recall, is more motivating. These situations encourage commitment by providing opportunities for learners to follow through on intrinsically motivated tasks. This increases motivation and relevance for learning.

*The Naturalness of Creativity.* All students benefit from involvement in creative learning. There may be varying levels and styles in the responses, but all people can use their natural level or style of creativity they have when provided the appropriate opportunity.

*Foundation on Knowledge.* Creative learning is not an either/or situation. You cannot focus purely on creativity. All creativity has a context and data surrounding that context. Creative learning uses traditional content as raw material when there is some relevance and need. The focus on process is not entirely independent or exclusive of content and may actually increase the retention and transfer of learned data.

## **APPENDIX 11-B: SOME GENERAL CONSIDERATIONS FOR FACILITATORS OF SMALL GROUP CREATIVE PROBLEM SOLVING**

The following general considerations for facilitators are meant to provide selected factors to be aware of when planning to use creative problem solving with groups. Rather than being a comprehensive list, these are springboards for planning and thinking. These considera-

tions may overlap and provide a quick checklist for response to the question: Once I am convinced that I want to use a group for creative problem solving, how do I get started?

*The Role of a Facilitator.* It is important to understand the unique style and skills necessary for effective facilitation. This special type of group-oriented leadership focuses on the release and effective utilization of group resources.

*The Client's Role.* Establishing and reinforcing the client's role during creative problem solving is a significant element of a productive session. Clients need to have guidance for making choices and judging at appropriate times; and they need to have support for permitting, encouraging, and participating in the divergent activities of the group.

*Resource Group Roles.* The members of the group who provide energy, diversity of experience, and viewpoints need to have guidance regarding their role. The facilitator's challenge is to have the group use their assets and limit their liabilities by providing the necessary balance of creative and critical thinking processes in meeting the needs or desires of the client.

*Process Technology.* Awareness of a variety of methods and techniques for use during a CPS session is an important attribute of an effective facilitator. Having the ability to use a diversity of tools provides the facilitator with an efficient means of meeting the needs of a client by fully utilizing the resources of the group. Knowing the type of outcome (adaptive or innovative) various techniques are likely to produce is another aspect to consider.

*Orientation to Process.* All group members need to have some basic information regarding what they are expected to do. Agreement is necessary regarding the procedures and methods used for group activity. It is also very helpful for group members to be aware of their strengths and limitations in using various process technologies, as well as the kinds of blocks to creative thinking which may surface during the session.

*The Structure of the Environment.* The climate needs to be conducive to creativity. Group members need to have a certain degree of trust and safety to make contributions and engage in open communication.

*Ownership.* It is important for group members to know that their efforts have some meaning and relevance. This can be achieved only if the client has sincere interest in implementing the solutions. The client also needs to possess a reasonable amount of influence to be able to implement the solutions. For a sense of ownership to develop, there must be room for a new approach or idea that the client is willing and capable to implement. This type of ownership builds commitment to the group process and helps in the development of effective groups. Elements of the client's task must be specified and have clear connection to the responsibilities of the client.

*Planning for Logistics.* Some attention must be focused on assuring that the necessary equipment and resources are assembled for the session. This means setting up visuals, flipcharts with plenty of paper and markers, and a means for affixing these papers in a prominent place for all to see. In addition, the group should be assembled in a place where it is possible to be comfortable to share ideas and engage in effective communication.

*Timing.* The purpose of the session, as well as the amount of time to be scheduled should be explicitly identified for all group members. Is the purpose of the group meeting to identify the initial statement of the problem (planning meeting), to generate ideas, or to develop and evaluate options? A specific task should be identified and an appropriate amount of time should be set aside for the accomplishment of that task.

*Group Composition and Size.* Some deliberate decisions need to be made regarding the number and type of human resources to be a part of the session. Heterogeneity of perspectives and experiences, as well as homogeneity of levels of power should be considered. Depending on the purposes of the session, a certain number of participants should be specified (generally five to seven). Larger groups should provide additional facilitators to allow an equivalent ratio. (For additional information, see Isaksen 1983, 1986.)

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