Teaching and Applying Creative Problem Solving: Implications for At-Risk Students

Donald J. Treffinger, Scott G. Isaksen

Abstract
We identify five reasons why it is important for at-risk students to learn and be able to apply Creative Problem Solving (CPS). CPS builds on both creative and critical thinking (in harmony with each other). The CPS Version 6.1™ framework incorporates guidelines and specific tools for generating ideas (“creative” thinking) and focusing ideas (“critical” thinking), and involves four components (Understanding the Challenge, Generating Ideas, Preparing for Action, and Planning Your Approach) and eight specific stages (Constructing Opportunities, Exploring Data, Framing Problems, Generating Ideas, Developing Solutions, Building Acceptance, Appraising Tasks, and Designing Process).

Teaching and applying CPS involves instruction in foundational tools, working on realistic problems and challenges, and dealing with real problems. Following this model, CPS can be incorporated in and across many curriculum or content areas, and more importantly, to a wide range of real-life opportunities and challenges. In some developmentally appropriate ways, CPS can be applied by individuals and groups across cultures and ages; it may also provide life skills that are vital for at-risk students now and in the future.

Keywords: Creativity; creative thinking; critical thinking; Creative Problem Solving; thinking skills.

Our contemporary Creative Problem Solving (CPS) framework, known as CPS Version 6.1™ (Treffinger, Isaksen, & Dorval, 2006; Isaksen, Dorval, & Treffinger, 2011) builds on more than six decades of research, development, and field experience (e.g., Isaksen & Treffinger, 2004; Treffinger & Isaksen, 2005). CPS is used widely in many countries and settings. There are at least five important reasons for educators to ensure that today’s students are learning and applying CPS (Treffinger, Schoonover, & Selby, 2013): these include:

- Creativity and CPS are essential for success in the complex, competitive global environment in which individuals, teams, and organizations must operate today;
- Creativity and CPS contribute to meaning, integrity, and satisfaction in career and in personal life;
- Creativity and CPS help people become effective, autonomous, and competent in their relationships with others and in dealing with novel situations;
- Creativity and CPS help people to deal effectively with the rapid pace, change, and unpredictability of modern life; and
- Creativity and CPS expand the range of situations, goals, and challenges with which people can deal successfully.

Creativity and CPS are important in helping students deal effectively, independently, and resourcefully with a wide variety of complex opportunities and challenges. In preparing students for the increasingly complex challenges of the workplace, they can also have a very powerful, positive impact on students’ personal lives and careers. Through knowledge of CPS tools and their ability to use them, students discover rich and varied new opportunities for personal growth and productivity, through which students discover and their passions, realizing and developing ways to be at their best. When people in a group talk about the best, most powerful learning experiences they have ever had, it is common for them to describe their encounters with creative learning. When people discover and use their creativity, they find that they feel healthier, happier, and more productive in a variety of ways (Treffinger, Schoonover, & Selby, 2013).

Engagement in creativity and CPS is demanding, but also rewarding. After a period of extended work on a creative project, or in a problem-solving group, it is very common for people to say, for
example, “I’m exhausted; I would never have believed thinking could be such hard work— but it was worth it!” They experience this paradox: they’re “drained” from the amount of focus and effort they invested in their work, but at the same time, they’re energized and excited by the results of that work, and they’re eager to carry out their action plans or put their new ideas to work.

The importance of being truly engaged in what we do is consistent with the recent emphasis on positive psychology. Rather than focusing on disease, disorder, damage or disability, this new trend emphasizes the discovery and promotion of factors that allow individuals and communities to thrive (Seligman & Csikszentmihalyi, 2000). Experiencing engaging work is important for students and has also been found to be a key factor in productivity and profitability in the workplace (Harter, Schmidt, & Hayes, 2002; Harter, Schmidt, Killham & Agrawal, 2009).

Creativity contributes to our efforts to bring liveliness, excitement, and challenge to any work project— in school, or on the job. Educators and employers today are increasingly aware of the powerful benefits that come from creative engagement in a task, and students or employees who feel “ownership” in what they are doing will pursue it more energetically and diligently, over sustained periods of time. Creative learning engages people in tasks, and brings a sense of commitment and renewal to one’s work. We need to help students to accept the challenges that extend beyond learning, recalling, and reciting facts or doing well on basic standardized tests. In education today, and particularly for at-risk students, we can help many students to become people who will be able to find, learn, and apply new knowledge to complex, novel, open-ended challenges; to make the most of the opportunities they discover or create in the future; and to proceed confidently and competently into outstanding accomplishments and productivity in the future.

It is possible to provide students today with thinker-friendly tools for creative and critical thinking, problem solving, and change management. When considering the role of CPS in education, however, it is also vital to keep an important fundamental principle always in mind: the purpose for teaching CPS to students is to enable them to deal with complex, open-ended opportunities and challenges, as well as to engage them in meaningful ways in learning content and developing academic skills and expertise (extending beyond merely “covering the content”). CPS is not a set of tools and techniques intended to teach facts and information at the recall or recognition level. Nor is CPS aimed at preparing students for “high-stakes tests” that emphasize students’ mastery of such information. People use and draw upon knowledge and information when thinking creatively and critically or solving complex, novel, open-ended problems, of course. But CPS is not a set of tools for acquiring or amassing that knowledge as much as a set of sophisticated tools for applying and extending knowledge in powerful ways. With that caution in mind, recognize that CPS tools are proven (having been used successfully for more than six decades and supported by extensive research), portable (readily learned and applied across a variety of situations by people of all ages), powerful (able to produce important changes in one’s life and work), practical (applicable to everyday problems as well as complex, long-term challenges), and positive (capable of being used constructively and collaboratively by groups as well as able to be applied individually). [For expanded explanations of each of these terms, you can also download the free PDF file on CPS Version 6.1™ from www.creativelearning.com.]

Our approach builds on two foundational concepts: creative thinking and critical thinking. Figure 1 presents our definitions of these terms (Isaksen, Dorval, & Treffinger, 2011; Treffinger, Isaksen, & Dorval, 2006).

<table>
<thead>
<tr>
<th>Creative Thinking</th>
<th>Critical Thinking</th>
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<tr>
<td><strong>Encountering gaps, paradoxes, opportunities, challenges, or concerns; then searching for meaningful new connections by generating —</strong></td>
<td><strong>Examining possibilities carefully, fairly, and constructively; then focusing your thoughts and actions by —</strong></td>
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<tr>
<td>• many possibilities;</td>
<td>• organizing and analyzing possibilities;</td>
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<tr>
<td>• varied possibilities (from different viewpoints or perspectives);</td>
<td>• refining and developing promising possibilities;</td>
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<td>• unusual or original possibilities; and</td>
<td>• ranking or prioritizing options; and</td>
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<td>• details to expand or enrich possibilities.</td>
<td>• choosing or deciding on certain options.</td>
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**Figure 1:** Definitions of Creative and Critical Thinking.
Basic Guidelines and Tools for Generating and Focusing Options

Both generating (using creative thinking) and focusing (using critical thinking) also involve learning and applying specific guidelines (attitudes and habits of mind that support effective thinking) and tools. In CPS, building on our basic definitions, we also identify two basic sets of tools: one for generating options and another for focusing our thinking.

Generating Options

Individuals or groups use these tools to produce many, varied, or unusual possibilities, to develop new and interesting combinations of possibilities, or to add richness and detail to new possibilities. When using these tools, it is important to follow four basic guidelines (Isaksen, Dorval, & Treffinger, 2011; Treffinger, Isaksen, & Dorval, 2006). These are:

1. **Defer Judgment.** When generating options, separate generating from judging, directing effort and energy to producing possibilities that can be judged later.
2. **Seek Quantity.** The more options a person or group can generate, the greater the likelihood that at least some of those possibilities will be intriguing and potentially useful.
3. **Encourage All Possibilities.** Even possibilities that might seem wild or silly might serve as a springboard for original and powerful new connections.
4. **Look for Combinations.** Increase the quantity and quality of options by building on the thinking of others and by seeing new combinations.

There are many tools for generating options. Brainstorming is an example of a generating tool and in fact, is probably the most widely known tool. Unfortunately, it is also often a commonly misused tool, and frequently is incorrectly equated with the entire CPS process, rather than being understood as one tool (among many) for generating options. Brainstorming is widely misunderstood and both researchers and practitioners have often ignored the specific procedures that enhance its productive use (Isaksen & Gaulin, 2005).

Other basic generating tools include: SCAMPER, Force-Fitting, Attribute Listing, and the Morphological Matrix. For more information about these tools and their educational applications, see: Treffinger and Nassab (2011), Treffinger, Nassab, Schoonover, Selby, Shepardson, Wittig, and Young (2006), or Treffinger, Schoonover, and Selby (2013).

Focusing Options

The focusing set includes several tools for analyzing, organizing, refining, developing, prioritizing, evaluating, or selecting options. Focusing also involves four broad guidelines (Isaksen, Dorval, & Treffinger, 2011; Treffinger, Isaksen, & Dorval, 2006), which are:

1. **Use Affirmative Judgment.** When focusing their thinking, examine options carefully but constructively, placing more emphasis on screening, supporting, or selecting options than merely on criticizing them.
2. **Be Deliberate.** Consider the purpose or need for focusing: to select a single solution, to rank order or prioritize several options; to examine ideas carefully with very detailed criteria; to refine or strengthen options; or to create a sequence of steps or actions. Each purpose may involve deliberately selecting and applying a specific focusing tool.
3. **Consider Novelty.** When seeking a novel or original solution or response, focus deliberately on that dimension when evaluating possible solutions.
4. **Stay on Course.** Keep the goals and purposes of the task clearly in sight and ensure that the options are evaluated in relation to their relevance and importance for the goal at hand.

There are also several basic focusing tools, including: ALoU, Hits and Hot Spots, Paired Comparison Analysis (PCA), the Evaluation Matrix, and Sequencing (SML). For more information about these tools and their educational applications, refer to Treffinger and Nassab (2011), Treffinger, Nassab, et al., (2006) or Treffinger, Schoonover, and Selby (2013).

The overwhelming historical emphasis of CPS has been on generating many, varied, and unusual alternatives. In part, this is one reason that brainstorming was often confused with CPS. A
major concern in our work has been to productively balance the generating with focusing guidelines and tools in order to create new and useful outcomes from CPS. We see generating and focusing as complementary, not oppositional, operations. The basic tools for generating and focusing options can be applied independently, and they can easily be incorporated into a variety of content or curriculum areas or linked to content standards (Treffinger, Schoonover, & Selby, 2013).

CPS Components and Stages

The CPS Version 6.1™ framework (Isaksen, Dorval, & Treffinger, 2011; Treffinger, Isaksen, & Dorval, 2006) involves four components, with eight specific stages. These components and stages are illustrated in Figure 2. We will explain each stage briefly.

Understanding the Challenge Component

This component involves three stages that contribute to clarity in defining a constructive goal or direction for problem solving. The three stages are Constructing Opportunities, Exploring Data, and Framing Problems.

Constructing Opportunities. This stage involves identifying a broad or general goal for your CPS efforts. Keep in mind three key characteristics of an opportunity statement: Broad (a general need, wish, or goal), Brief (concisely worded), and Beneficial (points in a positive or constructive direction). Very often people think of a “problem” as negative or “wrong” (a situation we describe as “WIBAI,” or “wouldn’t if be awful if…”), feeling worried, dissatisfied, frustrated, or unhappy. But CPS can also begin with tasks that are viewed in a positive way—a wish, a hope, a dream (referred to as a “WIBNI” statement, for “Wouldn’t it be nice if…”). Even when one begins with a WIBAI, CPS is more productive when the starting point is converted to look at the WIBNI.

Figure 2: CPS Version 6.1™ Framework.
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Exploring Data. Exploring Data is another stage in the Understanding the Challenge component of CPS. In this stage, problem solvers identify the important data in a task or opportunity statement, in order to refine their understanding of the situation and gain greater insight into the situation. This may involve:

• Know and Need or Want to Know;
• 5W’s and an H (Who, What, When, Where, Why, and How); and
• From “current reality” to “desired future state”.

Framing Problems. This stage involves formulating a specific problem statement to guide one’s search for ideas, by posing questions that challenge you to look forward and search for many, varied, and unusual possibilities. Framing Problems involves identifying and then choosing problem statements that contain:

• Invitational stem: IWWM (“In what ways might…”) [HM, “how might…” or H2, “how to”];
• Clarity of ownership (who?); and
• Verb and action (“Do what?”)

Generating Ideas Component

This component includes one stage of the same name. Generating Ideas involves searching for many, varied, original, or detailed ideas for dealing with or responding to an open-ended task. In carrying out this stage, problem solvers begin with an effectively worded, invitational problem statement, and then use one or more generating tools to produce a rich set of ideas for possible solutions. Before exiting this component, problem solvers also use one or more focusing tools to narrow down the list of options to those that are most promising or interesting (even if those options will need additional refining and development in order to become effective solutions).

Preparing for Action Component

This component consists of two stages, Developing Solutions and Building Acceptance.

Developing Solutions. The Developing Solutions stage helps problem solvers transform ideas into promising solutions. Its principal tasks include:

• Using the stem, “What I see myself doing…” This stage helps problem solvers to move from interesting or attractive ideas to workable solutions, keeping in mind that there is a difference between a “good” idea and a “useful” solution.
• Choosing a strategy and applying tools to determine whether to implement a few promising solutions, cluster or group a few promising possibilities to develop, or to undertake a detailed, careful analysis with criteria

Building Acceptance. The Building Acceptance stage involves assessing factors that will support or inhibit successful implementation and the development of a specific Plan of Action. It involves considering both assisters (people, places, resources, times, places that will help carry out the solution successfully) and resisters (people or other factors that might inhibit or interfere with successful action). This stage also involves constructing a specific Plan of Action. Effective Action Plans include at least one step that the problem solver(s) will carry out within 24 hours, and then other actions classified as “Short, Medium, or Long Term” steps. This classification depends on the nature and requirements of the situation.

Planning Your Approach Component

This CPS component includes two specific stages, Appraising Tasks and Designing Process. Planning Your Approach is a “management” or metacognitive component through which problem solvers monitor, manage, and modify (as necessary) their CPS efforts in real time (i.e., prior to and during their problem solving efforts). This component distinguishes the contemporary CPS framework from previous versions as well as from many other “problem solving” models. Many other models treat “process” as a fixed, linear, prescriptive order of steps or stages—each of which is
always deployed, and which are always in exactly the same sequence. Instead, our CPS framework, taking into account the real-world needs and behaviors of problem solvers and research on constructivist and cognitive models, treats process as a natural, dynamic, and flexible selection and application of the components, stages, and tools that problem solvers need in order to deal successfully with the actual (and often changing) tasks at hand.

CPS Version 6.1™ (Treffinger, Isaksen, & Dorval, 2006; Isaksen, Dorval, & Treffinger, 2011) provides effective problem solvers with an extensive set of tools upon which they can draw, rather than a rigid set of steps to be learned and followed mechanically. In this approach, we also recognize that all people do not learn or apply any process in exactly the same way, and that individual and group differences are valuable and not sources of “error” to be avoided. Appraising a task and designing an approach allows problem solvers to consider these individual differences as well as the conditions, climate, or context within which CPS will be applied.

Appraising Tasks. This stage guides individuals or groups in examining people, content, context, and methods in order to assess the appropriateness of CPS for use with a specific task. It includes four important factors: people, context, content, and method. For example, people, one important element of Appraising Tasks, involves using information about creativity characteristics (e.g., Treffinger, Young, Selby, & Shepardson, 2002) and problem-solving styles (Selby, Treffinger, Isaksen, & Lauer, 2004) to customize or personalize effective applications of CPS. In addition, considering the climate may also influence the importance of and approach taken for the task (Isaksen, 2007; Isaksen & Ekvall, 2010).

Designing Process. There are many change methods. When CPS is deemed to be an appropriate choice, the Designing Process stage guides specific choices of components, stages, and tools. Since we approach CPS as a natural, flexible process, rather than as a fixed sequence of steps, problem solvers use this stage to guide their decisions about where to enter and exit the CPS framework, and to assess which components, stages, and tools may be most appropriate for their purposes. This is not a “one-time, one-shot” stage, but since one’s needs change as work on the problem evolves, it is an ongoing or continuous monitoring of process. Throughout their work on a task, problem solvers need to be aware of their immediate goals and purposes, the process they are using, whether or not their choices are functioning effectively and as desired, or whether they may need to refocus or redirect their efforts and process choices. Designing Process involves “keeping your eyes on the process while you are using the process,” and being ready to consider adjustments that may be needed as you become aware of the need.

Learning and Applying CPS in Many Settings

CPS can be used successfully by individuals, teams or small groups, or larger groups, for a wide range of problems or challenges, including: personal or professional problems, people problems, product problems, or planning problems. CPS has been used across many ages, from children five or six years of age in the primary grades (e.g., Keller-Mathers & Puccio, 2000) to adults. With any age group or in any setting, the challenge of learning and applying CPS effectively involves several dimensions (Treffinger & Feldhusen, 2000; Treffinger, Schoonover, & Selby, 2013). These are summarized in Figure 3. Three general dimensions must always be considered: 1) the context or environment for teaching and learning; 2) metacognitive skills (monitoring, managing, and modifying your thinking while you are in process); and 3) personal characteristics (including cognitive abilities, specific talents and interests, personal characteristics, and style preferences, for example).

Within these three broad dimensions, our recent research has highlighted the significance of personal creativity characteristics (Treffinger, Young, Selby, & Shepardson, 2002; Treffinger & Selby, 2012; Treffinger, Schoonover & Selby, 2013) and problem solving style (e.g., Treffinger, Selby, & Isaksen, 2008; Treffinger & Schoonover, 2012) as important factors in effective problem solving as well as in teamwork, collaboration, project-based learning, and differentiation of instruction.
As illustrated in the circle in the center of the model in Figure 3, there are three important dimensions of teaching and learning: the foundations; realistic tasks; and real-life opportunities and challenges.

Although instruction or training in CPS might often treat these as sequential (from foundations to realistic to real-life), it is not necessarily always the case that they follow such a pattern. There may be many instances, for example, when work on a real-life problem clarifies the need for new “foundations,” tools, or skills. For simplicity of explanation, however, we will summarize each of the three dimensions, beginning with the foundations.

**Foundations**

As a foundation for CPS, it is helpful for people to learn basic tools for generating or focusing options and for process management. Many of the tools can be learned quickly and easily through the use of contrived exercises or “content-free” activities that draw upon the common, everyday experiences familiar to most people. These direct instructional efforts may not represent the person’s actual context for applying and using the tools—the domain or content area in which the person works—but they often help people recognize that the tools can be applied in a variety of different contexts. Direct instruction can always be followed, or even accompanied by, deliberate efforts to
practice and apply the tools in context-relevant applications.

**Realistic Tasks**

The foundational tools certainly can become more valuable and powerful when they are incorporated into the CPS framework. In the “realistic” dimension of the model, the primary goals involve learning and practicing the CPS components and stages. They may take the form of simulations, case studies, video clips or dramatizations of brief scenarios, or printed exercises. Realistic practice problems are intended to use content that will be of interest to the students, even though it is not of direct personal importance or consequence. The goal is to provide problems that are sufficiently engaging to be motivating for the group, but not so intensely involving that the group’s investment in solving the problem makes it difficult for them to learn and practice appropriate CPS tools. No one expects that anyone will actually use or do anything with the solutions that are created, because the problems are imaginary. Thus, we describe them as “realistic” problems, rather than as real problems. For example, Treffinger (2000) provided a collection of 50 sample problems suitable for use with children and teenagers. The importance of working with realistic practice problems might be summarized through three key words:

- competence—knowing CPS;
- confidence—belief in your ability to use CPS successfully; and
- commitment—seeking opportunities to use CPS.

Even though our contemporary CPS framework is flexible and non-linear in nature, educators often find that it can be helpful for students to view and practice the process components of *Understanding the Challenge, Generating Ideas, and Preparing for Action* and their six stages in a linear approach before learning and applying the *Planning Your Approach* component and its two stages. This enables students to build their understanding of each component and stage and its contributions to CPS so they can subsequently engage successfully in “taking the process apart” and applying CPS in more flexible ways.

**Real Life Opportunities and Challenges**

No one learns CPS simply as an interesting academic exercise, or just for the opportunity to do “practice problems” that are contrived and provided by a teacher, trainer, or workshop leader. The reason most people learn CPS is to increase their ability to think productively, creatively and critically, in situations that really matter in their life and work. Unlike the contrived, practice problems sometimes employed in the realistic dimension, real problems are the authentic opportunities, challenges, and concerns people encounter in real life. Real problems are situations that you really care about; you feel strongly about them, and you want to be able to solve them. You intend, without any doubt, to put the solutions to work and carry out your results.

Working on real problems, not just realistic exercises, is the eventual goal of any instructional or training program in CPS. The most powerful educational applications of CPS involve opportunities for students, working individually, as a team or small group, or as a class, to identify and solve real-life problems at home, in school, or in their community. Teachers, administrators, parents, community leaders, and students can work collaboratively to engage in such real-life problem solving. In many schools today, there may already be an emphasis (and sometimes even a requirement) for participation in community service projects or “service learning.” CPS offers a powerful set of tools to make service projects experiences that transcend routine “helping tasks” and provide students the deeper learning and satisfaction that come from making a difference for others.

**Importance and Value of CPS for At-Risk Students**

Some students who are different from the mainstream of the student population encounter a variety of challenges and obstacles to personal and academic success, and are often characterized as “at-risk students” (National Center for Educational Statistics, 1992). These students often experience low achievement and failure in school and may often become school dropouts. In the extreme, they may encounter higher incidence of delinquency, disciplinary action, and lower self-esteem (e.g., Ender & Wilkie, 2000).

At-risk students have found little stimulation, challenge, or success in school and have become disillusioned, disenchanted, or “demotivated,” removing themselves
emotionally, psychologically, and physically from school, from learning, and even from a productive role in society (cf., McCluskey, Baker, Bergsgaard, & McCluskey, 2001; McCluskey & Treffinger, 1998). Unfortunately, there has frequently been greater emphasis on negative or unproductive characteristics and behavior than on the social and environmental factors that have contributed to placing students at risk, and more attention to what is wrong than to how to guide students and redirect their efforts in more constructive ways. Hixson (1993) argued that: “the focus of our efforts… should be on enhancing our institutional and professional capacity and responsiveness, rather than categorizing and penalizing students for simply being who they are.”

As Torrance (1974) and Cramond (2005) argued, it is an error to view differences among people as problems or deficits; often they can be assets. Studies of “at-risk” young people have revealed strengths and talents that should not be overlooked or undervalued (e.g., McCluskey & Treffinger, 1998). Recommendations for effective educational programs for at-risk children and youth frequently emphasize the importance of providing realistic or real-life learning experiences, engaging students in high-interest, practical experiences and activities, and emphasizing active, hands-on engagement— all hallmarks of CPS in educational settings (cf., Treffinger, In Press). When at-risk youth have been guided in learning and applying Creative Problem Solving tools and methods, they have frequently discovered ways to deal with problems and challenges in constructive, forward-looking, and even dramatically life-changing ways (e.g., Baker, 2008; McCluskey, Baker, Bergsgaard, & McCluskey, 2001; Place, McCluskey, McCluskey, & Treffinger, 2000).

For educators and parents as well, guiding and facilitating students in learning and using CPS skills can be richly satisfying— bringing a sense of excitement and renewal from the experience of empowering young minds. The students who learn CPS today will become the adults on whom our world depends for health, quality of life, peace, and justice in the future. Could there be any higher calling?

References


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