WHAT IS CREATIVITY?

An Ability. A simple definition is that creativity is the ability to imagine or invent something new. As we will see below, creativity is not the ability to create out of nothing (only God can do that), but the ability to generate new ideas by combining, changing, or reapplying existing ideas. Some creative ideas are astonishing and brilliant, while others are just simple, good, practical ideas that no one seems to have thought of yet.

An Attitude. Creativity is also an attitude: the ability to accept change and newness, a willingness to play with ideas and possibilities, a flexibility of outlook, the habit of enjoying the good, while looking for ways to improve it. We are socialized into accepting only a small number of permitted or normal things, like chocolate-covered strawberries, for example. The creative person realizes that there are other possibilities, like peanut butter and banana sandwiches, or chocolate-covered prunes.

A Process. Creative people work hard and continually to improve ideas and solutions, by making gradual alterations and refinements to their works. Contrary to the mythology surrounding creativity, very, very few works of creative excellence are produced with a single stroke of brilliance or in a frenzy of rapid activity. Much closer to the real truth are the stories of companies who had to take the invention away from the inventor in order to market it because the inventor would have kept on tweaking it and fiddling with it, always trying to make it a little better.

The creative person knows that there is always room for improvement.

NEGATIVE ATTITUDES THAT BLOCK CREATIVITY

1. Oh no, a problem! The reaction to a problem is often a bigger problem than the problem itself. Many people avoid or deny problems until it’s too late, largely because these people have never learned the appropriate emotional, psychological, and practical responses. A problem is an opportunity. The happiest people welcome and even seek out problems, meeting them as challenges and opportunities to improve things. Definition: a problem is (1) seeing the difference between what you have and what you want or (2) recognizing or believing that there is something better than the current situation or (3) an opportunity for a positive act. Seeking problems aggressively will build confidence, increase happiness, and give you a better sense of control over your life.

2. It can’t be done. This attitude is, in effect, surrendering before the battle. By assuming that something cannot be done or a problem cannot be solved, a person gives the problem a power or strength it didn’t have before. And giving up before starting is, of course, self fulfilling. But look at the history of solutions and the accompanying skeptics: man will never fly, diseases will never be conquered, rockets will never leave the atmosphere. Again, the appropriate attitude is summed up by the statement, "The difficult we do immediately; the impossible takes a little longer."

3. I can’t do it. Or There’s nothing I can do. Some people think, well maybe the problem can be solved by some expert, but not by me because I’m not (a) smart enough, (b) an engineer, or (c) a blank (whether educated, expert, etc.) Again, though, look at the history of problem solving.

Who were the Wright brothers that they could invent an airplane? Aviation engineers? No, they were bicycle mechanics. The ball point pen was invented by a printer’s proofreader, Ladislao Biro, not a mechanical engineer. Major advances in submarine design were made by English clergyman G. W. Garrett and by Irish schoolmaster John P. Holland. The cotton gin was invented by that well known
attorney and tutor, Eli Whitney. The fire extinguisher was invented by a captain of militia, George Manby.

4. But I'm not creative. Everyone is creative to some extent. Most people are capable of very high levels of creativity; just look at young children when they play and imagine. The problem is that this creativity has been suppressed by education. All you need to do is let it come back to the surface. You will soon discover that you are surprisingly creative.

5. That's childish. In our effort to appear always mature and sophisticated, we often ridicule the creative, playful attitudes that marked our younger years. But if you solve a problem that saves your marriage or gets you promoted or keeps your friend from suicide, do you care whether other people describe your route to the solution as “childish”? Besides, isn’t play a lot of fun? Remember that sometimes people laugh when something is actually funny, but often they laugh when they lack the imagination to understand the situation.

6. I might fail. Thomas Edison, in his search for the perfect filament for the incandescent lamp, tried anything he could think of, including whiskers from a friend’s beard. In all, he tried about 1800 things. After about 1000 attempts, someone asked him if he was frustrated at his lack of success. He said something like, "I've gained a lot of knowledge--I now know a thousand things that won't work."

Fear of failure is one of the major obstacles to creativity and problem solving. The cure is to change your attitude about failure. Failures along the way should be expected and accepted; they are simply learning tools that help focus the way toward success. Not only is there nothing wrong with failing, but failing is a sign of action and struggle and attempt--much better than inaction. The go-with-the-flow types may never fail, but they are essentially useless to humanity, nor can they ever enjoy the feeling of accomplishment that comes after a long struggle.

Suppose you let your fear of failure guide your risk taking and your attempts. You try only three things in a year because you are sure of succeeding. At the end of the year the score is: Successes 3, Failures 0. Now suppose the next year you don’t worry about failing, so you try a hundred things. You fail at 70 of them. At the end of the year the score is Successes 30, Failures 70. Which would you rather have--three successes or 30--ten times as many? And imagine what 70 failures will have taught you.

Proverb: Mistakes aren’t fun, but they sure are educational.

MYTHS ABOUT CREATIVE THINKING AND PROBLEM SOLVING

1. Every problem has only one solution (or one right answer). The goal of problem solving is to solve the problem, and most problems can be solved in any number of ways. If you discover a solution that works, it is a good solution. There may be other solutions thought of by other people, but that doesn't make your solution wrong. What is THE solution to putting words on paper? Fountain pen, ball point, pencil, marker, typewriter, printer, Xerox machine, printing press?

2. The best answer/solution/method has already been found. Look at the history of any solution set and you'll see that improvements, new solutions, new right answers, are always being found. What is the solution to human transportation? The ox or horse, the cart, the wagon, the train, the car, the airplane, the jet, the SST? Is that the best and last? What about pneumatic tubes, hovercraft, even Star Trek type beams?

3. Creative answers are complex technologically. Only a few problems require complex technological solutions. Most problems you'll meet with require only a thoughtful solution requiring personal action and perhaps a few simple tools. Even many problems that seem to require a technological solution can be addressed in other ways.
For example, what is the solution to the large percentage of packages ruined by the Post Office? Look at the Post Office package handling method. Packages are tossed in bins when you send them. For the solution, look at United Parcel. When you send a package, it is put on a shelf. The change from bin to shelf is not a complex or technological solution; it’s just a good idea, using commonly available materials.

As another example, when hot dogs were first invented, they were served to customers with gloves to hold them. Unfortunately, the customers kept walking off with the gloves. The solution was not at all complex: serve the hot dog on a roll so that the customer’s fingers were still insulated from the heat. The roll could be eaten along with the dog. No more worries about disappearing gloves. (Note by the way what a good example of changing direction this is. Instead of asking, "How can I keep the gloves from being taken?" the hot dog server stopped thinking about gloves altogether.)

4. **Ideas either come or they don’t. Nothing will help.** There are many successful techniques for stimulating idea generation. We will be discussing and applying them.

### MENTAL BLOCKS TO CREATIVE THINKING AND PROBLEM SOLVING

1. **Prejudice.** The older we get, the more preconceived ideas we have about things. These preconceptions often prevent us from seeing beyond what we already know or believe to be possible. They inhibit us from accepting change and progress.

   Example problem: How to connect sections of airplanes with more ease and strength than using rivets. A modern solution is to use glue--glue the sections together. We probably wouldn’t think of this solution because of our prejudice about the word and idea of glue. But there are many kinds of glue, and the kind used to stick plane parts together makes a bond stronger than the metal of the parts themselves.

   Another problem: How can we make lighter weight bullet proof windows? Thicker glass is too heavy. Answer: Use plastic. Again, we are prejudiced against plastic. But some plastics are not flimsy at all and are used in place of steel and in bullet proof windows.

   Another problem: Make a ship’s hull that won’t rust or rot like steel or wood. Solution: Use concrete. Our prejudice is that concrete is too heavy. Why not make lightweight concrete? That’s what’s done.

   Final example: How to divide a piece of cake equally between two kids so they won’t complain that one kid is preferred over the other: “You gave him the bigger piece; you like him better! Waaaah!” Solution: Put the kids in charge of dividing the cake. Our prejudice is that immature, selfish kids can’t do the job. But the solution, one cuts the cake, the other has first choice of pieces, works very well.

2. **Functional fixation.** Sometimes we begin to see an object only in terms of its name rather in terms of what it can do. Thus, we see a mop only as a device for cleaning a floor, and do not think that it might be useful for clearing cobwebs from the ceiling, washing the car, doing aerobic exercise, propping a door open or closed, and so on. (Later on in the semester, we will be doing "uses for" to break out of this fixation.)

   There is also a functional fixation of businesses. In the late nineteenth and early twentieth centuries the railroads saw themselves as railroads. When automobiles and later airplanes began to come in, the railroads didn't adapt. "That's not our business," they said. But if they had seen themselves as in the people transportation business rather than in the railroad business, they could have capitalized on a great opportunity.

   Similarly, when the telephone began its rise, some of the telegraph companies said, "That's not our business; we're telegraph companies." But if they had said, "Hey, we're in the communication business, and here's a new way to communicate," they would have grown rather than died. Compare Western Union to AT&T. And have you heard of those big calculator companies Dietzgen or Pickett? No? Well, they were among the biggest makers of slide rules. But when electronic calculators began to rise, they didn’t know what business they were in. They thought they were in the slide rule business, when they were really in the
And there's a functional fixation of people, too. Think a minute how you react when you see your pastor mowing his lawn, or your auto mechanic on a television show promoting a book. Stereotyping can even be a form of functional fixation—how many people would laugh at a blonde quoting Aristotle? Too often we permit only a narrow range of attitudes and behaviors in other people, based on bias, prejudice, hasty generalization, or limited past experience. Think of those statements like, "I can't believe he said that," or "imagine her doing that," and so on. But recall the proverb, "The goal of my life is not to live down to your expectations."

3. Learned helplessness. This is the feeling that you don't have the tools, knowledge, materials, ability, to do anything, so you might as well not try. We are trained to rely on other people for almost everything. We think small and limit ourselves. But the world can be interacted with.

If you are in need of information, there are libraries, bookstores, friends, professors, and, of course, the Internet. And there are also city, county, and state government agencies with addresses and phone numbers and web sites. There are thousands of government agencies that really exist and that will talk to you. Contact the EPA if you're working on air pollution or pesticides. Get some government publications. Call your state senator or federal congressman for help on bills, information, problems. Contact the manufacturer of a product to find out what you want to know about it.

If you are technologically poor, you can learn. Learn how to cook, use tools, make clothes, use a computer. You can learn to do anything you really want to do. All you need is the motivation and commitment. You can learn to fly an airplane, drive a truck, scuba dive, fix a car—name it.

4. Psychological blocks. Some solutions are not considered or are rejected simply because our reaction to them is "Yuck." But icky solutions themselves may be useful or good if they solve a problem well or save your life. Eating lizards and grasshoppers doesn't sound great, but if it keeps you alive in the wilderness, it's a good solution.

Perhaps more importantly, what at first seem to be icky ideas may lead to better solutions—de-ickified analogues of the original. When doctors noted that some unsophisticated natives were using giant ant heads to suture wounds, they imitated this pincer-closing technique by inventing the surgical staple.

POSITIVE ATTITUDES FOR CREATIVITY

1. Curiosity. Creative people want to know things—all kinds of things—just to know them. Knowledge does not require a reason. The question, "Why do you want to know that?" seems strange to the creative person, who is likely to respond, "Because I don't know the answer." Knowledge is enjoyable and often useful in strange and unexpected ways.

For example, I was once attempting to repair something, without apparent success, when an onlooker asked testily, "Do you know what you're doing?" I replied calmly, "No, that's why I'm doing it."

Next, knowledge, and especially wide ranging knowledge, is necessary for creativity to flourish to its fullest. Much creativity arises from variations of a known or combinations of two knowns. The best ideas flow from a well equipped mind. Nothing can come from nothing.

2. Challenge. Curious people like to identify and challenge the assumptions behind ideas, proposals, problems, beliefs, and statements. Many assumptions, of course, turn out to be quite necessary and solid, but many others have been assumed unnecessarily, and in breaking out of those assumptions often comes a new idea, a new path, a new solution.

For example, when we think of a college, we traditionally think of a physical campus with classrooms, a library, and some nice trees. But why must college be a place (with congregated students and faculty) at all? Thus, the electronic college now exists, where students "go" to college right at home, online.
Correspondence courses have existed for years, too, beginning with the challenging of the school-as-centralized-place idea.

When we think of an electric motor, we automatically think of a rotating shaft machine. But why assume that? Why can’t an electric motor have a linear output, moving in a straight line rather than a circle? With such a challenged assumption came the linear motor, able to power trains, elevators, slide locks, and so on.

Problem: We make brandy, and for this special edition of our finest kind, we want a fully-grown pear in one piece inside each bottle. The bottle is narrow necked. How can we do it? As you think, watch for the assumptions you are making. Possible solutions (assuming fully grown pear): close the neck or bottom after insertion, use a plastic bottle like heat-shrink tubing, change to a wide mouth bottle. If we do not assume a fully grown pear: grow the pear from a bud inside the bottle.

3. Constructive discontent. This is not a whining, griping kind of discontent, but the ability to see a need for improvement and to propose a method of making that improvement. Constructive discontent is a positive, enthusiastic discontent, reflecting the thought, "Hey, I know a way to make that better."

Constructive discontent is necessary for a creative problem solver, for if you are happy with everything the way it is, you won’t want to change anything. Only when you become discontent with something, when you see a problem, will you want to solve the problem and improve the situation.

4. A belief that most problems can be solved. By faith at first and by experience later on, the creative thinker believes that something can always be done to eliminate or help alleviate almost every problem. Problems are solved by a commitment of time and energy, and where this commitment is present, few things are impossible.

The belief in the solvability of problems is especially useful early on in attacking any problem, because many problems at first seem utterly impossible and scare off the fainter hearted. Those who take on the problem with confidence will be the ones most likely to think through or around the impossibility of the problem.

5. The ability to suspend judgment and criticism. Many new ideas, because they are new and unfamiliar, seem strange, odd, bizarre, even repulsive. Only later do they become "obviously" great. Other ideas, in their original incarnations, are indeed weird, but they lead to practical, beautiful, elegant things. Thus, it is important for the creative thinker to be able to suspend judgment when new ideas are arriving, to have an optimistic attitude toward ideas in general, and to avoid condemning them with the typical kinds of negative responses like, "That will never work; that's no good; what an idiotic idea; that's impossible," and so forth. Hospital sterilization and antiseptic procedures, television, radio, the Xerox machine, and stainless steel all met with ho-hums and even hostile rejection before their persevering inventors finally sold someone on the ideas.

Some of our everyday tools that we now love and use daily, were opposed when they were originally presented: Aluminum cookware? No one wants that. Teflon pans? They'll never sell. Erasers on pencils? That would only encourage carelessness. Computers? There's no market for more than a few, so why build them?

Proverb: "A crank is a genius whose idea hasn't yet caught on."

6. Seeing the good in the bad. Creative thinkers, when faced with poor solutions, don't cast them away. Instead, they ask, "What's good about it?" because there may be something useful even in the worst ideas. And however little that good may be, it might be turned to good effect or made greater.

Example problem: How can we get college students to learn grammar better? Solution: Spank their bottoms with a hickory stick. This isn't a good solution, partly because it's probably illegal. But should we just toss it out? Why not ask what's good about it? (1) it gives individual, attention to the poor performers, (2) it gives them public attention, (3) it motivates other students as well as the student being
spanked, (4) it’s easy and costs nothing. The next question is, Can we adapt or incorporate some of these
good things into a more acceptable solution, whether derivative of the original or not?

7. Problems lead to improvements. The attitude of constructive discontent searches for problems and
possible areas of improvement, but many times problems arrive on their own. But such unexpected and
perhaps unwanted problems are not necessarily bad, because they often permit solutions that leave
the world better than before the problem arose.

For example, the first margarine was made from beef fat, milk, water, and chopped cow udder. It wasn’t
extremely tasty or healthy. Then about the turn of the century a shortage of beef fat created a problem.
What to use? The margarine makers turned to vegetable fats from various plants and the soybean, corn,
and sunflower oils they used are still used today. The margarine is healthier and tastes better.

8. A problem can also be a solution. A fact that one person describes as a problem can sometimes
be a solution for someone else. Above we noted that creative thinkers can find good ideas in bad
solutions. Creative thinkers also look at problems and ask, "Is there something good about this
problem?"

For example, soon after the advent of cyanoacrylate adhesives (super glue), it was noted that if you
weren’t careful, you could glue your fingers together with it. This problem—a permanent skin bond—was
soon seen as a solution, also. Surgeons in Viet Nam began to use super glue to glue wounds together.

Another example, also involving glue: 3M chemists were experimenting with adhesives and accidentally
came up with one that was so weak you could peel it right back off. Hold strength, shear strength, all were
way below the minimum standards for any self-respecting adhesive. A glue that won’t hold? Quite a
problem. But this problem was also a solution, as you now see in Post-It Notes.

9. Problems are interesting and emotionally acceptable. Many people confront every problem with
a shudder and a turn of the head. They don’t even want to admit that a problem exists—with their car,
their spouse, their child, their job, their house, whatever. As a result, often the problem persists and
drives them crazy or rises to a crisis and drives them crazy.

Creative people see problems as interesting challenges worth tackling. Problems are not fearful beasts
to be feared or loathed; they are worthy opponents to be jousted with and unhorsed. Problem solving
is fun, educational, rewarding, ego building, helpful to society.
CHARACTERISTICS OF THE CREATIVE PERSON

- curious
- seeks problems
- enjoys challenge
- optimistic
- able to suspend judgment
- comfortable with imagination
- sees problems as opportunities
- sees problems as interesting
- problems are emotionally acceptable
- challenges assumptions
- doesn't give up easily: perseveres, works hard

ICEDIP MODEL:

**Inspiration** is described as the research phase. Most of us are already familiar with this stage. Geoffrey explains that the inspiration mindset is to be free, fearless and deeply engrossed. I enjoy this stage because it is not a time to worry about structure and practicality. Let yourself be free of all restrictions. Most creative’s are very self-critical and they don’t give themselves enough time become inspired.

**Clarification** focuses on solving the problem, what are you trying to do? At times creative minds get so caught up on making something look good that they forget the actual problem. During this phase do not focus too much on beauty but a solution. Geoffrey explains that the clarification mindset is strategic, un-hurried and clear minded.

**Evaluation** is the phase where you will look back over your work in progress. What needs to be improved? What strengths can be enhanced and perfected? Let’s face it there is always room for improvement. Our mindset here as Petty describes should be critical, positive and willing to learn.

**Distillation** decides what ideas to work on. Choose your best ideas and expand them, better yet choose a few and combine them. Our mindset here should be judgmental yet positive about where your ideas may take you. Do not choose ideas just because they are familiar, this will inhibit your best intentions.

**Incubation** is described as leaving the work alone, yet leave it on the surface of your mind. We are bound to run into difficulties in coming up with solutions. Believe in yourself that you will manage to find your way around those difficulties. Petty describes the incubation mindset as unhurried, trusting and forgetful.

**Perspiration** is where the work is done. Work persistently on your best ideas that you most likely came up with during the distillation and inspiration processes. Perspiration is the final result of many drafts
developed throughout all of the phases. Our perspiration mindset needs to be uncritical, enthusiastic and responsive. Many creative minds struggle with this phase because they are too self-critical and tend to think that it is due to lack of talent rather than a need for more work.

**SIX STEPS IN MANAGERIAL DECISION MAKING PROCESS**