

**The Use of Creative Problem-solving and Critical Thinking Strategies
To Prepare Gifted Learners for 21st Century Challenges**

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Learning for what? This is a common lament, heard from gifted students around the world as they face another boring day at school. Too often the nature of learning in school is hard for them to connect to the fast-paced world outside their window that is action-oriented and fluid in its operation. School-based learning, by contrast, often is slow and linear in its approach. Yet educators can positively impact this scenario by infusing their work with the gifted with the skills and strategies that constitute real world problem-solving, used by all professions that they will one day enter. Such skills are in the realm of critical thinking and creative problem solving. Taken together, they comprise the most powerful approaches we can employ to educate the gifted for the future lives they will live as citizens in a global society.

What are the features of critical thinking and creative problem-solving that are so powerful? They share several that impact on what students learn about subject matter, how they learn it, and how they feel about what they have learned. These features include:

- an emphasis on student-centred learning
Both critical thinking and creative problem solving models put students in charge of the learning process and solicit from them ideas, conjectures, and working hypotheses about how the world works.
- an emphasis on collaboration
Both types of models force students to become co-learners, working on problems together and using each others' expertise and knowledge to solve the problems posed. Problems that are highly complex benefit from shared knowledge in the process of solution.
- an emphasis on the work of the mind
Both types of models suggest that students have the capacity to think through a situation and come to a reasoned conclusion by using their minds as the major tool rather than books or other sources.

The following descriptions provide a model for each type of thinking and then an example to illustrate the model. The article concludes with an example of how to combine both types of models into a unit of study.

Problem Solving

Problem recognition and delineation as a critical element of the creative problem-solving process was first identified by Getzels and Csikszentmihalyi (1976) in their pioneering study of artists' approaches to the problem of depicting some aspects of human experiences. They found that creative artists who were able to sustain careers in art were more effective at problem-finding not problem-solving than less successful fellow students. These findings spawned many models that provided a more balanced perspective between the two types of skills.

Problem solving formally may be described as a series of steps. Beyer (2000) set forth such a model in his broader taxonomy of thinking skills:

1. *Recognise a problem*
2. *Represent the problem*
3. *Deliver/choose a solution plan*
4. *Execute the plan*
5. *Evaluate the solution*

The formal steps may or may not characterise students' cognitive activity in a real problem situation. In a sense, they represent an ideal. The steps also define a convergent conception in that a single solution is envisioned, although the language of the model is open to alternative solutions from different problem solvers.

Another complex form of problem-solving that involves both critical and creative thinking, widely applied in gifted programs and special extracurricular programs like Olympics of the Mind and Future Problem Solving, is creative problem solving (Isaksen, Treffinger, Dorval, & Nollar, 2000). Six steps or processes characterise the model:

1. Mess finding
2. Data finding
3. Problem finding
4. Idea finding
5. Solution finding
6. Acceptance finding

The main characteristic of "mess finding" is to sort through a problem situation and find direction toward a broad goal or solution. In "data finding," participants sort through all available information about the mess and clarify the steps or direction to a solution. In "problem finding," a specific problem statement is formulated. "Idea finding" is a processing of many ideas for solution to *the* problem or parts of the problem. "Solution finding" is an evaluation or judgmental process of sorting among the ideas produced in the last step and selecting those most likely to produce solutions. Finally, in "acceptance finding," a plan is devised for implementing the good solution. An adaptation of the creative problem-solving model is Future Problem Solving that involves the application of the creative problem-solving model to studies of the future.

Critical Thinking

Higher level process skills require students to make nuanced judgments and interpretations about data. An effective model to teach students to enhance these skills is the Ennis Model of Critical Thinking which uses judgment and inference as the centrepiece of the critical thinking process (Ennis, 1996). Although the model has been used more extensively at secondary level, it can be applied with gifted students at upper elementary levels with successful results. An important aspect of this model is the twelve dimensions of critical thinking he derived from a study of the literature and his own philosophically trained education. These are:

- Grasping the meaning of a statement
- Judging whether there is ambiguity in a line of reasoning
- Judging whether certain statements contradict each other
- Judging whether a conclusion necessarily follows
- Judging whether a statement is specific enough

- Judging whether a statement is actually the application of a certain principle
- Judging whether an observation statement is reliable
- Judging whether an inductive conclusion is warranted
- Judging whether the problem has been identified
- Judging whether something is an assumption
- Judging whether a definition is adequate
- Judging whether a statement made by an alleged authority is acceptable

The first dimension of his model involves all aspects of interpretation, whether it is derived by inductive or deductive means. A student activity that aids the development of interpretation might be to have students study proverbs or the sayings of great writers and philosophers. Presented with a statement of import, students could be asked the following questions:

- What do the significant words mean?
- What does each line of the statement mean?
- What situations does the statement refer to?
- What ideas about life does it share?
- What new applications can you make to the idea that relate to your life and to the society as a whole today?

Using a combination of models

Teaching a combination of critical and creative thinking skills through relevant models can also do double duty in respect to learning. It can promote strong content-based understanding at a deeper level as well as teaching the skills of creativity and problem-solving. The following example represents a curriculum framework for a unit of study on war where students are engaged in both critical thinking and creative problem solving as they are addressing historical and ethical outcomes as well.

Goal: To understand historical decision-making about war

Students will be able to:

Understand options for waging and ending war

Develop a recommendation for ending a war that is defensible, given US goals and interests, world military and diplomatic events, and the evolution of the relationship between the US and other countries.

Explain the process for leaders' making high stakes decisions

Goal: To develop problem-solving skills

Students will be able to:

Recognise the gap between the “real” and “ideal” as the area in which problem resolution takes place.

Enlarge databases in preparation for forming decision options.

Generate a resolution for the problem of ending war that is defensible within the context provided by real events and that is ethically acceptable.

Refine personal problem solving strategies to make skills more effective, efficient, and humane through self-evaluation.

Goal: To develop critical thinking skills and strategies

Students will be able to:

Argue a point of view on waging war.

Write an essay that outlines the implications and consequences for the United States based on the outcomes of any given war

Explain different stakeholders' assumptions about war.

Conclusion

The need for changing the instructional approaches to student learning has been well-supported in the learning research literature for decades. Such strategies promote deeper learning, more relevant learning for students and for the required skills of the 21st century workplace. Both creative problem solving and critical thinking also have the power to sustain student interest and motivation in learning important content. It only remains for educators in all cultures to acknowledge the value of such teaching approaches and to put in place the mechanisms that encourage regular and sustained use of such pedagogy in schools. Learning for what? A focus on creative problem solving and critical thinking in school provides a real world authentic response to gifted students.

References

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