

Exercises

R Epstein, University of California, San Diego, CA, USA

© 2011 Elsevier Inc. All rights reserved.

Glossary

Broadening Building skills and knowledge well outside of your current areas of expertise.

Capturing Preserving new ideas as they occur, without judging or editing them.

Challenging Seeking challenges and managing failure constructively.

Core competencies of creative expression Skills that are important for the expression of creativity in individuals. The four core competencies are: Capturing, Challenging, Broadening, and Surrounding (see separate definitions).

Creative problem solving A structured system for solving problems creatively, involving visionizing, attribute listing, problem finding, and other techniques.

Generativity Theory A formal, predictive theory of the creative process that asserts that new behaviors result from an orderly competition among previously established behaviors.

Hypnagogic state The semisleep state people experience when just falling asleep or waking up.

Managerial competencies for enhancing creativity Skills that help managers, teachers, and supervisors elicit creative

expression in other people. Eight important managerial competencies include: Encouraging the Preservation of New Ideas, Challenging Others, Encouraging the Broadening of Skills and Knowledge, Providing Diverse and Changing Physical and Social Environments, Managing Teams Appropriately, Providing Adequate and Appropriate Resources, Providing Positive Feedback, and Modeling Creativity Competencies.

Open-ended problems Problems that have an endless number of solutions. Almost all tasks and goals can be made open-ended by adding a phrase such as 'at least' to the description, as in: 'Please generate at least three names for this new product.'

Resurgence The reappearance of previously reinforced behaviors that occurs when a current behavior is no longer effective.

Shifting Allowing people to leave group or team meetings for short periods in order to work privately on idea generation.

Surrounding Surrounding oneself with diverse and changing physical and social stimuli.

Background

Exercises intended to enhance creative expression have been around since at least the 1940s, when Alex Osborn and Robert Crawford formed the first creativity development programs. In the 1950s, Osborn founded the Creative Education Foundation and the annual Creative Problem Solving Institute, and William Gordon and George Prince founded Synectics, precursors to dozens of training programs and consulting firms dedicated to enhancing creativity in both individuals and organizations. Today, many business schools have also incorporated courses on creativity and innovation into their curriculums, and thousands of companies and organizations, including the US military, feature creativity training in their training programs. Dozens of popular books, such as Julia Cameron's *The Artist's Way* and Michael Michalko's *Thinkertoys*, also promise to increase creativity. Exercises and games of various sorts play an important role in many of these efforts.

Osborn's 1953 book, *Applied Imagination*, described both the Creative Problem Solving technique, later updated by Sidney Parnes, and the now-ubiquitous practice called 'brainstorming.' Both were taught in part through exercises. In brainstorming, people work as a group to generate ideas following guidelines that increase creative output, the most important of which is to withhold judgment when someone voices an idea. Brainstorming groups strive for quantity of creative output,

deferring judgment until a later time. One can teach brainstorming by assigning tasks and problems to a group and then having them follow the guidelines. One can also show the power of the brainstorming rules by comparing the output of groups that follow the rules to groups that do not.

Although particular exercises are usually not evaluated, programs that employ exercises have been evaluated in a number of studies. In a paper published in 1972, E. Paul Torrance reviewed 142 studies that evaluated various creativity-enhancing techniques programs for children and students, many using the Osborn-Parnes Creative Problem Solving technique, concluding that 72% of them had produced positive results. In a review of additional studies published in 1987, Torrance found a success rate of 68%. More recently, Ginamarie Scott and her colleagues at the University of Oklahoma looked at 70 carefully selected training studies with both adults and children and concluded, unambiguously, that 'creativity training works.' This was confirmed in a similar study published by Hsen-Hsing Ma in 2006.

Creativity training studies tend to focus on problem solving abilities *per se*, but creative expression can also be enhanced in other ways: through play, incentive systems, altering the work environment, broadening people's knowledge, providing new resources, changing the feedback that people are given, forming and guiding teams in certain ways, and so on. Exercises can be used to teach all of these concepts.

A Scientific Framework for Understanding Creativity Exercises

Games and exercises for enhancing creativity can be organized into 12 categories suggested by Generativity Theory, a formal, predictive theory of the creative process first proposed by Robert Epstein in the 1980s.

According to this theory, which has been validated in both laboratory and applied settings, the behavior we call creative occurs as previously established behaviors (which also includes thoughts and ideas) become interconnected in various ways to produce blends and new sequences. The process of interconnection is both orderly and predictable; instantiated as a series of equations called 'transformation functions,' Generativity Theory can predict the emergence of novel performances in the laboratory moment-to-moment in time in both animals and people. According to the theory, creative behavior or ideas are especially likely to occur under circumstances that cause multiple behaviors to compete. Two situations invariably cause such competition: when behavior is ineffective and when organisms are exposed to multiple or novel stimuli.

In the laboratory setting, ineffectiveness is studied by first reinforcing behavior (say, with food if an animal is hungry, or with money if humans are being studied) and later by withholding reinforcement, a process called 'extinction.' All situations involving 'problems' are, by definition, extinction situations. Laboratory research shows that extinction affects both behavior and emotions in ways that are consistent with what typically happens when people solve problems. The primary effect of extinction is to weaken behavior: if a problem is sufficiently difficult, initial attempts to solve it fail, and ideas are rejected; in other words, behavior weakens. (If you can solve a problem quickly and easily, it's unlikely that much 'creativity' has occurred; previously established behaviors were apparently adequate for the task.) As behavior weakens, 'resurgence' takes place: other behaviors that were successful in similar situations in the past rapidly increase in probability. Now multiple behaviors (ideas, thoughts, images) are competing, setting the stage for interconnections. This dynamic process is typically felt as 'confusion'; if it continues long enough, more negative emotions are experienced, such as 'frustration.'

From this competition, both new sequences and new forms of behavior (blends) emerge in an orderly way; interconnection is the fuel of solutions to problems and the basis for all novel behavior, some of which is sometimes labeled 'creative.' (That label is applied by a community when it values the novel behavior; one can't label one's own behavior creative.)

Generativity Theory and related research suggest: (a) that virtually everyone has enormous creative potential; (b) that most people tend to express little creativity because of inhibitions created by socialization; and (c) that creative expression can be enhanced both through various environmental manipulations and by teaching people special skills (called 'creativity competencies').

Four core competencies of creativity expression flow directly from the theory: Capturing (preserving novel ideas as they occur, without first judging or editing them), Challenging (seeking challenges and managing failure constructively), Broadening (acquiring knowledge and skill well outside of

one's current areas of expertise), and Surrounding (surrounding oneself with diverse and novel physical and social stimuli). Because novel behavior occurs naturally and frequently, simply teaching people to preserve their new ideas (by jotting things down, keeping a notebook or recorder by one's bed, finding quiet places where one can listen to one's thoughts, etc.) often has a dramatic effect on creative output. Teaching people to seek challenges and to manage the negative emotions that often are produced in challenging situations sets the stage for resurgence to occur and for new ideas to emerge at a high rate. When people broaden their knowledge and skills, more diverse material is available for interconnection, and new ideas tends to be more interesting and unusual. And when people surround themselves with interesting and diverse stimuli, both social and physical, again, multiple repertoires of behavior compete with each other, increasing creative output.

The four core competencies are helpful for individuals. Eight competencies that allow managers and supervisors to enhance creativity in other people also flow from Generativity Theory and research:

1. Encouraging Capturing (encouraging people to preserve novel ideas, and providing resources that make it easy for people to capture such ideas);
2. Challenging Others (giving people difficult problems to solve and ambitious goals to reach);
3. Encouraging Broadening (providing training in areas well outside current areas of expertise);
4. Providing Diverse and Changing Physical and Social Environments (changing the work environment frequently, assembling diverse teams, and in other respects creating an interesting and stimulating environment);
5. Managing Teams Appropriately (assembling diverse teams, e.g., or 'shifting' team members out of the group periodically to work on problems on their own);
6. Providing Appropriate Feedback and Recognition (rewarding people for contributing new and valuable ideas);
7. Providing Adequate and Appropriate Resources (providing tools and supplies adequate to solving problems or generating new products or methods); and
8. Modeling the Core Competencies of Creative Expression (showing others that you, as a supervisor, practice what you preach).

Shifting people out of a team meeting to work on a problem on their own, even for a few minutes, can increase team creativity dramatically. While in the group, the presence of other people, although stimulating, also inhibits creative expression. When people shift out of a group, inhibitions are reduced, and people typically record many new ideas. When the group reassembles, people have a much larger pool of ideas with which to work. With even one brief shift (about five minutes), groups that shift tend to produce 50% more ideas than nonshifting groups.

Managers can challenge employees in many ways. One of the simplest and most effective ways is to make sure that all tasks, goals, and assignments are stated in an 'open-ended' fashion, meaning that what is requested has no set limit. Instead of asking for three new names for a product, for example, a manager can ask for *at least* three new names. Challenge can also be added to deadlines by adding phrases such as 'at the latest.'

All competencies for enhancing creative expression can be taught through games and exercises. Here, organized by competency area, are examples of such exercises.

Exercises that Boost Individual Creativity

Exercises can enhance four types of competencies that are important for creative expression in individuals, which Epstein calls the Core Competencies of Creative Expression: Capturing, Challenging, Broadening, and Surrounding.

Capturing

Exercises can quickly show people the value of capturing new ideas without judging them. Exercises can also help people learn to use a variety of materials to help them capture ideas on the fly and to identify places and times that facilitate capturing – to make use of the ‘Three Bs’ of creativity, for example: the Bed, Bath, and Bus. Some capturing exercises, such as simple daydreaming exercises, do little more than remind people that they have creative potential which they may currently not be exploiting. Studies of people who are famous for expressing creativity virtually always show that they have excellent capturing skills; they obsessively record new ideas on pads, memo recorders, napkins, or whatever is at hand.

Both Salvador Dali, the great Surrealist artist, and Thomas Edison, the most prolific inventor in history, got ideas by making deliberate use of the hypnagogic state – the semi-sleep state that everyone experiences at least twice a day. Dali would lay on a sofa, extending a spoon outward over the edge. On the floor beneath the spoon, he placed a glass plate. As he began to doze off, his hand released the spoon, and it fell to the plate and made a noise, which brought him back to full consciousness. If he had experienced interesting images during his brief hypnagogic experience, he would grab a pad and sketch. Edison got ideas for inventions by relaxing in a chair, holding steel spheres in each hand, beneath which were metal plates.

Although other competencies are important for enhancing creative expression, when people learn and practice capturing skills alone, their creative output sometimes increases by a factor of ten or more. No other competency increases creative output to such an extent.

Here are examples of relevant exercises.

Morning pages

Poet and artist Julia Cameron, author of *The Artist’s Way*, teaches people to enhance their creative output by doing stream-of-consciousness writing every morning: so-called ‘Morning Pages.’ Says Cameron, “Every morning, set your clock one-half hour early; get up and write three pages of longhand, stream-of-consciousness morning writing. Do not reread these pages or allow anyone else to read them. Ideally stick these pages in a large manila envelope, or hide them somewhere. Welcome to the morning pages. They will change you.”

Capturing a daydream

In *The Big Book of Creativity Games*, Epstein describes a simple daydreaming exercise: he instructs people to close their eyes, relax, and let their minds wander for a few minutes – in other

words, to have a daydream deliberately. When done in a group setting, almost everyone reports having a daydream, and some are quite bizarre. The exercise quickly demonstrates that daydreaming can be used intentionally for creative purposes. It also empowers; that is, it reminds people that even if they don’t normally express much creativity, the generative mechanisms that underlie creative expression are operating inside their heads every day.

The memory game

Another of Epstein’s exercises, ‘The Memory Game,’ shows what happens when people fail to capture. Some groups work on a simple problem – say, generating names for a new running shoe – without the aid of paper or recording devices. Other groups work on the same problem and have access to paper and pencils. After 15 minutes, both groups report on their best ideas. The groups that had access to paper will often report three times as many ideas as the groups without paper. The longer the work sessions, the greater the difference in creative output between the two types of groups.

Challenging

Most programs that promise to enhance creative expression do so by improving problem-solving strategies, and all of these programs incorporate exercises of some sort. Dozens of exercises used in the venerable Creative Problem Solving training program are collected in books such as Sidney Parnes’ *The Magic of the Mind* and its sequel, *Optimize the Magic of the Mind*. Popular creativity-enhancing books such as Edward de Bono’s *Lateral Thinking*, Tom Wujec’s *Five Star Mind*, and Roger von Oech’s *A Whack on the Side of the Head* are also filled with intriguing problems, as are thousands of books of puzzles, riddles, and mathematical challenges, some of which have been around for centuries.

As noted above, the ‘problem’ is a special case of a larger class of situations in which behavior (which includes thinking) is ineffective. The only way to be effective in such situations is to do something new, or at least to do old things in a new order; hence the connection between problem solving and creativity. Thus, any tough situation in which we don’t know exactly what to do is good for creativity, and so are exercises which (a) teach us to value and seek such situations, (b) teach us how to be more effective in such situations, and (c) teach us how to manage the unpleasant emotions we often feel in such situations, some of which can ‘block’ creative expression. Here are some representative examples:

The nine dots problem

Perhaps the most famous problem-solving exercise of all time, this is the exercise that gives rise to notion of ‘thinking outside the box.’ The problem solver is shown nine dots arranged in a square, three-by-three array and instructed to connect all of the dots by drawing four lines or less – without lifting his or her pen from the paper. Initially, people try to draw lines within the square, but they eventually discover (sometimes after experiencing considerable frustration) that the problem can’t be solved this way. The solution involves extending lines *outside* the square. The problem appears in a puzzle book published in 1914 and may have even earlier origins.

Half of eight

This is one of dozens of exercises used in the Osborn–Parnes Creative Problem Solving program. It appears in Parnes' book, *The Magic of the Mind*, and elsewhere. When asked, "What Is Half of Eight?" most people immediately reply, "Four." An instructor then asks for more creative replies, and people soon become aware of interesting possibilities: splitting the number 8 into two zeros (with a horizontal cut), for example, or into two threes (with a vertical cut). Employing problems of this sort, a Creative Problem Solving workshop teaches people new strategies for solving problems: visionizing (focusing on dreams and visions), forcing relationships among ideas or objects, listing attributes of a situation, and so on.

Wrestling with your voice of judgment

Negative emotions associated with solving problems or expressing new ideas can be debilitating. In this exercise, from *The Creative Spirit*, by Daniel Goleman, Michael L. Ray, and Paul Kaufman, one is instructed to close one's eyes and imagine hearing a negative statement, such as "You've never had an original idea." Then one amplifies and enlarges it "using laser lights, screaming rockets, full symphony orchestras, and choruses of disapproval," until the message is so big that it looks ridiculous. The exercise derives from a powerful technique used by clinical psychologists called 'flooding.' Michalko teaches a simpler exercise called 'Tick-Tock' that also aims to eliminate harmful thinking: on the tick of an imaginary clock, one writes one's fear; on the tock, one writes a positive thought that overcomes the fear.

Steel pipe

This is from former Stanford University professor James L. Adams' book, *Conceptual Blockbusting*: "Assume that a [4-inch-long] steel pipe is imbedded in the concrete floor of a bare room as shown below. The inside diameter is 0.06" larger than the diameter of a ping-pong ball (1.50") that is resting gently at the bottom of the pipe. You are one of a group of six people in the room, along with the following objects: 100' of clothesline, a carpenter's hammer, a chisel, a box of Wheaties, a file, a wire coat hanger, a monkey wrench, and a light bulb. List as many ways you can think of (in five minutes) to get the ball out of the pipe without damaging the ball, tube, or floor."

Stone soup

This is from creativity consultant Michael Michalko's book *Thinkertoys*: After you learn about an old fable in which a beggar asks villagers to imagine that the stone in his pot can make a delicious soup, you are challenged as follows: "List as many 'what if' scenarios as you can" and then "answer the questions posed by your scenarios." This is an example of an open-ended task with virtually no boundaries. Edward de Bono describes a similar game, called "The 'Why' Technique," in *Lateral Thinking*.

Egg drop soup

Web designer Stefan Mumaw and graphic designer Wendy Lee Oldfield's book *Caffeine for the Creative Mind* includes a classic design problem, sometimes given as a challenge to school children: "Create a container for an egg that will safely keep the egg from breaking when dropped from a two-story window.

The container can be made of whatever materials you deem appropriate. Draw a sketch of the container as if you were going to show a craftsman what your idea is and how to make it. Use a dotted line to signify where the egg would be, inside of the container, and callouts to describe what the materials are and what their functions would be."

Broadening

Exercises can also be used to teach people the value of broadening their knowledge and skills. Generally speaking, the more diverse a person's knowledge, the more interesting the behavioral interconnections – and, ultimately, the creativity.

Reading archaeologically

Choreographer Twyla Tharp recommends a unique way of broadening one's knowledge in her book, *The Creative Habit*. When you read a book that refers to an earlier book – maybe even one written long, long ago – read that one next. Then repeat. She calls this a 'reading dig.' A variation on this, called 'reading fat,' involves reading books related to the one you just read, and then, in turn, books related to those.

Imaginary lives

In *The Artist's Way*, renowned poet/artist/playwright Julia Cameron recommends that you generate a list of professions you might have led in other lives. Then, each week, she suggests *living* one of them to some extent. If you imagined yourself as a bus driver, you could read a pertinent training manual, for example – or even sign up for some *real* training.

Surrounding

Exercises can also help people learn the value of surrounding themselves with interesting objects and people, as well as the value of modifying one's environment regularly.

Artist date

In *The Artist's Way*, Cameron recommends that people go out on adventurous little dates every week. One possibility: "Take five dollars and go to your local five-and-dime. Buy silly things like gold stick-'em stars, tiny dinosaurs, some postcards, sparkly sequins, glue, a kid's scissors, crayons . . . Just for fun." Fresh environments stimulate thinking and lead to fresh ideas. Michalko recommends nature walks in his book, *Cracking Creativity*, for the same reason. An early trash compactor was invented when engineers got curious about how different animals handled their waste. Goats, it seems, compact it.

Create your own oracle

In his book, *A Whack on the Side of the Head*, creativity consultant Roger von Oech reminds us that in ancient times people consulted oracles or wise men to get new ideas or solve problems. You can create your own oracle, he says, by asking yourself a question, then generating some random information, and then interpreting that information as the answer to the question. For example, you might ask, "How can I become more creative?" and then open a book to a random page and point. I just did this and found the word 'Mexico.' Then interpret: Yes, visiting Tijuana for a few hours (I live fairly near the border) would definitely free up my thinking.

The Srtcdjgklerden Game

It's difficult to pronounce, and that's the point. In this game, from Epstein's *Big Book of Creativity Games*, people are asked to generate sentences as quickly as possible in reaction to random streams of alphabet letters called 'word ticklers.' Stick a dagger in a juggler? Sort your CDs from black to red? The possibilities are endless.

Selling a zork

In this exercise, Epstein also teaches the value of surrounding oneself, and especially one's work area, with unusual stimuli. A trainer first asks for a volunteer 'salesperson' to come to the front of the room. That person, the trainer explains, will soon have to try to sell a very unusual object to the audience for a large sum of money, explaining in detail why it's worth so much. Then the object – something absolutely bizarre that has no obvious function – is uncovered or displayed on a screen, and the fun begins. What's especially interesting in this exercise is that the salesperson virtually always has no trouble at all generating outlandish ideas almost immediately. Unusual stimuli generate unusual ideas.

Exercises That Help Managers to Enhance Creativity in Others

Exercises can also enhance eight types of competencies that help managers, teachers, and supervisors to elicit creative expression in other people, whether in small groups or large organizations.

Encouraging the Preservation of New Ideas

Just as individuals can learn the value of Capturing, managers can learn many ways to promote Capturing in an organization. They can use exercises, for example, to train people to capture their ideas. They can also create an environment in which people are simply more *likely* to capture their ideas; the employees themselves usually don't have such power. For example, a manager can equip everyone's computer with capturing software: 'new idea' boxes or icons that encourage people to record their new ideas on the fly. Managers can also provide free time for people to listen to their own thoughts and explore their ideas. Both 3M and Google are famous for allowing employees to spend part of their time every week exploring pet projects. Managers can also create physical spaces that promote capturing. At the famous Lockheed 'Skunk Works' where stealth fighters were invented, people could write on the walls, for example – a superb way both to promote capturing and to surround people with idea-generating stimuli.

Here are two pertinent exercises.

Brown paper caper

A stunning photograph in Hanley Norins' book, *Young & Rubicam Traveling Creative Workshop*, shows thousands of words and designs written on wide brown paper lining a 30-foot-long wall. To generate new ideas for a project, he often has people capture all of their thoughts on a 'problem-solving mural' of this sort. You can show people the benefit of wall writing by creating a large writing surface on a wall, giving

them a difficult problem to solve, and then having people use markers to record their ideas one at a time on the surface. With each new contribution, the group will be able to see how the ideas grow and develop over time. In some companies, erasable white boards are permanent fixtures on a great deal of wall space.

The anonymous suggestion game

This exercise, from *The Big Book of Creativity Games*, demonstrates a way of dramatically increasing the number of contributions people make to suggestion boxes in an organization. People are asked to suggest ways of solving a sensitive problem, such as how to reduce street crime. Some are given forms on which they must reveal detailed information about themselves; others are given forms that allow them to remain anonymous. The latter group will typically produce twice as many suggestions as the former. Given this outcome, people are asked to redesign their organization's present suggestion system. In an ideal system, people can submit suggestions anonymously, but the suggestions are coded in a way that allows people to claim them (and perhaps be rewarded for them) if they're later adopted by the organization.

Challenging Others

Managers can increase the creative output of employees by giving them difficult assignments, and all assignments, including easy ones, will produce more creativity if they are open-ended. When managers (or teachers or supervisors of any sort) are being trained or retrained, exercises can be used to teach these concepts. Perhaps equally important, managers also need to help employees deal with the frustration that often accompanies challenge. They can do this by teaching stress-management skills and by providing resources that help people manage stress. These concepts can also be taught with the help of exercises.

The lola cola game

This exercise, from *The Big Book of Creativity Games*, teaches the value of open-ended assignments. Teams are divided into two types, those who receive traditional closed instructions and those who receive open-ended instructions. Written instructions are distributed. The closed instruction is to invent three names for a new cola product; the open-ended instruction is to invent *at least* three new cola names. After ten minutes or so, the groups report on their creations. Typically, the open-ended groups will have devised at least twice as many names as the closed instruction groups. The difference in the instructions is then revealed, and a discussion follows. The critical question is: What if *all* assignments were always open ended? How much more would people produce and create?

Building bridges

Bridge-building exercises of various sorts are commonly used for team building and management training. In a typical scenario, teams are given equal quantities of newspaper and instructed to build a bridge between two tables. Sometimes, each team is divided in half, and each subgroup must build only half a bridge; the two halves must ultimately connect to each other. The first team to build a successful bridge wins the

exercise, or bridges can be judged according to how much weight they can support or other criteria. The exercise can then be repeated with the tables moved much farther apart, increasing the difficulty of the task. This kind of exercise not only builds teamwork, it also shows the power that challenge has to boost creativity.

The ultimate challenge game

In this exercise, also from Epstein's *Big Book of Creativity Games*, people are asked to propose solutions to extreme challenges, such as, "Give me at least three ways of flying people from here to the moon for the price of a New York subway token" or "Give me at least three methods for making birds swim and fish fly." No matter how difficult the problem, people generate solutions, and if the challenge is made open-ended, they will generate many solutions. The game can easily be adapted for the business environment: people can be asked to spend a few minutes each day generating solutions to ultimate challenges related to a particular business or industry.

The beastly boss game

In this exercise, from Epstein's *The Big Book of Stress Relief Games*, people learn the value of performing relaxation exercises when they're under stress. People divide into pairs and role play situations in which a Beastly Boss makes unreasonable demands of an Exemplary Employee. In some role plays, the employee subtly performs simple breathing exercises in order to stay relaxed. Without such exercises, the conversations often escalate; with the exercises, they do not. Exercises of this sort can be used to teach both managers and employees the value of stress-management training.

Encouraging the Broadening of Knowledge and Skills

Managers can teach people the value of broadening, and they can also use an organization's resources to make sure that people acquire new knowledge and skills. Some companies groom people for high management positions by having them work in different departments in the organization; the broad knowledge they acquire not only gives them a more informed picture of the organization, it also gives them the raw material they need to be more creative.

The experts game

Used in a group setting, this exercise, from Epstein's *Big Book of Creativity Games*, teaches the value of broadening. People from the audience who are experts on something very obscure (and there are always such people in every audience) are asked to give five minute, impromptu lectures about their unique knowledge – about hooking rugs, perhaps, or color-balancing a picture using Photoshop, or designing a nuclear reactor. Then everyone is asked to invent at least three new products based on the three kinds of new knowledge they just acquired. A colorful carpet with molecular designs, perhaps?

The amazing magazine game

Also from *The Big Book of Creativity Games*, in this exercise, individuals or teams are supplied with small stacks of widely different kinds of magazines. They're given time to read articles from each of the magazines and then asked to solve a

challenging problem using the new knowledge they've acquired. They can also be asked to design new products or services, or even to write a poem or story based on their new knowledge. A discussion about the value of broad training follows.

Providing Diverse and Stimulating Physical and Social Environments

Managers have enormous power to enhance creative expression through manipulation of the physical and social work environments. Diverse teams typically produce more and fresher ideas than homogenous teams. Interesting workspaces produce more and better ideas than dull ones. Most important of all, changing environments produce more and better ideas than static ones. Moving people or desks or posters around is unsettling to people, and that's the whole idea. In team meetings, people can temporarily become quite different people through role playing.

Here are exercises that demonstrate such concepts.

Six thinking hats

Creativity consultant Edward de Bono's exercise, 'Six Thinking Hats,' described in his book by that title, is a widely used role-playing technique that helps teams solve problems and generate ideas. It involves having people imagine wearing, and sometimes removing, each of six different hats that signal that one is to play a specific role in the discussion: the white hat signals that one is neutral and objective, the red hat that one is angry, the black hat that one is negative and gloomy, the yellow hat that one is positive and sunny, the green hat that one is creative, and the blue hat that one is cool and concerned with control issues. As a discussion proceeds, the team leader can ask people to remove a hat or to switch hats. The technique allows people to examine an issue from many angles, and it also brings out different sides and capabilities of people that otherwise might never appear. The value of the Six Hats technique can be demonstrated by having two sets of teams work on the same problem; one set uses the technique and the other does not. The work product of the two teams can then be compared. If time allows, the two sets of teams can then swap methods and take on a new problem.

Picture portfolios

This is an exercise from Michalko's *Cracking Creativity* which uses both pictures and other people's ideas as stimuli to help improve creative expression: "1. Read a problem statement aloud and ask the group to verbally brainstorm solutions. 2. Give each group member a folder containing eight to ten pictures that are not related to the problem area. 3. Instruct them to examine each picture and silently write down any new ideas or modifications of previous ideas suggested by the pictures. 4. After a designated time period, ask the group members to read their ideas aloud. 5. As each idea is read, ask the group to discuss it and try to develop more new ideas or modifications."

Airplanes

Also from *Cracking Creativity*, this exercise gives people a fun way to build on other people's ideas: "Have each participant

construct a paper airplane. Each participant writes down an idea on the airplane and sends it flying to another participant. Upon reading what's been written on the airplane, he or she writes down a modification or improvement of that idea, or an entirely fresh possibility, and then sends it flying to someone else. Continue the exercise for twenty minutes and then collect and categorize the ideas."

Managing Teams Appropriately

As noted above, one of the best ways to enhance team creativity is to ensure from the outset that the team membership is diverse. Michael Michalko suggests a dramatic way of assembling diverse teams: occasionally announcing 'open meetings' that anyone in an organization can attend, from custodians to accountants to CEOs. Once a team has been assembled, surrounding techniques such as Six Thinking Hats can improve process and output. Other rule systems, such as brainstorming, can also be helpful. Finally, since group settings will tend to inhibit creative expression in many people, team output can be greatly increased by having people shift out of a group one or more times to generate ideas on their own. Here are exercises that teach such concepts.

Brainstorming

First proposed by advertising executive Alex Osborn in 1938, brainstorming is the most widely used technique for generating new ideas in teams. Team members are instructed to follow simple rules to keep ideas flowing: express ideas freely; withhold making any kind of judgment, especially a negative one, about people's ideas; the team is seeking to generate a large quantity of ideas; quality concerns will come later. The power of this technique can be demonstrated by dividing people into teams that brainstorm and teams that do not. Then all of the teams work on the same problem for the same amount of time, after which results are compared. Typically, brainstorming groups will produce far more ideas than non-brainstorming groups.

The shifting game

Two sets of teams, Shifters and Togethers, are given the same naming task or a problem to solve. Over the next 15 minutes, the Togethers remain together to work on the task. Shifters team members spend five minutes together, then split up and work on the problem on their own for five minutes, and then reassemble for the remainder of the 15 minutes. Even though time has been wasted moving around, the Shifters will typically produce 50–100% more names or solutions than the Togethers. Although groups are stimulating, they also inhibit creative expression in many people, in part because people are afraid of receiving negative feedback in the group, but also because of criticism people have received throughout their lives. The shift makes it more likely that people will capture their own ideas. When the group reassembles, people usually pool their many ideas.

Providing Adequate and Appropriate Resources

It's difficult – sometimes even impossible – to express creativity unless you have access to adequate and appropriate resources.

If your job is to develop a new glue or medication, you'll only get so far without a well-equipped chemistry lab. Simple exercises can help managers and teachers see how this concept works in action. Here is an example:

Sticky business

In this exercise from *The Big Book of Creativity Games*, two sets of teams are supplied with equal amounts of wooden sticks or pieces of colored construction paper. One set of teams is also supplied with a full bottle of glue. The other set of teams are given glue bottles that are nearly empty. The task for all teams is to create at least one beautiful work of art. After 15 minutes, participants who have been appointed judges rate the creativeness of the artistic creations and also count the number that each team has produced. Teams lacking glue generally fare poorly in this exercise.

Providing Positive Feedback

Scientists sometimes debate about the value that positive feedback has for creative expression. Under some conditions with children, if creative expression is rewarded and then later rewards are no longer available for expressing creativity, the rate of creative expression may drop. That said, there is strong evidence that rewards, properly used as incentives, can greatly increase creative output. Adults routinely make discoveries or produce new books, works of art, musical compositions, products, or services in order to win awards, get praise, or earn money. What's more, even the slightest negative reaction to a new idea – say, a raised eyebrow – can have a devastating effect on creative expression, in some cases leading to blocks that can last for years.

In an organization, incentive and evaluation systems that recognize and reward creative contributions can help keep creativity flowing. Managers also need to use care when giving people feedback on their ideas. Here is a pertinent exercise from *The Big Book of Creativity Games*.

The tiny little nod game

This game shows that even very subtle feedback can have a big effect on behavior. People are divided into pairs in which one person chooses to be a speaker and the other a listener. The listener then writes down a target sentence that he or she wants the speaker to say. Listeners are told that they can't communicate with speakers in any way except to nod their heads very slightly up and down (in other words, signifying 'yes' but never 'no'). Participants are told that they have five minutes in which to try to reach the target sentence. Then speakers are told to start talking. Listeners are instructed to raise their hands when they hear the target sentence or something close to it. Remarkably, within the allotted time, at least a third of the pairs will reach the goal. If additional time is allotted, more pairs will reach the target. The speaker and listener can then switch roles.

Modeling Creativity Competencies

One of the best ways for a manager to stimulate creative expression in other people is to model the core competencies. People tend to imitate the behavior of others, especially the behavior or authority figures. Here is an exercise from *The Big Book of Creativity Games* that makes the point:

The green-and-yellow game

The instructor asks an audience to suggest names for two new soft drinks, one green and one yellow. As people raise their hands and make their suggestions, the instructor makes two lists on a blackboard or flipchart and also asks people to take notes. When suggestions for green drinks are made, the instructor records them accurately, but he or she records suggestions for yellow drinks less accurately, in abbreviated form, or not at all. After a fairly large number of suggestions have been made, the instructor erases the board or flips the page and then gets a rough count of how many green and yellow names people recorded. These numbers are compared to an accurate count that a designated person has made secretly. Because people tend to imitate authority figures, participants' notes will under-report names for the yellow drink. In this instance, people were imitating the instructor's uneven capturing skills. A discussion about the importance of being a good role model follows.

See also: Problem Solving.

Further Reading

Cameron J (1992) *The Artist's Way*. New York: G. P. Putman's Sons.
de Bono E (1985) *Six Thinking Hats*. Toronto, Canada: Key Porter Books Limited.

- Epstein R (1996) *Cognition, Creativity, and Behavior: Selected Essays*. Westport, CT: Praeger.
- Epstein R (2000) *The Big Book of Creativity Games*. New York: McGraw-Hill.
- Goleman D, Kaufman P, and Ray M (1992) *The Creative Spirit*. New York: Penguin.
- Ma Hsen-Hsing (2006) A synthetic analysis of the effectiveness of single components and packages in creativity training programs. *Creativity Research Journal* 18: 435–446.
- Michalko M (1991) *Thinkertoys*. Berkeley, CA: Ten Speed Press.
- Michalko M (1998) *Cracking Creativity*. Berkeley, CA: Ten Speed Press.
- Mumaw S and Oldfield WL (2006) *Caffeine for the Creative Mind: 250 Exercises to Wake Up Your Brain*. Cincinnati, OH: HOW Books.
- Mumford MD, Leritz LE, and Scott G (2004) The effectiveness of creativity training: A quantitative review. *Creativity Research Journal* 16(4): 361–388.
- Osborn Alex (1953) *Applied Imagination: Principles and Procedures of Creative Problem Solving*. New York: Charles Scribner's Sons.
- Parnes SJ (1997) *Optimize the Magic of Your Mind*. Buffalo, NY: Bearly Ltd.
- Scott G, Leritz LW, and Mumford MD (2004) The effectiveness of creativity training: A quantitative review. *Creativity Research Journal* 16: 361–388.
- Torrance EP (1987) Teaching for creativity. In: Isaksen SG (ed.) *Frontiers of Creativity Research: Beyond the Basics*, pp. 189–215. Buffalo, NY: Bearly Ltd.
- von Oech R (1990) *A Whack on the Side of the Head: How You Can Be More Creative*. New York: Warner.

Relevant Websites

- <http://MyCreativitySkills.com> – Epstein Creativity Competencies Inventory for Individuals (or ECCL-i).
- <http://CreativityInternational.com> – Creativity International.
- <http://DrEpstein.com> – Dr. Robert Epstein, Building Competencies Worldwide.