# CHAPTER 5
# Developing Creativity Across All Areas of the Curriculum

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*Imagination grows by exercise.*

W. Somerset Maugham

This chapter will deal with two aspects of providing teachers with guidance about encouraging more creative thinking in their classrooms. The first part will focus on a few basic principles and strategies underlying creativity training and how these principles and strategies can lead us in the more practical task of developing creativity-training exercises. This section uses a "learn-by-doing" approach and will prepare you for the more advanced challenge of developing your own activities.

The second part of the chapter focuses on using the basic principles of creative thinking to develop your own activities. In this section you will be asked to examine any and all topics that are part of the regular curriculum or prescribed curricular standards and to design and infuse creative thinking activities into standards based curricular topics. This section is purposefully designed to develop your own creativity, and by so doing you will not only be enriching the regular curriculum for your students but also modeling the creative process for them.

## PART 1: BASIC PRINCIPLES AND START-UP ACTIVITIES

**Three Major Starting Points.** Although a great deal has been written about fostering creativity in classrooms, relatively few basic teaching strategies have been effective in encouraging creative development. The starting point for teachers who would like to promote more creative behaviors in their students is a basic understanding of the difference between convergent and divergent production. In most traditional teaching-learning situations, major emphasis is placed on locating or *converging* on correct answers. Teachers raise questions and present problems with a predetermined response in mind, and students' performance is usually evaluated in terms of the correctness of a particular answer and the speed and accuracy with which youngsters respond to verbal or written exercises. Thus, the types of problems raised by the teacher or textbook and the system of rewards used to evaluate student progress cause most youngsters to develop a mindset that is oriented toward zeroing in on the "right" answer as quickly and efficiently as possible. Although this ability has its place in the overall development of the learner, most teachers would agree that impressionable young minds also need opportunities to develop their rare and precious creative thinking abilities.

Divergent production provides these opportunities, as it is a kind of thinking that is characterized by breaking away from conventional restrictions on thinking and letting one's mind flow across a broad range of ideas and possible solutions to a problem. These are the kinds

of thinking that literally have enabled people to change the world, and we can do more in our schools to prepare young people to bring about changes in small or large ways.

The real problems humanity confronts do not have the kinds of predetermined or "pat" answers on which a great deal of traditional instruction focuses. Yet we give our students very few opportunities to practice letting their minds range far and wide over a broad spectrum of possible solutions to open-ended questions or problems. The philosopher Alan Watts (1964) has talked about these two kinds of thinking in terms of what he calls the "spotlight mind" and the "floodlight mind." The spotlight mind focuses on a clearly defined area and cannot see the many alternative possibilities or solutions to a problem that may exist outside that well-defined area (Figure 5.1).
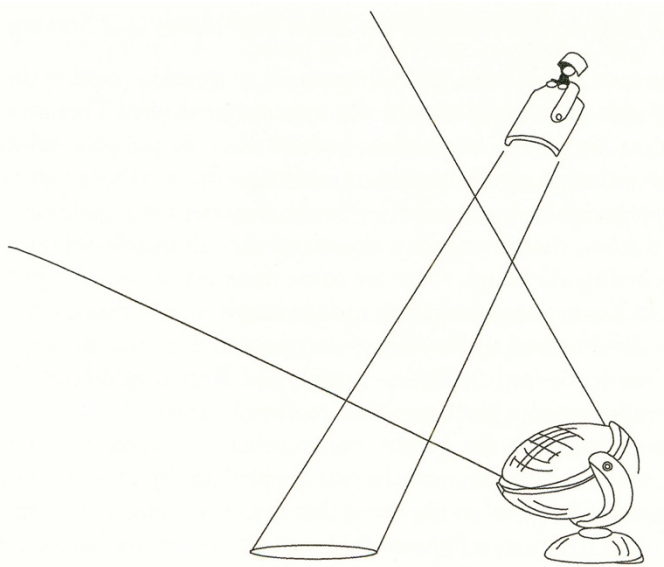


**Figure 5.1** The Spotlight and Floodlight Mind.

Floodlight thinking, on the other hand, reaches upward and outward without clearly defined borders or limitations. The floodlight thinker is free to let his or her imagination wander without the confinements or limitations that usually lead to conformity. Both types of thinking are valuable, and to pursue one at the expense of the other is dearly a disservice to the young people for whose development we are responsible. This description of divergent thinking should not lead teachers to believe that opportunities for creative thinking are undisciplined or disorderly. Meeker (1969) has pointed out that "divergent generation does not proceed willy-nilly; the divergent thinker is not a scatterbrain; the worthwhile generation of information requires discipline and guidance" (p. 32).

A second starting point to providing teachers with guidance about encouraging more creative thinking in their classrooms is crafting a classroom atmosphere where divergent thinking is valued, where teachers model divergent thinking by asking open-ended questions and encouraging their students to do the same thing. In describing the role of teachers in this regard, Starko (1995) emphasized the distinction between teaching for the development of creativity and creative teaching. She concluded that effective teachers who develop students' creative thinking know how to use techniques that "facilitate creative thinking across disciplines and provide a classroom atmosphere that is supportive of creativity" (p. 17). Other studies, including a meta-analysis study by Rose and Lin (1984) and a research synthesis by Torrance (1987), indicate that

training in divergent thinking is associated with increased creativity, involvement in creative activities, and positive feelings toward school.

The third and perhaps most important starting point is that teachers themselves must become more creative, not in the sense of becoming artists or poets or inventors (which they very well might want to pursue), but in *the creative act of teaching*. Therefore, a focus of this chapter is on applying the basic strategies of creativity training to curriculum modifications in their classrooms. Gandhi once said, "You must be the change you wish to see in the world." I would like to modify this quote slightly by saying that: "You [the teacher] must be the change that you wish to see in your students." In other words, the things you do in your teaching will reflect examples of the creative process in action.

## A Quick Overview of the Basic Principles and Strategies

In most cases, the first thought that comes to mind in seeking the solution to a difficult problem is seldom the most original idea. Therefore, *fluency*, defined as the ability to produce several ideas or possible solutions to a problem situation, is an important condition for creative production. The fluency principle, which underlies the development of most creativity training, maintains that fluency is a necessary, though not sufficient, condition for originality. Although there are some cases on record of highly creative products that have resulted from sudden inspirations, research on creativity in both children and adults strongly supports the fluency principle. Studies by Archambault (1970), Paulus (1970), and Baer (1996) have shown that initial responses to a given problem tend to be the more common or ordinary ones, and that the greater the number of responses generated in a problem-solving situation, the higher the probability of producing an original response (*original* in the sense that fewer students come up with that response). Therefore, a hypothetical curve of creativity for a given task or activity would show a gently sloping incline, with an increase in originality being related to an increase in the number of responses. For example, if we asked a group of students to list all of the utensils that people *might* use to eat with, their initial responses would no doubt include common utensils such as forks, spoons, and knives. But if we encouraged them to increase their lists by using their imaginations ("Suppose you didn't have any forks or spoons. What *could* you use?"), students would begin to explore some possible alternatives. They might suggest such items as sharpened sticks, shells, and bottle caps. If we compared the lists of several youngsters, we would find that most of the initial answers are quite common and that most of the students have given the same responses. As the lists grow longer, we would find more divergence occurring, and the probability of a youngster's producing an original response increasing. In other words, quantity generates quality, and research has shown that individuals who produce a large number of ideas are more likely to produce ideas that are more original (Bousfield & Barclay, 1950; Derks & Hervas, 1988; Runco, 1986). Originality is defined in research and, indeed, in most real-life situations as a statistical rarity. If everyone in our example above says that knife, fork, and spoon are eating utensils, we would not consider these responses to be statistically rare. But if only one student said that a bottle cap could be used as an eating utensil, we can consider this response creative because of its statistical infrequency in this particular problem-solving situation.

The questions you raise in your classroom can capitalize on the fluency principle by including a number of activities that generate a large number of responses. In opposition to the techniques of convergent production discussed earlier, these exercises should have no "right" or predetermined correct answer. Rather, they should be designed to encourage the student to

produce a large quantity of responses, and hopefully, practice in this mode of thinking will help free the learner from previously acquired habits of mind, which predispose him or her to rely mainly on recall and convergent thinking.

       The basic technique for increasing fluency of expression is called *brainstorming*. The first step in this process is to provide students with a problem that has many possible alternative solutions. Brainstorming can be carried out individually or in group sessions. During the early stages of a brainstorming activity, students should write or verbalize *all* thoughts and ideas that come to mind, no matter how silly, way-out, or wild the ideas may be. The best way to promote free-wheeling and offbeat thinking is to value quantity and withhold criticism and evaluation until students have exhausted their total supply of ideas related to a given problem. At that time you may then ask students to explain a response if you are unclear about the relevance of the response to the problem being addressed. This practice, known as the principle of deferred judgment (or unevaluated practice), simply means that judgment is deferred until the individual has had an opportunity to explore several possible answers or solutions to a given problem. The principle of deferred judgment, first elaborated on by Osborn (1963), has consistently been shown to be an essential ingredient for creative thinking. Several researchers (Amabile, 1985; Baer, 1996) have found evidence to support this claim. The main purpose of unevaluated practice is to free children from the fear of making mistakes.

       The following is a list of general questions (adapted from Arnold 1962) that can be used to spur students' thinking during brainstorming sessions:

**Other Uses**
    Can it be put to other uses as is?
    Can it be put to other uses if it is modified?

**Adaptation**
    What else is like it?
    What other ideas does it suggest?
    What could you copy?
    Whom could you imitate?

**Modification**
    What new twist can you make?
    Can you change the color, size, shape, motion, sound, form, and odor?

**Magnification**
    What could you add?
    Can you add more time, strength, height, length, thickness, value?
    Can you duplicate or exaggerate it?

**Minification**
    Can you make it smaller, shorter, lighter, lower?
    Can you divide it up or omit certain parts?

**Substitution**
    Who else can do it?
    What can be used instead?
    Can you use other ingredients or materials?
    Can you use another source of power, another place, another process?
    Can you use another tone of voice?

**Rearrangement**
  Can you interchange parts?
  Can you use a different plan, pattern, or sequence?
  Can you change the schedule or rearrange cause and effect?
**Reversibility**
  Can you turn it backward or upside down?
  Can you reverse roles or do the opposite?
**Combination**
  Can you combine parts or ideas?
  Can you blend things together?
  Can you combine purposes?

   These are only some of the questions that teachers and students can use to stimulate creative thinking during brainstorming. Once students have learned the basic brainstorming technique, you should encourage them to approach each activity with an idea-finding frame of reference. As a general rule, you should always encourage students to go as far as they can to come up with many answers to an open-ended question and use probing questions such as the above to extend brainstorming activity.

## Getting Started

If you have not previously carried out creativity training activities, a good way to get started is to walk students through an activity that demonstrates the difference between convergent and divergent thinking. The following sample activity has been purposefully designed to teach this distinction.

   *Today we are going to begin practicing a different kind of thinking. This kind of thinking will help us learn how to explore many different kinds of solutions to a given problem. Some problems and questions have only one right answer, but there are also many problems and questions that have hundreds of possible answers.*

   *Suppose I asked you, "Who was the first president of the United States?"* (Wait for an answer and write it on the white board.)

   *Are there any other possible answers to this question?* (General conclusion should be negative.)

   *Now suppose I were to ask you, "What are all of the possible ways that you might have come to school this morning?"* (Call on youngsters and list responses on the white board.)

   Students will probably give some fairly common responses ("walk," "bus," "car," "bicycle"). At this point, you might say:

*Remember, I said all of the possible ways that you might have come. Use your imagination. Let your mind wander, even if you think the method for coming to school is silly or unusual. How about by donkey or pogo stick?* (Add these to the list on the board.) You can emphasize this

point by grabbing a yardstick (conveniently placed nearby beforehand) and improvise with a few hops to demonstrate a pogo stick. Students will no doubt become a little noisy and even express some laughter, but it is very important to tolerate these reactions. If you hush them, the whole atmosphere of freedom you want to create will be lost, and they will subjectively think that this new kind of thinking is the same old "right answer" game.

This point is extremely crucial to introducing creativity training to your students. By suggesting the donkey and the pogo stick, you have accomplished three very important objectives. First, you have conveyed the idea that answers need not be feasible, practical, or realistic. Second, you have let youngsters know that you will accept these kinds of answers. Third and perhaps most important, you have let the youngsters know that you are capable of some way-out ideas.

After your examples, students may give a wide variety of answers. Let them call out their answers (rather than raising hands) as you write them on the board. Prompt students if necessary:

> *Are there any other way that you might come to school? How about on an airplane or in a rocket?*

A second crucial factor at this point is the generous use of praise on your part. Enthusiastic comments such as "good," "great," and "fantastic" will help youngsters open up. Do not call on students who are not taking part. It takes some youngsters longer than others to trust the teacher and their classmates in this type of atmosphere. The main idea is to let students know that you like what is going on and that you are having fun. When the flow of responses begins to slow down, say:

> *Let's go one step farther. Suppose you could change your size or shape. Can you think of some other ways that you might possibly come to school?*

If no one responds, say: *Could you make yourself very tiny and come in your brother's lunch box? Could you change to a drop of water and come in through the drinking fountain? Could you come in as an app in your friend's cell phone?*
Continue to fill the board as long as the youngsters are generating responses. When you finally call a halt, say:

> *I guess there really are many questions and problems that have several possible answers. ls the question different from the one about the first president of the United States? Do you think this kind of thinking is fun?*

This activity is an excellent way of teaching students the difference between convergent and divergent thinking without dwelling on the rituals of a formal definition.

Next, you might want to say: *From time to time, we are going to be working on some activities like the one we just did. The main purpose of these activities will be to practice answering questions and solving problems that have many possible answers. We will be using our imaginations to come up with some clever new ideas.*

# The Principle of Mild Competition

Although a great deal has been written about the dangers of high-pressure competition in the classroom, research with various curricular materials has shown that *mild* competition is a positive nutrient in motivating students to become involved in learning activities. The use of simulations and learning games to promote learning is based on the finding that game-like activity is one of the child's preferred ways of learning (Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012). Several researchers have investigated the relationship between children's play and creativity. For example, Li (1985) found significant gains in preschool children's creativity after being exposed to play training. Mellou (1995) examined the literature on the relationship between dramatic play and creativity and concluded that most of the research supports a positive relationship between them, noting the alternative symbolic constructions and flexibility common to both. In a research synthesis on creativity processes in children that are predictive of adult creativity, Russ (1996) also concluded that the relationship between children's play and creativity is strong.

We have made an attempt to capitalize on the motivational benefits of game-like activity by suggesting that certain exercises be carried out under mildly competitive conditions. This approach will introduce an element of excitement into the program and give youngsters an opportunity to pursue classroom activities in their preferred manner of learning. To avoid the dangers associated with high-pressure competition, you should use caution when employing the mildly competitive mode. You should observe ·the following general rules whenever you introduce competition into creativity training activities.

1. Group competition should be used rather than individual competition.
2. Grades or other material rewards should never be associated with competitive activities. Students will derive satisfaction from the competitiveness itself and the excitement of winning or trying to win.
3. Teams should continually be rearranged in a way that allows all youngsters an opportunity to be on a winning team.

You will, of course, have to experiment to determine the best ways for operating in the mildly competitive mode. A good deal of the art of teaching is in knowing your students and in using classroom management procedures that are especially applicable to a given group.

A general strategy that you can use in follow-up discussions is intergroup competition. Prior to assigning a particular exercise or after an exercise has been completed, divide the class into several small groups that can then compete with each other on the basis of: (1) the greatest number of team responses, and (2) the most original responses (i.e., statistically rare responses that other teams did not think of). A team's score would consist of one point for the total number of responses generated by all team members (including duplications) minus a given number of points for each response that appears on another team's list. Slowly increasing the number of points for unusual responses will encourage the students to strive for originality as well as quantity of responses. Students might like to keep a scorecard on the bulletin board to record team progress. Competitive follow-up activity of this type is probably most appropriate for exercises that emphasize the quantity of responses rather than the production of a story, invention, or piece of artwork.

## The Principle of Cooperation

Researchers have found that activities involving team collaboration help youngsters increase their creative productivity (Fleming, Mingo, & Chen, 2007). You should allow students to work on some activities in pairs or in small groups, and students should direct their efforts toward the production of group as well as individual responses. Group activities provide an opportunity for youngsters to "piggyback"[1] on other students' responses and learn cooperation and the benefits of bringing several minds to bear, on a particular problem. They also provide opportunities for you to develop leadership skills and help less creative youngsters experience success by working cooperatively with more highly creative individuals. Since you can use many of the activities in the data base mentioned above for both individual and group work, it is important for you to review each activity before using it with students. Field tests have shown that the teacher is the best judge of the conditions under which the class works best, and therefore the teacher should decide when it is best to use creativity training activities with individuals, groups, or both.

## The Importance of Classroom Atmosphere

The success of any creativity training program depends on the amount of freedom and flexibility that exists in the classroom. The very nature of creativity requires that students be allowed to express their thoughts and ideas in a warm and open atmosphere. Teachers should encourage their students to play with ideas, laugh, and have fun without worrying about being graded and evaluated when they are engaged in creativity-training activities. Rogers (1969) emphasized the importance of freedom from the threat of evaluation and asserted that creativity can be fostered by establishing psychological safety through the unconditional acceptance of each individual's worth. When you encourage youngsters to express themselves in an uninhibited manner, it is extremely important that you also provide them with a climate that is free from external evaluation and the critical judgments so often associated with schoolwork. The importance of providing this free climate is supported by the research of Amabile (1996) and Lepper, Greene, and Nisbet (1973) who found that extrinsic motivation undermines students' creativity, and Amabile identified factors of intrinsic motivation that impact students' performance on creative tasks. Since no right answers are prescribed for this type of creativity training, students have the opportunity to work in an open atmosphere without the constant threat of failure hanging over their heads.

The most effective way to open up the classroom atmosphere is to minimize formal evaluation and lead students in the direction of self-evaluation. In the real world, people often judge things in terms of self-satisfaction and the degree to which they, as individuals, like or dislike the things they do, the products they purchase, the books they read, or the products they produce. The only way that we can teach students to become self-evaluators is to give them numerous opportunities to judge their own work and to modify their work when they are not satisfied with it. On occasion, peer reactions may spur further originality. For example, you might say: *"Of all the examples about the best ways to come to school today, which one(s) do you think were the most original?"*

As mentioned earlier, unevaluated practice simply means that judgment is deferred until the individual has had an opportunity to explore several possible answers or solutions to a given problem. Creating such an atmosphere in the classroom is far easier said than done, but there are

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[1] "Piggybacking" simply means that the response of one person gives rise to a response(s) on the part(s) of others.

some specific strategies that teachers can use to help promote an environment that is more supportive of creativity. The most important strategy is to be tolerant and respectful of children's ideas, questions, and products. You should show interest, acceptance, and excitement toward student responses and avoid expressions of shock, surprise, annoyance, or disinterest. Above all, never laugh at or make light of a youngster's responses, and try to discourage teasing and laughter from other students. Healthy amusement and friendly competition will help promote a supportive atmosphere, but ridicule and scowls will have a negative effect. Each student must come to believe that his or her ideas are as valuable as the ideas of others. One of the hardest things to control in the classroom is the spontaneous laughter that may arise when a student says something that is somewhat unusual. A good way to overcome this problem is to legitimatize laughter by showing students that you also have some way-out ideas and that you do not mind if the students laugh when you express them. If you demonstrated an improvised pogo stick as suggested in the Getting Started section earlier in the chapter, you undoubtedly noted an expressive reaction on the parts of your students. This activity has been found to be an extremely effective way to legitimatize laughter and show students that you are not afraid to express unusual ideas or actions. Whenever possible, participate in written and oral activities and set the pace by contributing your own unusual responses. Your contributions will help students realize that you are a human being and that you are not afraid to express yourself freely. Remember, you set the limits on student behavior. If you actually participate in creative activities, students will learn that you value your own creative behavior, and they will quickly begin to display their own creative thoughts.

Another strategy aimed at promoting an environment that encourages students to be creative involves the principle of rewarding desired types of responses. If you show generous praise for quantity and unusualness of responses, students will quickly recognize the types of behavior that you value and they will strive to achieve these types of behaviors.

You can increase creative production by combining the fluency principle with the reward principle and the principle of unevaluated practice. In follow-up discussions to creativity-training activities, you should praise individual responses and give generous praise to the sheer quantity of response. Remember that an increase in fluency will almost always result in a corresponding increase in flexibility and originality. Consequently, you should develop a repertoire of enthusiastic fluency-producing comments, such as: *"That's really good. Can you think of a few more?"* and *"Let's see who can come up with five more possible titles for Bill's picture."* Don't be afraid to make up a few new words (for example, *"fantabulous," "super-great"*) to show your enthusiasm. Gently probing youngsters for more and more responses will help them develop a fluency mindset, and hopefully, practice in this mode of thinking will carry over to other areas of learning and experience.

You should make every effort to avoid using phrases or expressions that are natural "killers" of creativity. Examples of such phrases include:

> Don't be silly.
> Let's be serious.
> That's ridiculous.
> Quiet down.
> The principal won't like it.
> Let's be practical.
> You should know better.
> What's the matter with you?

Thar's not our problem.
We've tried that before.
That's not part of your assignment.
That's childish.
A good idea but ...
It won't work.
Don't be so sloppy.

One of the underlying purposes of creativity training is to help youngsters learn how to evaluate their own creative products. One of the great tragedies of traditional school instruction is that students almost always look to the teacher for evaluation and approval. By so doing, they fail to develop a system of internal self-evaluation. And yet, psychological studies have revealed that each person has a need to be his or her own primary evaluator. The nature of creativity is. such that the individual produces something that is new, unique, or novel for him or her at a particular point in time (Beghetto & Kaufman, 2007). To break away from social pressure toward ordinary and common production, a person must place his or her own opinions and feelings above those of others. He or she must be satisfied with his or her products and feel that they express a part of his or her feeling, thoughts, and ideas.

One of the primary goals of developing creativity is for teachers to prepare young people to learn how to make judgments about their own work. This task is undoubtedly one of the most difficult challenges of teaching, but there are a few simple guides that you can use to help students evaluate their own work. When students look to you for judgment, you might ask:

*What do you think about it?*
*Do you feel good about it?*
*Would you like to work on it some more?*
*Why do you like (or dislike) it?*
*What things (criteria) are important to you?*
*How would you compare it to the work you did last time?*

Encourage students to compare their own products by ranking them and selecting the ones they like best. Students should learn that you respect their judgment and will not overrule that judgment by placing your evaluation above their own. This behavior does not mean that you should not comment and make suggestions, especially about the relevance of a student response to the problem or question being addressed. Students should always be given an opportunity to explain relevance in their own words. But they should also understand that you are stating your opinion and there is no reason to assume that it is more important than theirs. Since there are no right answers to creativity exercises, and since students should not be graded on their creativity or creative products, training activities provide a real opportunity for students to develop self-evaluation techniques. The keyword in this process is trust. If students think that you will consider their creative activities in their final grades, they will constantly look to you for what they believe to be the ultimate source of judgment.

Peer evaluation can also provide students with a source of feedback. This feedback should always be informal, and it should be related to the type of product involved. For example, in writing a humorous ending for an unfinished story activity or a cartoon caption-writing activity designed to stimulate humor, the amount of laughter the student elicits from the class is

the best kind of real-world assessment that one can receive. You should encourage students to add their own praise to other children's responses, and their spontaneous reactions should be a regular part of all follow-up discussions.

A final consideration in the creation of a free and open classroom atmosphere is the acceptance of humor and playfulness. When you purposefully ask youngsters to strive for clever and unusual responses, a good deal of healthy noise and whimsical behavior is likely to result. The creative adult has the same uninhibited expressiveness and spontaneity found in happy and secure children. Creativity time should be a fun time, and playfulness, impulsiveness, humor, and spontaneity are all part of having fun.

## PART 2: CREATIVITY APPLIED: DEVELOPING YOUR OWN ACTIVITIES THROUGH AN INFUSION-BASED APPROACH TO CURRICULAR MODIFICATION

This section deals with an infusion-based approach to promoting creativity within the context of the standards-based or "regular curriculum." We do not criticize or recommend throwing out basic curriculum, current practices, programs, or projects if they are currently producing positive results in both achievement and joyful learning. Rather, the approach recommended here attempts to strike a balance between traditional approaches to learning and approaches that promote creative thinking skills, hands-on learning, and original thinking on the parts of all students. Our goals are to minimize boredom and school "turn-offs" and to improve achievement and creative productivity by infusing what I call the Three E's—Enjoyment, Engagement, and Enthusiasm for learning—into the culture and atmosphere of a school, the tool bags of teachers and administrators, and the mindsets of students.

An Infusion-Based Approach simply means that teachers will (1) examine opportunities to create and select highly engaging open-ended activities related to particular topics; (2) infuse these activities into the curriculum to make the topics more interesting; and (3) provide support and encouragement for individuals and small groups who would like to extend their pursuit of the teacher-designed activities. The infusion process described here is your opportunity to apply the material described earlier in the chapter to your own challenge of becoming a more creative teacher.

A few examples will show how this Infusion-Based Approach works. A Creative Idea Generator that uses the following guidelines is distributed to individuals or small groups of teachers, and they are asked to focus on a topic within their prescribed curriculum that is generally based on acquiring and memorizing facts, concepts, or other forms of received knowledge. Teachers are asked to keep in mind the concepts listed above (Other Uses, Adaptation, Modification, etc.)[2] and apply as many of the following criteria as possible to the brainstorming process.

1. The activity has a relationship to one or more regular curriculum topics.
2. There is not a single, predetermined correct answer or solution to the problem raised in the activity.
3. The activity consists of something students do rather than sit and listen to.
4. The activity is fun for most students.
5. The activity should lead to some form of product development on the parts of students who show an interest in the topic.

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[2] It is a good idea to have printed copies or a poster with these concepts readily available while brainstorming.

6. The activity has various levels of challenge to which interested students can escalate if they would like to creatively extend the interest through follow-up activity.

The examples that follow illustrate how the generator has been used by teachers to infuse creative activities into regular curricular topics. Figure 5.2 is an example of how a group of teachers used the Creative Idea Generator to brainstorm interesting creativity and thinking skills activities that could be infused into a typical memory-oriented curricular topic in geography.
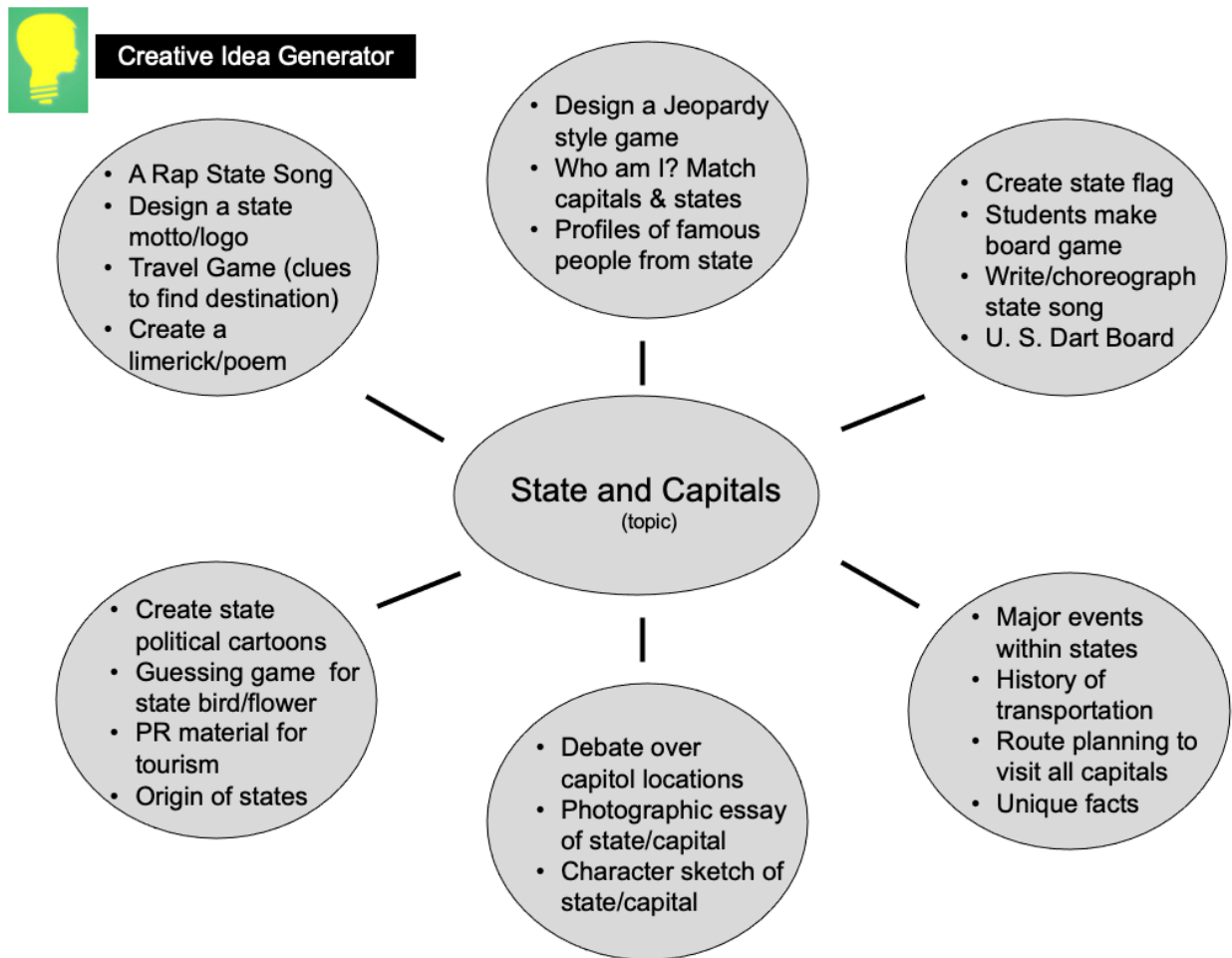
**Creative Idea Generator**

- A Rap State Song
- Design a state motto/logo
- Travel Game (clues to find destination)
- Create a limerick/poem

- Design a Jeopardy style game
- Who am I? Match capitals & states
- Profiles of famous people from state

- Create state flag
- Students make board game
- Write/choreograph state song
- U. S. Dart Board

**State and Capitals**
(topic)

- Create state political cartoons
- Guessing game for state bird/flower
- PR material for tourism
- Origin of states

- Debate over capitol locations
- Photographic essay of state/capital
- Character sketch of state/capital

- Major events within states
- History of transportation
- Route planning to visit all capitals
- Unique facts

**Figure 5.2** Creative Idea Generator (Geography).

The teachers in this example were required to have their students memorize the names of all the states and capitals in the United States. To make the assignment more interesting, they brainstormed potential activities related to this topic and gave their students an opportunity to select an activity that the latter would like to pursue based on their interests and learning styles. One group of students interested in music chose to develop a rap song for their state's official anthem. Another group interested in history decided to develop historic site maps, posters, and travel brochures for a state they had visited or would like to visit some day. A third group used state-shaped cookie cutters to make an edible map of the United States, using chocolate bits to designate the locations of each state's capital. This group was so enthusiastic that they extended their work by starting a small cookie-making business. They visited other classrooms, accepted

donations that were used to buy supplies for the school store, and provided brief historical facts and points of interest about some of the states in which other students expressed an interest. This follow-up is a good example of the creative extension mentioned in Guideline No. 6 above.

A second example of how the Creative Idea Generator was used by a group of primary grade teachers to make the topic of teaching the alphabet more interesting and creativity oriented is presented in Figure 5.3. In this case the teachers were in a school that had adopted Howard Gardner's well-known work on Multiple Intelligences (Gardner's, 1983) as a school-wide theme. Note that the suggested activities listed in Figure 5.3 range across several levels of complexity, but that all activities provide students with an opportunity to engage in some level of the creative process related to learning the alphabet. Also note how the several intelligences of Gardner's theory are accommodated.
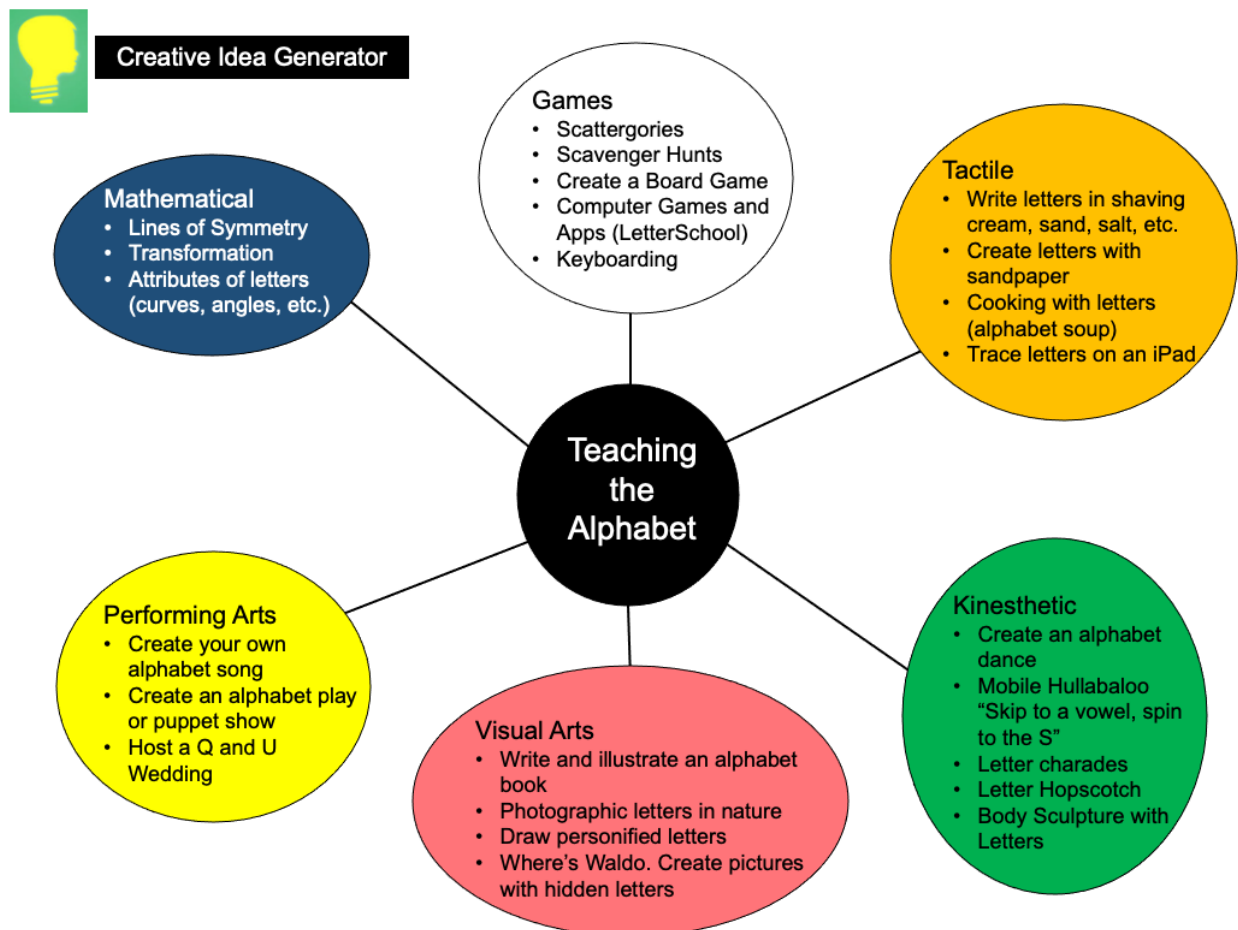


**Creative Idea Generator**

**Games**
- Scattergories
- Scavenger Hunts
- Create a Board Game
- Computer Games and Apps (LetterSchool)
- Keyboarding

**Mathematical**
- Lines of Symmetry
- Transformation
- Attributes of letters (curves, angles, etc.)

**Tactile**
- Write letters in shaving cream, sand, salt, etc.
- Create letters with sandpaper
- Cooking with letters (alphabet soup)
- Trace letters on an iPad

**Teaching the Alphabet**

**Performing Arts**
- Create your own alphabet song
- Create an alphabet play or puppet show
- Host a Q and U Wedding

**Visual Arts**
- Write and illustrate an alphabet book
- Photographic letters in nature
- Draw personified letters
- Where's Waldo. Create pictures with hidden letters

**Kinesthetic**
- Create an alphabet dance
- Mobile Hullabaloo "Skip to a vowel, spin to the S"
- Letter charades
- Letter Hopscotch
- Body Sculpture with Letters

**Figure 5.3** Creative Idea Generator.

Additional examples can be found in the brief descriptions of teachers who used the Creative Idea Generator to infuse open-ended activities into various subject areas at different grade levels. A middle grade math teacher had her students develop fictional fantasy baseball cards and analyze the players' statistics to facilitate the drafting and trading of players while building their own teams. One group of students drew caricatures of their players and a "Player Wheel" with geometric representations of player's strengths and weaknesses was created, and

they used the player wheel to play against other students' teams. A regular season schedule was set for the class, ending with a World Series game to decide the classroom champion.

A high school AP Physics teacher assigned a year-long project that encouraged students to use all of the concepts they covered in each unit of his course to addressing practical problems related to their project. A recent project by one group was to launch a platform containing a video camera, a GPS tracking unit, and weather data-gathering instruments into space. The platform was carried high above the Earth's surface by helium-filled weather balloons and the instruments gathered various types of atmospheric data while the camera recorded the entire experiment from lift off to touch down. Numerous examples of applied physics and real-world creative problem solving took place throughout the duration of this year-long project.

A middle school social studies teacher covering U.S. history used the Creative Idea Generator to help make history come alive. Her idea was to ask students to use the Internet to select and portray one person of interest for a Night of The Notables showcase event highlighting the lives of famous Americans from all walks of life (art, government, sports, pop culture, etc.). Students were required to research the life of the person, develop a 30-second "Who Am I" guessing game about their famous person, design a costume, prepare artifacts representing the person's life, and become that person for the evening. History became more meaningful as students created scenarios about their assumed identities, answered questions for parents and other students attending the showcase, and related information about the lives of the persons they selected to portray. They were not allowed to step out of character for the entire evening. This creative idea was so successful that other teachers in the school district adopted it for use in their own classrooms.

### Using Technology to Enhance the Infusion Process

We now have the tools to easily infuse engaging material and creative activities into the curriculum because of changes taking place in technology that have given us the potential to make formal learning a different process than it was a decade or two ago. Today's young people are digital learners and emerging masters of interactive media technology. Traditional ways of learning, even under the best of circumstances, cannot compete with students who find texting under their desks more engaging than listening to their teachers and professors or memorizing factual material for a forthcoming test.

Another development in technology that will aid infusion is the almost unlimited amount of information that is now available through the Internet. Thousands of free course-related materials are easily accessible through organizations such as the Khan Academy, which has produced more than 4,000 videos on topics across all grade levels and several curricular areas. The Massive Open Online Courses sponsored by some of the best-known universities in the country, including MIT's Open Course-ware program and Coursera, have produced thousands of courses that can be widely accessed without cost.

Changing the learning process and infusing more creativity development opportunities have now become a reality because of the almost unlimited access to the knowledge sources mentioned above. Teachers can also become creative contributors to the resource stockpile and the producers of their own televised lectures, course-related material, and media events. Free or inexpensive software now allows teachers to prepare and upload their own lectures and assignments, as well as creative activities for student use anytime and anywhere through the application of easy-to-use screen-casting software (e.g., Camtasia Studio 8, Screenflow

Software). They can also become creative contributors to the profession by sharing their innovative activities with other teachers through various forms of social media. A program called Juno (https://www.gofrontrow.com/products/juno-systems/) enables easy recording of high-quality audio/video clips without adding any extra work to a teacher's day. The program automatically adds titles, prepares files for uploading, and they can be accessed by computers, tablets, smart phones, or interactive white boards. And, as mentioned earlier, content recorded by others is readily available in all subject areas. These tools enable teachers to easily turn their lectures, creative activities, and related lesson-planning material into audio and video podcasts and printed course and video materials that can be easily uploaded for student access. We can capitalize on students' fascination and skills with technology and the availability of vast amounts of online material by giving teachers the license and the skills to infuse creativity and thinking skills activities into standards-driven curriculum.

While it is not practical to use infusion for every topic or course, the value of this approach is to make learning more engaging and to create an enthusiasm for learning that seldom results from merely covering the material in traditional ways. Finding activities for infusion is now easier than ever. Internet-based search engines allow teachers to search for topics, subtopics, and sub-subtopics by subject area, grade level, and difficulty level. A program called GoQuest (https://compasslearning.com/goquest/), developed at the University of Connecticut (Renzulli & Reis, 2007) and now marketed by Compass Learning, provides an electronic profile of each student's interests, achievement levels, learning styles, and preferred modes of expression. A search engine then scans through thousands of resources and matches these resources with individual student profiles. Teachers can also use the GoQuest program to identify literally thousands of high-engagement activities that direct them to an almost endless array of exciting open-ended enrichment activities. By using the aforementioned six guidelines when selecting activities that are specifically designed to promote creativity, especially the one that relates to "no single, predetermined correct answer," teachers can rest assured that these strategies serve as important criterion for selecting or developing creativity infusion activities.

## Conclusion

I first became interested in creativity in the 1960s when I ran across a mimeographed copy of the Minnesota Test of Creative Thinking, later to become known worldwide as the TTests of Creative Thinking (TTCT, Torrance, 1998). I began experimenting with my middle school students using activities that I designed to promote the kinds of divergent thinking measured by the TTCT, and later collaborated with Carolyn Callahan (Callahan & Renzulli, 1974) to conduct a research study that showed that we could indeed improve test scores through the use of these activities. The 250 activities, along with teacher's guides, were originally published as a five-book series (Renzulli, 1972) but are now available at no cost on our Web site: https://gifted.uconn.edu/schoolwide-enrichment-model/ndc/.

Among the hundreds of articles about creativity that I have read over the years, the one contribution that has been the most influential to my present way of viewing this complex concept is the previously cited article by Beghetto and Kaufman (2007). This article reinforces the intuitive belief that I have over time had that (1) creativity exists along a continuum, from small to larger manifestations, and that (2) providing young people with training activities will not only improve divergent thinking, but that some people, both young and older, will "climb up the scale" from mini-c to more advanced manifestations of creative output.

Society advances through innovation and the economic, social, and cultural success of any country based on the creativity of its people. Recent popular press commentaries about chief executive officers at major corporations worldwide identified creativity as the most important leadership quality of the future. The demand for creativity and innovative thinking is increasing and will fuel the economies and cultural growth of the future, yet historically, the education establishment has not focused on preparing all of our young people to become the innovative thinkers of tomorrow. There is a vast amount of research that clearly and unequivocally shows these skills can be enhanced and taught. There is a young Thomas Edison, Rachel Carson, and George Washington Carver in every school in the world, and the kinds of teaching discussed in this chapter describe easy-to-learn instructional practices that will find and nurture the creative potential that is so desperately needed to make the world a better place. Teachers must become the change they wish to see in their students, and administrators must value this kind of teaching by giving teachers the license to blend creativity development into a curriculum that has traditionally focused on acquiring received knowledge. New and better ideas lead to the kinds, of innovation that address the requirements of a rapidly changing world, and education leaders and policy makers are finally realizing that what happens in classrooms on a daily basis can play an important part in contributing to the world's reservoir of creative and productive people.

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