

THE CREATIVE THINKING

- In the beginning God created the heavens and the earth.
 - **GENESIS 1:1 the Holy Bible**
- The act of creation and the act of appreciation of beauty are not in essence, distinguishable.
 - **H.E. Huntley The divine Proportion, 1970**
- Imagination is more important than knowledge.
 - **Albert Einstein. On Sciences, 1931**
- All good things which exist are the fruits of originality.
 - **John Stuart Mill. Liberty, 1859**
- More today than yesterday, and more tomorrow than today, the survival of people and their institution depends upon innovation.
 - **Jack Morton. Innovation, 1969**
- The age is running mad after innovation. All the business of the world is to be done in a new way. Men are to be hanged in a new way.
 - **H. Herbert Fox A Critique on creativity in science**
- Creator than the head of mighty armies is the idea whose time has come.
 - **Victor Hugo. History d'un Crime, 1852**
- Creativity is man's most challenging frontier!
Common sense is not so common.
 - **Voltaire Dictionnaire Philosophique, 1764**
- A child is highly creative until he starts to school.
 - **Stanly Czurles Director of art education, New York State College for teachers**
- To think is differ.
 - **Clarnce Darrow**
- The test of tolerance comes when we are in a majority; the test of courage comes when we are in a minority.
 - **Ralph W. Sockman D,C. Forbes Scrapbook of thoughts in Business of life**
- Iron rusts from disuse, water loses it purity from stagnation and in cold water becomes frozen; even so dose inaction sap the vigor of the mind.
 - **Leonardo Da Vinci Forbes Scrapbook of thoughts in Business of life**
- Creativity is the art of taking a fresh look at old knowledge.
All men are born with a very definite potential for creative activity.
 - **John E. Arnold**
- Reason can answer questions, but imagination has to ask them.
- Why and how are words so important than they cannot be used too often?
 - **Napoleon Bonaparte**
- Want is the mistress of innovation.
 - **Susanne Centlivre, The Busybody, 1667-1727**

- Lord, grant that may always desire more than I can accomplish.
 - Michelangelo
- The thing of which I have most fear is fear.
 - Michel Eyquem de Montaigne *Essays, 1533-1592*
- Important ideas are those that lie within the allowable scope of nature's laws.
You can observe a lot just by watching.
 - Yogi Berra Quoted in Eric Hodgins's *Episode*
- Scientists study the world as it is, engineers create the world that never has been.
 - Theodors von Karman
- Chance favors only the prepared mind.
 - Louis Pasteur
- Our doubts are traitors and make us lose the good we oft might win by fearing to attempt.
 - William Shakespeare, *Measure for Measure*
- We fear things in proportion to our ignorance of them.
 - Titus Livius *Histories, 50 B.C- 17 A.D.*
- It would seem quite apparent that there is no one creative process, and there may well be as many creative processes as there are creative people.
 - H. Herbert Fox. *A Critique on creativity in the science*
- Observation, not old age, brings wisdom.
Behold the turtle; he makes progress only when his neck is out.
 - Dr. James B. Conant *President, Harvard University*
- I am a great believer in Luck. The harder I work the more of it I seem to have.
 - Coleman Cox
- It's amazing what ordinary people can do if they set out without preconceived notions.
 - Charles F. Kettering, *Forbes Scrapbook of thoughts in Business of life.*
- Some things have to be believed to be seen.
 - Ralf Hodgson *the skylark and other Poems*
- Habit is a cable; we weave a thread of it each day, and at last we cannot break it.
 - Horace Mann *Forbes Scrapbook of thoughts in Business of life*
- There are no foolish questions and no man becomes a fool until he has stopped asking questions.
 - Charles P. Steinmetz

- There is no experiment to which a man will not resort to avoid the real labor of thinking.
 - **Sir Joshua Reynolds**
- Daring ideas are like chessmen moved forward; they may be beaten, but they may start a winning game.
 - **Goethe**
- The probability is that tomorrow will not be an extrapolation of today.
 - **Ernest C. Arbuckle**
- If you want to kill an idea assign it to a committee for study...Every idea is the product of a single brain.
 - **Bishop Ricardo Cumberland**
- Society is never prepared to receive any invention- Every new thing is resisted, and it takes years for the inventor to get people to listen to him and years more before it can be introduced.
 - **Thomas Alvey Edison**
- We do not have to teach people to be creative; we just have to quit interfering with their being creative.
 - **Ross L. Moorey**
- Invention, strictly speaking, is little more than a new combination of those images which have been previously gathered and deposited in the memory. Nothing can be made of nothing; he who has laid up no materials can produce no combinations.
 - **Sir J. Reynolds**
- **BEWARE!** Don't become victimized by habit.
 - **The tyrant custom. Shakespeare Othello**
- Those who dream by day are cognizant of many things which escape those who dream only at night.
 - **Edgar Allan Poe, Eleanor, 1841**
- "The horror of that moment", the king went on, "I shall never, never forget!" "You will though", the queen said, "if you don't make a memorandum of it".
 - **Lewis Carroll**
- A man would do well to carry a pencil in his pocket, and writes down the thoughts of the moment. Those that come unsought for are commonly the most valuable, and should be secured, because they seldom return.
 - **Bacon**
- If my theory of relativity is proven successful, Germany will claim me as a German and France will declare that I am a citizen of the world. Should my theory prove untrue, France will say that I am a German and Germany will declare that I am a Jew.
 - **Albert Einstein**
- The mind is not a refill to be filled but a fire to be kindled.
 - **Plutarch**

- When dealing with people, remember you are not dealing with creatures of logic, but with creatures of emotion, creatures bristling with prejudice and motivated by pride and Vanity.
 - Dale Carnegie
- It takes courage to be creative, just as soon as you have a new idea, you are a minority of one.
 - E. Paul Torrance
- Disciplined thinking focuses inspiration rather than constricts it. It is better to wear out than to rust out.
 - Bishop Richard Cumberland, 1697
- There are two kinds of failure: The man who will do nothing he is told, and the man who will do nothing else.
 - Perle Thompson

THE CREATIVE PROCESS

- Innovation is the discovery of a new or unusual idea or product by the application of logic, experience, or artistry. This would include the recombination of things or ideas already known.
- A given engineer may or may not be a creative thinker, although all engineers should have mastered the basic techniques of problem solving.
- For problem solving, the engineer must be intelligent, well informed, and discerning, so that he can apply the principles of deductive reasoning to the various innovational alternatives when he encounters them.
- Although creative thinkers must be innovators, it does not follow necessarily that all innovators have to be creative thinkers.
- All persons of normal intelligence possess some ability to think creatively and to engage in imaginative and innovative effort. Unfortunately, the vast majority of people are only partially aware of the range of their creative potential. This potential seldom is attained, even if recognized.
- Methods used to stimulate ideas are:
 - The use of checklists.
 - Reviewing of properties & alternatives.
 - Systematically searching design parameters.
 - Brainstorming.
 - Synectics

- Mental attributes that contribute positively towards creative thought are:
 - An inquiring & questioning mind
 - Ability to concentrate and communicate.
 - Ability to accept conflict and tension without becoming frustrated.
 - Willingness to consider a new idea even though it may seem to be in conflict with previous experience
- In addition, there are personal qualities frequently associated with creative individuals. Developing them will enhance the likelihood that the individual will express himself creatively. They are as follows:
 - Intellectual curiosity.
 - Acute powers of observation.
 - Sensitivity to recognize that a problem exists.
 - Direct imagination.
 - Initiative.
 - Originality.
 - Memory.
 - Ability to analyze and synthesize.
 - Intellectual integrity.
 - Ability to think in analogies and images.
 - Intuition.
 - Being articulate in verbal response and alert in mental processes.
 - Patience, determination, and persistence.
 - Understanding of the creative process.

THE SEARCH & EVALUATION OF ALTERNATIVES

- **Specification:**
 - The specification is listing by the designer of parameters essential to design.
 - Any item or value transferred from the requirement to the specification must be critically examined before the transfer is permitted.
 - The specification must be so framed as to avoid unnecessarily influencing the possible range of solutions.
 - An order of priorities within a specification must be recognized.

- **Speculation:**
 - The two main forms of stimulus applicable to good design are:
 - Human interaction (brainstorming).
 - The pursuit of logical path.

- **Evaluation:**
 - The 1st stage of assessment can be made on the basic of common sense.
 - The 2nd stage in the elimination is one of considering technical feasibility.