Creativity and problem solving
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Background

This articles was written in 1971-72. At that time in the field of Design, doing and making dominated compared to even talking. Much less emphasis was on writing. Thus we see very little written material in the area of design.

Writing a paper was new to us when I joined IDC at IIT. Suddenly an announcement came from IIT Madras asking for papers on creativity for a seminar. I had not seen anybody writing papers in NID or IDC for conferences or journals with references. I was interested in Creativity. So I made my first attempt to write a paper on 'creativity and problem solving'. I took some help from my friends in 'Science department', to understand the structure of paper (I didn't know what ibid stands for). I sent the paper. They even accepted it. But unfortunately due to some reasons the seminar did not take place!

But later I was invited to give a lecture on the topic to college teachers us QIP (Quality improvement programme) course. This was later used as an article in may short term courses on creativity in IDC.

In the definition of Industrial Design, we observe that the creative part is emphasized. Creativity is essential for progress. We can agree with Dr. Bono's definition of creativity as 'unpredictable effectiveness'. This covers any field of activity as creativity is common to all walks of life. It is often believed that creativity is a gifted trait. The work in psychology and psychotherapy indicate that any child could be as good as any other in their creative approach to problems. But they seem to be losing their creativity when they grow-up. Further probe leads to four basic reasons for lack of creativity.

1. Inhibitions : children are completely uninhibited in their behavior and thinking. A child comes to his father, takes his pen, says, 'papa, this is an aero plane" and starts playing with it. The father laughs at it and says "stupid! It is a pen. An aero plane should have two wings and a tail". This sets up the process of inhibition which is reinforced in the school. The child cannot express freely because of the ridicule he has to face. In school, child learns what the teacher wants him to say rather than understanding the problem. Later stages colleagues substitute the teacher

in ridiculing. Rate of innovations during the wars is high because of the urgency of the problem which over-rides inhibitions.

2. Conformity in thinking : Conformity in a person develops because of sheer habit and the security it offers. Habitual thinking is necessary for routine life to save the mind from the burden of taking decisions from innumerable possible alternatives. Our habits transfer from one situation to another and we try to use them even when they do not apply. Quite often things start arbitrarily and they continue to be believed without questioning.

3. Vertical thinking: Vertical thinking can be compared to the digging of a hole deeper and deeper, instead of digging a new hole. It is safer and easier to dig the hole deeper because a new place will have to be found out to dig a new hole. Further, there is a force of continuity in developing, carrying ahead. It is rather like moving from the first aero plane in 1903, taking 84 days to cross America in 1911, and taking couple of hours today. On the other hand, something like hovercraft, which was technologically simpler than the aero plane, was invented much later.

4. Lack of Intuition: Intuition seems to be the mysterious faculty by which one reaches solutions without logical backgrounds. Intuition is related to the emotional involvement of a person in the problem he is solving. This answers for high intuitive qualities in artists who are usually emotional. Children have high emotional attachment with things they use. But we never seem to encourage children to develop these emotional attachments. We select their toys, decide what they should study and so on.

Four techniques to practice creative thinking are discussed below:
1. Removal of mental blocks
2. Alternative solutions-Lateral thinking
3. Brain storming
4. Synectics

1. Removal Mental Blocks: Self-imposed constraints tend to form a mental block because we see the problem only in a particular way or frame work. A problem or situation perceived by the mind in precise elements with definite relationships can result in a mental block. It is necessary to blur this precise image in the mind to get out of the mental block. Osborne suggests the following nine transformations.

Put to other use?, adopt ?, modify?, magnify ?, substitute ?, re-arrange/, reverse?, combine?.   These words could suggest different ways of solving the particular problem.

2. Alternative Solutions-Lateral thinking: We tend to get stuck at the very first idea we get in our kind. And rest of the time we keep on developing and justifying this idea. It becomes very difficult to realize that, this very idea could be in the wrong direction. Deciding to achieve a fixed number of alternative solutions is suggested to counter this problem.

3. Brain Storming : Brain storming first suggested by Osborne, is a technique adopted with a group of people .The problem is posed to the group and everybody in the group is invited to give ideas. Quantity in ideas is encouraged. All are asked not to criticise any of others' ideas. They can combine or add upon the ideas given by others. All ideas are recorded. Evaluating the ideas take place later. Brain storming seems to be successful in overcoming inhibitions.

4. Synectics : Synectics is a theory developed by Willaim J.J. Gordon for conscious use of pre-conscious psychological mechanisms present in man's creative activity. It is a group activity. The group necessarily consists of people from different fields. The four mechanisms identified in Synectics are :-

1. Personal analogy:
   The method involves in stating of the problem in simple terms and imagining the parts as one-self or imagining one-self to travel into that particular situation.

2. Direct analogy:
   The process here is basically one of taking 'direct comparison' from different fields. Examples from Nature have many a time produced original concepts in other fields

3. Symbolic analogy :
   Symbolic analogy uses objective impersonal image to describe problem. Aesthetically satisfying image is summoned up even when technologically inaccurate.

4. Fantasy analogy :
   Sigmund Freud's wish fulfillment theory is adopted as fantasy analogy.

A particular problem is tackled by imagining the things to happen as in a fairy tale.

Creativity in designing a product mainly matters at two stages – problem stating and problem solving. Restatement of problem depends on how one looks at the problem which can change the whole concept of the problem. Creative step at the solution stage is an obvious necessity in achieving worthwhile results.