Professional
Development
for *Successful*
Classrooms

Instructional
Strategies
for
Diverse
Learners

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Chapter One
Brainstorming

Businesses use it all the time to develop new products, to improve existing products, and to solve marketing and advertising problems. Teachers use it to compel students to be creative and to solve real-life problems in the classroom.

Getting students to generate new ideas can be a difficult task, even for the best teacher. Many students are afraid of letting others know about their ideas for fear of criticism. How can teachers get the creative juices flowing in their classrooms on a daily basis? One of the best ways is by teaching students how to brainstorm effectively.

Brainstorming is a method of thinking up new concepts, ideas, or solutions. Take the word *brainstorm* and separate the two words, *brain* and *storm*. To brainstorm means to use the *brain* to *storm* (or think of) creative problems. Alex Osborn, the advertising executive who is affectionately named the father of brainstorming, coined the word brainstorm back in 1939. He said that *storm* meant to take charge as "in commando fashion, each stormer audaciously attacking the same objective" (1953, p.297). Osborn believed that creative ideas should be expressed without any judgment or evaluation. He did not believe that one could be both creative and critical at the same time. Some of the ideas produced in a brainstorming session will be wild and crazy. Oftentimes, these ideas lead to the best solutions. Osborn said, "It is easier to tone down a wild idea than to think up a new one" (Davis, 1998, p. 174).

Brainstorming is a type of lateral thinking. Edward de Bono, a psychologist and professor of investigative medicine at Cambridge University, coined the term *lateral thinking. Vertical thinking* occurs when one solves a problem by going from one logical step to another logical step (De Bono, 1970). Lateral thinking comes from seeking solutions to problems through unconventional methods, as illustrated in Figure 1.1.

Figure 1.1: Lateral vs. Vertical Thinking
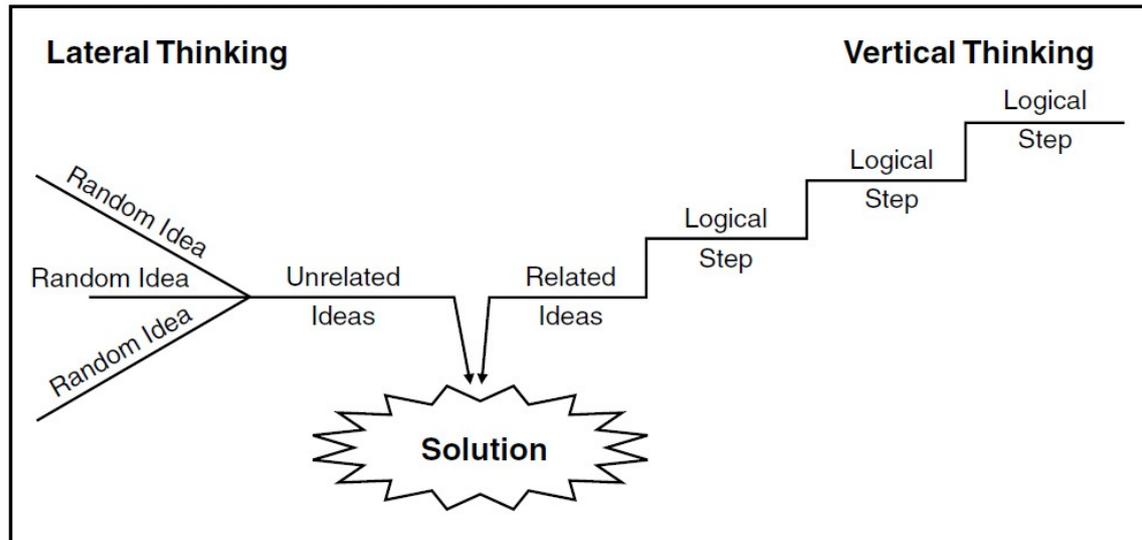
Our brains function very differently than computers. It takes years before we learn to do simple math problems, but it takes computers only seconds. The brain is a patterned recognition system, and we quickly and easily recognize faces, languages, and objects. It is easy to get stuck in our patterned way of thinking, but lateral thinking helps us to break out of this habit. Lateral thinking generates new ideas and concepts. Brainstorming helps students to break out of their patterned way of thinking and look at things in a new way.

Why Use Brainstorming?

Brainstorming strengthens a person's natural abilities, which improves both teamwork and productivity. Many believe that creativity is the most important human resource of all. Without creativity, we would see no progress and would be perpetually repeating the same patterns.

To understand the benefits of brainstorming, it might help to look at why so many businesses utilize it. Businesses use it with their employees to help produce creative solutions to problems. Someday many of your students will be called on in the workplace for creative ideas. Will they be able to meet the task? One thing we know is that those who are able to brainstorm will be able to solve problems more efficiently.

The main reason many people like brainstorming is because it generates so many ideas in a short amount of time. Whether it is a company looking for a new advertising campaign for a product or a classroom trying to decide how to raise money for charity, many ideas can be generated in just a matter of minutes.

It is important to know that creative thinking is a skill that can be taught

and learned. Brainstorming increases mental capacity to think creatively, which improves with practice. The more we practice thinking creatively, the more creatively we will think. It's a skill that can be used with any age group or learning level.

Creatively thinking individuals can see the best ideas when they arise. Many times these ideas are the crazy ones, but if seen in a creative light, they become the appropriate choices for the occasion. For example, how can a company keep from being bought out by a competitor? By giving things away for free! This very idea kept a software company from being taken over by Microsoft.

How to Implement Brainstorming

When brainstorming is done correctly, it taps into the brain's capacity for creative thinking. There are many ways a teacher can implement the brainstorming technique in the classroom. If the class has many students, divide it into small groups where students will feel more at ease. Another alternative is to have each student brainstorm an individual list and then share it with the class. Oftentimes, using individual brainstorming sessions can be just as productive.

To ensure a productive brainstorming session, here are some general guidelines:

1. Before getting started, formulate an open-ended question for students to brainstorm. It should not be too specific or have just one right answer. This question should be shared the day before the brainstorming session so that students can be thinking about it ahead of time.

2. Set aside a specific time for brainstorming. Brainstorming sessions should not last very long—five to 15 minutes should be enough time in the classroom.

3. No criticism should be allowed while brainstorming. All ideas should be written down, no matter how crazy they seem. Remember, some of the best ideas seem very crazy at first glance.

4. Students should not only contribute original ideas, but they should also build upon the ideas already presented. Some call this "piggy-backing."

5. Props like a grab bag of items can be used to stimulate creativity.

6. After the session is over, have students select the top three ideas and write about why they like these ideas the most.

After a brainstorming session, students should judge the ideas using some sort of criteria. These criteria can include questions like: *Will it work? Is it too complicated to implement? Will others accept it? Is it a temporary or permanent solution? Is it cost effective?*

Using criteria to evaluate the brainstorming results is helpful for many reasons. It helps to solve a problem in a reasonable way by which the class can agree upon the solution. Students will see that evaluating the results is a necessary part of the creative process. Evaluation helps students to consider many perspectives of a problem. It is also good for students to explore the values related to the problem. Finally, the evaluation process proves that some of the most far-fetched ideas are the best solutions to a problem.

For example, suppose a school has a very high tardy rate. A teacher might present the following question a day ahead of time to the class for brainstorming: *How can we get more students to arrive at school on time?* Before the brainstorming session, the teacher should remind students that there will be no criticism during the brainstorming session, one person will speak at a time, and all ideas will be considered. One by one, students' ideas should be recorded on the board. After five minutes, the teacher stops the group and they evaluate the ideas using set criteria.

Brainstorming can take on many variations. One variation is *stop-and-go brainstorming*. After five minutes of gathering ideas, the teacher can stop the group and then have the group briefly evaluate the ideas and then continue brainstorming with another evaluation after five minutes.

Another variation is called *reverse brainstorming*. The problem is turned around and students brainstorm for ideas to help them see new viewpoints. For example: *How can costs be increased? How can we stimulate tardiness?* With reverse brainstorming, students are actually listing the causes of the problem.

Brainwriting is a variation that helps students to hitchhike ideas from each other. Students should work in small groups. One student writes down a solution to the problem, then the paper is passed to another student who writes a completely new idea on the paper, modifies the original idea, or uses the original idea to stimulate another related idea. The process continues until the paper gets back to the original writer. Then the group evaluates the ideas on the paper.

Some teachers who have a technology-savvy group might want to try *electronic brainstorming*. These types of brainstorming sessions can be accomplished through electronic messaging, discussion boards, chat

rooms, or e-mail. This way no one has to wait in order to give an idea. With no face-to-face interaction, some students might be able to overcome their anxiety of criticism as well.

More Brainstorming Methods

Brainstorming not only can be used for creative problem solving, but it can also be used to generate a list of new ideas. This technique is called the *Attribute Listing Method*.

Robert Crawford, the designer of the Attribute Listing Method, believed that every time we take a creative step, we do it by changing the attributes of something. These attributes can then be modified (1954).

For example, if students want to create a new type of chips, they would first identify important attributes of chips with which they are already familiar. A chart can be made on the board with the following headings: *flavors, shapes, colors,* and *sizes*. Under each heading, students can list the qualities of chips. For example, under colors, students may list *orange, white, yellow, blue,* and *black*. Then, students think of ways to improve each attribute or good combinations can be chosen from the list.

If a toy store has an overabundance of scooters in its warehouse, students can be asked to change one or more parts of the scooters to make them really different in hopes of selling them. Students would list the parts of a scooter. Then under each part, changes would be listed in a chart format.

Suppose your school has bought all new desks. How can the old desks be put to use? First, have students list the qualities of a desk in a chart. Then, have them list the qualities or changes that they could make to the desks so that they can be used in another way around the school.

An extension of the Attribute Listing Method is *Morphological Synthesis*. A matrix grid is drawn with one attribute listed along the left hand side and another set of attributes listed along the top of the matrix. The two attributes or ideas combine in the cells of the matrix to create a new attribute or idea. Suppose students want to invent a new flavor of ice cream. Students can use the matrix grid on page 18 to create 100 new flavors of ice cream. A blank matrix grid is also provided on page 25.

Matrix Grid to Create New Flavors of Ice Cream

	vanilla	cake batter	bubble gum	berry	coconut	pineapple	coffee	cheesecake	rocky road	white chocolate
cherry										
strawberry										
peach										
lemon sherbet										
orange sherbet										
peppermint										
lime										
peanut butter										
cookie										
chocolate										

Brainstorming can be formatted into an idea checklist to help generate new products. One idea checklist is called SCAMPER (Osborn, 1953). Each letter stands for a way to change the product or item

S	Substitute—components, materials, people
C	Combine—mix, combine with other assemblies or services, integrate
A	Adapt—alter, change function, use part of another element
M	Modify, Minify, or Magnify—increase or reduce in scale, change shape, attributes
P	Put to another use
E	Elaborate or Eliminate—remove elements, simplify, reduce to core functionality
R	Reverse or Rearrange

Sample SCAMPER activity: First, read the passage below.

> The Ring Lady was a famous skeleton found by archaeologists in a boathouse in nearby Herculaneum, Italy (also destroyed and buried by Mt. Vesuvius in A. D. 79). Along with her skeleton were found two gold rings, two gold bracelets, and two earrings for pierced ears. Archaeologists have deducted that these articles were jewelry used by the woman. Thieves stole these jewelry items in 1990. Luckily, archaeologists had made pictures of her jewels.

Find a picture of the Ring Lady; then complete the following SCAMPER activity using the blank SCAMPER chart on page 24.

Substitute: If the Ring Lady did not have pierced ears, in what other way could she have used the earrings that archaeologists think were made for pierced ears?

Combine: Jewelry gives messages based on how it is made and what pictures it displays. On her ring was a strutting bird and on her bracelets were two snakes. If you could combine these images onto one piece of jewelry, along with anything else, what message would that piece of jewelry send?

Adapt: Imagine that the Ring Lady was allergic to gold. What could have been her purpose for having these gold jewelry items with her at the time of her death?

Modify/Minify/Magnify: Archaeologists believe that the Ring Lady was

"homely," but her elaborate jewelry shows that she was well cared for. What kind of feelings does this stir up in you toward the Ring Lady? How would your feelings change if she was described as a beautiful rich princess, or an ugly wretched witch, or a mean old stepmother?

Put to another use: Jewelry isn't only used for adorning oneself. What are some other ways that the Ring Lady's jewelry could have been used in everyday life?

Elaborate/Eliminate: The gold jewelry items were the only things by the skeleton that lasted for two thousand years, before the Ring Lady was discovered by archaeologists. What other items could have survived two thousand years with her body if she had chosen to be buried with them?

Reverse/Rearrange: Skeletons tell us many things about a person. Scientists know that she was female, 45 years old, and what she possibly looked like almost two thousand years ago. What if the Ring Lady had turned out to be a slave? What would the general public think about her?

Ideas for Classroom Brainstorming

1. **Brainstorming:** Suppose you just bought a pizza restaurant and want to expand your business to other countries. Your recent research reveals that people in other countries don't just like traditional toppings, such as cheese, pepperoni, and sausage. They want toppings of food found in their own culture. What kinds of toppings would someone who lives in Mexico like? What kinds of toppings would people who live in China like? How about in Saudi Arabia? Give each pizza a name and list its ingredients.

2. **Reverse Brainstorming:** There is a theft problem in your school. Try reverse brainstorming. What types of things can be done to make the theft problem worse in your school? Do any of these ideas give you some ways for making the school a theft-free place?

3. **Attribute Listing:** You are a writer/producer working for one of the major TV networks. They need a new idea for a show that would air on Saturday mornings. Make four columns. In the first column, list all the interesting characters you can think of. In the second column, list some ideas for plots (saving the planet, feeding the homeless, caring for pets) for the story line. In the third column, list problems that the characters might have, such as: they can't walk, they have no home, they have no power, or they are angry. In the fourth column, list some solutions that the characters find in the story, such as finding courage in unknown people, discovering hope in a hopeless situation, or

persuading others to change their minds. Finally, choose three characters from the first column and one or two ideas from the second, third, and fourth columns. Use these ideas to write a sketch for your Saturday morning show.

4. **SCAMPER** can be used with people or things from history. Try this activity with the Revolutionary figure of Abigail Adams:

Substitute: If Abigail Adams lived today, how would she communicate with her husband John Adams?

Combine: In your opinion, what other events in Abigail Adams' life would be interesting to know about?

Adapt: If Abigail Adams lived today, what modern figure would she resemble?

Modif/Minify/Magnify: What if Abigail Adams had not written any letters? How would we know about her life?

Put to another use: What if John Adams had used his legal training to prosecute the Boston Massacre defendants instead of defending them? How would the trial outcome have been different?

Elaborate/Eliminate: What if John Adams had not listened to his wife? How would her life have been different?

Reverse/Rearrange: What if the British had won the Revolution? How would John and Abigail Adams' lives have changed?

5. **SCAMPER** can also be used with books. Try this activity with the storybooks about the epic of Gilgamesh. The books are titled: *Gilgamesh the King, The Revenge of Ishtar, and The Last Quest of Gilgamesh* by Ludmila Zeman.

Substitute: The goddess, Ishtar, kills Gilgamesh's dear friend, Enkidu. Gilgamesh then sets out on a quest for eternal life. If you could change the reason that Gilgamesh sets out to overcome death, what would it be?

Combine: If you could combine Ishtar, the goddess of love, and Humbaba, the monster who hid in the forest, what kind of character would you have? Describe and draw this new character.

Adapt: Gilgamesh learned that the good he could accomplish in his kingdom during his lifetime was his immortality. How can this lesson that Gilgamesh learned be applied to you and your life?

Modify/Minify/Magnify: What if Gilgamesh had attained

immortality? How would the story have ended? Rewrite the ending of Gilgamesh, telling what he did with this immortality.

Put to another use: Utanapishtim offered Gilgamesh a plant that would keep him young, but not necessarily keep him from dying. If Gilgamesh had been able to keep this plant, how could he have used it in his kingdom for the good of his people instead of for selfish means? Write a persuasive letter to Gilgamesh urging him to follow your advice.

Elaborate/Eliminate: Gilgamesh's quest took him to the house of Siduri, who gave him directions to Utanapishtim, the only mortal to have attained eternal life. Eliminate the female tavern owner, Siduri, from the story. How else would Gilgamesh have found his way?

Reverse/Rearrange: Rearrange all three picture books in the opposite order in which they were intended. Could the story make sense if events were reversed? Create a flow chart with this rearranged story.

SCAMPER

S Substitute	C Combine	A Adapt	M Modify Magnify Minify	P Put to Other Uses	E Elaborate Eliminate	R Reverse Rearrange

Blank Matrix Grid

Chapter 1 Review

1. What are some general guidelines when brainstorming with a class?

    a. resist criticism

    b. set aside a specific time for brainstorming

    c. allow students to build upon ideas already presented

    d. All of the above

    e. only a and b

2. Why should we evaluate brainstorming using criteria?

    a. Students need to see that evaluation is a necessary part of the creative process.

    b. It is good for students to explore the values related to the problem.

    c. It helps students to consider many perspectives of a problem.

    d. Evaluation proves that some of the far-fetched ideas are sometimes the best solutions to a problem.

    e. All of the above

3. What are some ways to brainstorm?

    a. Morphological matrix

    b. SCAMPER

    c. Attribute Listing Method

    d. All of the above

4. True or False? All ideas should be judged immediately during a brainstorming session.

Chapter 2 Pre-Reading Reflection

1. What is a graphic organizer?

_____

_____

_____

2. Why do graphic organizers help students retain information?

_____

_____

_____

3. Why is a graphic organizer sometimes referred to as a "map"?

_____

_____

_____

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