CHAPTER 6
DISCUSSION OF RESULTS

6.1.0 Effectiveness of Six Thinking Hats strategy

This study, primarily, aimed at studying effectiveness of Six Thinking Hats strategy on the development of parallel thinking, lateral thinking and general creativity among high school students. It also aimed at seeing the effect of Six Thinking Hats strategy on the development of argumentativeness of high school students. The major finding of the study is that there were significant differences in the post-test mean scores in parallel thinking, lateral thinking and general creativity test of control group and experimental group of high school students. It clearly indicated that the students of experimental group of high school students achieved much higher scores after the exposure to the Six Thinking Hats strategy. Therefore, it can be concluded that the strategy was very effective in developing the Parallel Thinking, Lateral Thinking, and General Creativity of the high school students. The one other finding of the study was that there was significant difference in the post-test mean score in argumentativeness of high school students. The present chapter deals with the discussion of chief findings in sequence as: (i) discussion of results pertaining to parallel thinking. (ii) discussion of results pertaining to lateral thinking. (iii) discussion of results pertaining to general creativity. (iv) discussion of results pertaining to argumentativeness.

6.1.1 Discussion of results pertaining to Parallel Thinking

Main finding of the study was that six thinking hats strategy of teaching was helpful in improving parallel thinking of high school students. These results can be explained from the process of six thinking hats, social learning theory, theory of emotional intelligence and principles of parallel thinking.

a) Process of Six Thinking Hats: One most important aspect of six thinking hats strategy lies in its process that helps people to be more productive, focused and mindfully involved (de Bono, 1985). The major stress of six thinking hats is on “to think in a particular direction” by wearing six colored metaphorical hats. It is a beneficial tool for creating a classroom atmosphere in which thoughts can be freely stated and considered within a disciplined structure. It separates thinking into six valuable functions and roles. Each thinking role is identified with a colored symbolic
“thinking hat”. Therefore it helps to simplify complex thinking processes. So, the six thinking hats is a great tool in the teacher’s toolkit for helping children to think in particular direction under each thinking hat. Another plausible reason may be that it is easy to learn and to use. Students can use effectively the system of thinking represented by the ‘six thinking hats’ in the learning process. It helps learners to analyze a topic, problem or situation from different viewpoints. The respective hats in this strategy as described by de Bono are given as below.

The White Hat concerns with pure knowledge gathering and historical account. It addresses cognition. White hat thinking involves exploring facts rather than personal opinions. “First class” facts consist of ones that are checked and proven, while “second class” facts include information believed to be true. Information that is missing is also included here. Thus the white hat covers facts, figures, information needs, and gaps related with problem.

The Red Hat represents feelings, intuitions and hunches. This hat legitimizes emotions and explores fears, likes, dislikes, loves, and hates. This legitimizes emotions and feelings by focusing on “This is how one’s feel”. The red hat is the opposite of neutral, objective information (White Hat). Here there is no need to give reasons or justification for the subjective feelings.

The Black Hat focuses on critical negative judgments, a risk analysis. It identifies cautions, dangers and potential problems. It is the logical negative and can be used to determine weakness in an idea. It also addresses why it does not fit – facts, experience, policy, system and ethics. The Black Hat Thinker works like a gatekeeper, not a dream breaker.

The Yellow Hat symbolizes sunshine and brightness. It is optimistic, positive and constructive. It addresses feasibility, benefits, advantages, and savings. The Yellow Hat addresses reframing and permits visions and dreams. Yellow Hat thinking helps to keep the group going when everything looks gloomy and difficult.

The Green Hat symbolizes fertility, growth and the value of seeds. It involves creative thinking and the search for alternatives while generating new concepts and new perceptions. The green hat is the "thinking outside the box" creative hat. It involves brainstorming and free association which explore new possibilities, alternatives, ideas, and concepts.

The Blue Hat represents the management of the thinking process. Blue Hat thinkers are like the orchestra conductors seeking the proper balance and blending of the other
five hats. Blue Hat thinking is a final reflection on the other five hats that have been both over and under-utilized in the problem solving exploration. The Blue hat is also responsible for summaries, overviews and conclusions.

Thus the ‘six thinking hats’ system organises the thought processes to consider a subject matter thoroughly by focusing on one aspect at a time with each thinking hat. As de Bono (1999) stated that the process of the ‘Six Thinking Hats’ was developed to escape adversarial thinking, avoid confusion, generate focus and synergy and to achieve powerful results. It is perhaps because of this the strategy is helpful in enhancing parallel thinking of high school students.

Another explanation for it can be looked into the way the hats are used. De bono(1987) considered that the six thinking hats strategy uses the metaphor of “put on your thinking hat” to mimic a change of thought processes as one puts on or takes off a hat. The deliberate process of putting on a hat allows the thinker to role play thinking in that mode like putting on the green hat focuses one’s attention on creative, generative thinking and thus facilitates thinking in that mode. Thus “Putting on” a hat is a deliberate process that switches the student’s attention exclusively to that mode and “switching” hats redirects thinking to another mode. Thus this strategy provides a very convenient way to switch thinking or to ask for a certain type of thinking. With six thinking hats, in the classroom, such a congenial environment is created which facilitates a “mapmaking” thinking process that is an alternate to an “argument” style. This type of mapmaking process helps the students to deeper understanding and diverse, flexible thinking. In six thinking hats process, it is essential that everyone is wearing the same hat at the same moment. Probably, this process of thinking develops parallel thinking of high school students in the present study as everyone is looking in the same direction under each hat.

Another aspect of six thinking hats process is that this strategy allows the students to unbundle the thinking. It identifies confusion as the biggest thinking deficiency. Emotions, logic, information, hope and creativity scramble together to overwhelm the thinker. The six hats unscramble this disarray by differentiating the various thought modes, thus permitting the thinker to use each mode one at a time. So it reduces the complexity of thinking. Instead of trying to do everything at once, one’s separates out the different aspects of thinking. This way one’s can pay full attention to each aspect in turn. This is like full-color printing, where the basic color separations are made and then each basic color is printed separately onto the same sheet to give full-color
printing. In the same way, it helps the students to separate the modes of thinking and then apply each mode to the same topic in order to end up with full-color thinking on the topic. This type of thinking helps the students to think in a parallel way.

Still another plausible reason for enhancement of parallel thinking is that six thinking hats strategy encourages performance rather than ego defense. The six hats represent six modes of thinking and are directions to think rather than labels for thinking. Hats are used proactively rather than reactively. Therefore, in group, all members actively participate and contribute while wearing a specific hat even though they initially may support an opposite point of view. The goal of this strategy is to demonstrate how many considerations each person can put forward under each respective hat. One person’s ego is no longer tied to being correct. Therefore they can learn to accept other peoples’ views and broaden their outlook objectively about an issue, problem or idea. For this reason, probably it may be helpful in enhancing parallel thinking of high school students in the present study. These results are in consonance with the results of the study of Li, et al(2008) who reported that six thinking hats is helpful in problem-solving, decision making, generating ideas and improves counseling and supervision activities among counselor interns.

Another reason for the effectiveness of Six Thinking Hats strategy is that it helps in utilizing the full thinking potential of teams as it required each individual to look at all sides of an issue/topic. It allows the thinker to look at problems, decisions, and opportunities systematically, clearly and objectively. This strategy allows the brain to maximize its sensitivity in different directions at different times under each thinking hat. Each individual of a group think in the same directions at all points once at a time which encourages parallel thinking. It was in accordance to Vacca (2006) who stated that it is a thinking tool for group discussion where individual thinking is combined with the idea of parallel thinking. It provides a means for groups to think together more effectively and a means to plan thinking process in a detailed and cohesive way. One more reason for the effectiveness of the strategy for enhancement of parallel thinking of high school students may be that this strategy is helpful in promoting quality of thinking and communication among students, teachers, and educational leaders as stated by de Bono(1990). According to him many successful people think from a very rational, positive viewpoint. They may fail to look at a problem from an emotional, intuitive, creative or negative viewpoint. This can mean that they
underestimate public resistance to plans, fail to make creative leaps, and do not make essential contingency plans. By this technique people can consider the different points of view together at the same time, rather than arguing about them. Here, each hat represents a direction and ensures that the experience, intelligence and knowledge of each group member is fully used as the entire group works and thinks in the same direction. It is perhaps because of this, that the strategy in present study could effectively develop parallel thinking of high school students.

It can be further explained through the findings of Manketlow (2005), who reported that Six Thinking Hats is an important and a powerful technique used to look at decisions from a number of important aspects which forces one to move outside his habitual thinking style. It is going to help students to react in difficult situations. The concreteness of the Hats helps them to identify their reactions to the situations, analyze them, and create real life changes. It is helpful in conflict resolution and creating more positive school climate. Students’ problem solving ability increased with this technique. Probably, these characteristics of Six thinking Hats strategy may be helpful in developing of parallel thinking in high school students.

One more reason for the effectiveness of the strategy may be its simplicity. It is used equally by four year olds in school and by top executives at some of the world’s largest corporation as advocated by de Bono. It is powerful in its effects and obtains the full power of the minds of those at the meeting (de Bono, 2008). Therefore it can be used in family discussion also.

The results in the present study, about the effectiveness of Six Thinking Hats strategy in parallel thinking are also in consonance with the researcher like Saffin(2003) who reported that it’s a simple and practical method for encouraging good thinking skills and a great way to brighten up a lesson. Govender(2005) also used six thinking hats to encourage different types of critical thinking among 10 years students and suggested that it scaffolded the learning process. Further the strategy provided a literacy tool that helps everyone become independent, lifelong learners as reported by McAleer(2006). Through his paper he cited the views of many teachers and educationists regarding the use of six thinking hats as follows:

Sorensen used this strategy in Applied Communication class and reported that the students loved six thinking hats and designed an independent novel unit. Lau found it easy to simplify and helpful in adapting to the proficiency levels of ESL students. Six
Thinking hats strategy provided a multisensory learning environment, giving students a greater chance for success. Gamrat stated that his autistic students asked to use the Hats everyday. Herr explained that the work with de Bono's Six Hats provided a great base for improving higher level thinking and created valuable awareness among students. Mamrose focused that this strategy could help the teachers in providing particular direction to the students’ line of thought during class discussion. Brewer also reported that the students answer the questions using the hats in greater depth without prompting them to go deeper. It improved their problem solving ability also. Micheletti described that his students revelled in the metacognitive strategies with six hats. Students purposefully examined all approaches to solve a problem.

In addition to this, Jackso asserted the following benefits of this strategy from the point of view of the superintendent of schools. It empowered teachers to utilize best practices in their classrooms, encouraged them to utilize proven instructional methods that are research based and to “take a risk” to learn something new and apply it to their teaching. It also encouraged their imagination and the power of thinking. Morrison stressed that the toolbox of the Six Thinking Hats provided staff and students with a concrete way to approach decision making in the classroom and broadened their way of thinking.

So, in brief it can be said that the result of the present study fall in consonance with all these findings. Similar (positive) results were noted by Wang (2003) while examining the effects of six thinking hats training in problem-solving abilities of elementary students. Horsfall and Bennett (2005) also revealed that there are positive outcomes such as improvement in speaking and listening skills, development of effective collaboration as well as increased motivation amongst pupils of IV class after teaching through Six Thinking Hats. This strategy improved decision making and problem solving skills among adults and children. These results were supported by Tamura and Furukawa (2007).

Another physiological reason behind the effectiveness of six thinking hats strategy found in research that has shown that brain chemicals sensitize certain areas according to the overall emotional need. So when one is frightened he sees more danger; when one is positive he sees more values etc. Since one cannot be ‘sensitized’ in all direction in the same time, so there is a need to separate out one’s thinking modes to find effective results. This is done with the Six Thinking Hats strategy,
where each type of thinking is separated out and given full attention. It depends on the metaphor of wearing one hat at a time. When wearing a specific color hat, the rule is that everyone in the group must think from the perspective of that particular hat. It helps them to think collaboratively from that perspective. Everyone then removes that hat and puts on another color hat in order to think differently about the same problem or topic, while all continue to think alike. These characteristics of six thinking hats strategy are like the classic Gestalt empty-chair technique. The six thinking hats is the equivalent of structurally moving from one chair then changing the focus when moving back to other.

So, it can be concluded that the process of six thinking hats strategy can be used effectively to escape adversarial thinking, avoid confusion, generate focus, resolve conflicts, remove ego from performance and make students to understand the topic in a better way. It comprehends the cooperative thinking with application of six ways of thinking under six metaphoric colored hats one at a time. Therefore, this strategy may be effective in development of parallel thinking among high school students in the present study.

(b) Social Learning Theory: Another explanation behind the effectiveness of six thinking hats strategy in developing parallel thinking of high school students can be seen in social learning theory. According to this theory, most of learning is acquired through simply watching and listening to other people. Thus, observational or vicarious learning (learning through indirect experiences) rather than the learning based on direct experiences is the base of this theory. In six thinking hats, firstly the students are made to observe the color and functions of each thinking hat like a model. Secondly, these are filed in their memory in the form of mental images. Thirdly, they are made to think according to particular hat in exploration of any idea or topic. It is like the imitation of the observed, remembered and accepted aspects of model’s behavior. Here all students learn to think in the same direction according to prescribed thinking hat. Therefore they learn to think in a parallel way. Finally, the responses of the students are reinforced under each thinking hat for proper adoption and further continuance. According to Bandura(1977) all these steps are usually involved in social learning theory. Thus parallel thinking can be taught, modeled and learned through six thinking hats strategy.
(c) Theory of Emotional Intelligence: Still another explanation of the finding of the present study lies in theory of emotional intelligence (Goleman, 2006). In six thinking hats, the students are made to consider their emotions, feelings, intuitions and hunches about an idea or issue without any justification by wearing red hat. In the process of this strategy, the students learn to perceive emotions, integrate them in thought, to understand and to manage them in problem solving and decision making. It is such type of thinking that encourages the students for parallel thinking as everyone is looking in particular direction. All these capacities lie with emotional intelligence in which managing and understanding emotions effectively and using them in thinking and reasoning correlate with life outcomes. In this way, parallel thinking supports and complements the theory of emotional intelligence as reported by de Bono (2008). Hence, it may be one of the reasons behind the effectiveness of six thinking hats strategy in enhancement of parallel thinking among students.

(d) Principles of Parallel Thinking: The effectiveness of the six thinking hats strategy can also be justified through the principles of the parallel thinking. Parallel thinking is based on the theme that at each moment everyone looks in the same direction. The main point of parallel thinking is that everyone is thinking about the subject matter, not about what the other person has said. So there is no attack and defense. For this reason there is a thorough exploration of the subject and usually some agreed way forward at the end. If everyone wants to think and look in the same direction there would need to be some clearly indicated direction. This direction is provided by the symbolic ‘Six Thinking Hats’. It is a simple and practical way to carry out parallel thinking (de Bono, 1985). This is a technique for teaching the brain to look at a problem from a variety of angles. These six thinking hats are aimed at exploring ideas and generating better outcomes, and provide an alternative to traditional critical thinking that mainly analyzes ideas with argument and counter-argument. At one moment everyone is wearing metaphorically, one of the six hats. So everyone ends up thinking in the same direction. If there is disagreement then there is no argument in this strategy. Both differing versions are recorded here. Normally, if someone is against an idea that person is not going to put forward the virtues of idea. But with six thinking hats strategy, the person is challenged to do exactly this. He is invited to focus on the value of idea with ‘yellow hat’ thinking. So the person looks for the values and sometimes surprises himself in the process. All these characteristic
also lie with the parallel thinking. Therefore in a way such type of thinking environment promotes flexibility in ideas, combating rigidity and promotes parallel thinking. It also may be the plausible reason for increase in the scores of parallel thinking of high school students after teaching through six thinking hats strategy.

The discussion in the preceding paragraphs highlighted that the parallel thinking can be enhanced through the six thinking hats strategy because it enables the students to think in a particular direction by using specifically colored hats. Parallel thinking can be easily taught, modeled and learned by these colored hats similar to Bandura’s Social learning theory. It also improves emotional intelligence among the students which complements parallel thinking.

One more finding was about the effect of intelligence on the parallel thinking test scores. In the present study, there was noted a significant effect of intelligence on the parallel thinking scores. So it may be concluded that although the high intelligence students tend to score better in parallel thinking test yet intelligence is not a determinant of parallel thinking.

When the effect of intelligence was studied in relation to the effect of testing occasions, no significant difference in the test scores of different groups with respect to intelligence was reported. It may be observed that all experimental groups faired much better than their counterparts in control group irrespective of their intelligence. So it can be concluded that the strategy was equally effective for all the students irrespective of their intelligence.

6.1.2 Discussion of results pertaining to Lateral Thinking

The present study also reveals that the lateral thinking of the high school students is also enhanced when taught through Six Thinking Hats strategy. The effectiveness of the strategy may be justified considering the basic principles of lateral thinking. The first principle of lateral thinking is ‘Background’. It means lateral thinking refers to moving sideways across the patterns instead of moving along them as in normal thinking. For this there is need of alternatives in order to break free from stereotype thinking generated by the past experience. The six thinking hats strategy also does the same with six metaphoric colored hats. The second principle of lateral thinking is ‘Process’. Lateral thinking is concerned with changing concepts and perceptions with escape from old ideas and generation of new ones. Looking at the process of lateral
thinking as given by de Bono, the two basic principles, escape and provocation both were integral parts of the ‘Green Hat’. The major stress of the green hat thinking is on the conscious use of provocation. In provocation we move from the starting point to an arbitrary provocation. Then we move on from provocation to an idea or concept, after that looking back we can get the real value of the idea. The strategy thus helps to break from straightforward way of thinking and forces for good provocation. Good provocation is important for being lateral that encourages experiments in mind. It is because of this reason that high school students became capable of escaping from the obvious answers. The third principle is ‘Method’ which means the use of lateral thinking in which there is awareness of the patterning nature of mind, well understanding of the rules of lateral thinking, the application of special settings as techniques and development of new operational work. All these characteristics lie with six thinking hats strategy. Therefore the strategy was based on all the principles of lateral thinking, that may also be the reason behind its effectiveness.

One another reason behind its effectiveness may be explained as, the philosophy of six thinking hats is helpful in developing lateral thinking with white, red, black, yellow, green and blue thinking hats as reported by de Bono(1970). The concept of lateral thinking rests on the premise that there are six distinct nodes in the brain, each of which can be represented by a color node in six thinking hats strategy. Six Thinking Hats is such type of technique which can be applied to many situations in which brainstorming, problem solving, creative and lateral thinking are required. The use of this strategy benefits students’ understanding of a topic, text, or issue as they consider alternate viewpoints and outlooks on the topic, text, or issue with six different thinking hats. It is because of this probably that their lateral thinking enhanced after teaching through six thinking hats strategy in the present study. Further it can be explained that once knowledge of lateral thinking skills exists, the act of lateral thinking could cross domains and disciplines while performing problem solving activities. De Bono has even suggested that one hour in a week during the educational process may be adequate to infuse higher order thinking skills. This is also true in case of lateral thinking. Once this thinking is introduced and cognitively implemented, the emphasis would be to use it throughout future work. The same holds true for the present study which applied the six thinking hats strategy of
teaching to high school students and made them implement it through examples so that they can use it in future to think laterally.

One more reason for the effectiveness of the strategy may be that it facilitates divergent thinking and awareness so that when situations change or contexts change, students learn to view a problem or topic differently—in short—to teach students to **reflect** on their thinking and to recognize that different thinking is required in different learning situations. Students are asked to extend their way of thinking about a topic by “wearing” a range of differently colored “thinking hats.” Students deliberately focus on information available and needed, examine the problems or difficulties associated with the topic, centered on the benefits and values, studies the emotions or feelings that are generated by the topic or problem, require imaginative or creative thinking about the problem or topic, focus on metacognitive or reflective thinking about the problem-solving process. It is perhaps this way of thinking improves their lateral thinking.

Another explanation for it can be looked into the way that different techniques of lateral thinking are organized under these three broad categories; challenge, alternatives and provocation. These techniques are important part of green hat thinking. The students were trained to move forward from an idea in order to reach a new idea, to jerk thinking out of current patterns and to find best alternatives by seeing which one fits their needs and their resources through this strategy. Green hat thinking forces anyone for provocation in a quite manner. A provocation is a temporary idea that is used to encourage new perceptions and patterns and is “used for its movement value” (De bono, 1986). Thus the goal of this hat is to move on from the provocation to end up with useful ideas. For Perhaps, it is because of these reasons that lateral thinking of high school students were enhanced after exposure of six thinking hats strategy.

Still another plausible reason for enhancement of lateral thinking is that Six Thinking Hats strategy deals with creative challenge and alternatives under Green Hat. Creative challenge is totally different from critical challenge. The creative challenge refuses to accept that the current way is necessarily the best way. The creative challenge assumes that the current way is just one way which happens to be there for a variety of reasons. The creative challenge is usually expressed as “why?” “Why do we think in this way?” After one has made a creative challenge de Bono wants one to move on
the next step which is to try to find alternative ways of doing things. Here, in this strategy, the search for alternatives is a fundamental aspect of green hat thinking. There is a need to go beyond the known and the obvious and the satisfactory. This forces students to find alternate and innovative ways in collective manner. The strategy used in present study fulfill all the principles of lateral thinking, that may also be the reason behind its effectiveness in developing lateral thinking of high school students.

One more reason for the effectiveness of the strategy may be that the strategy helped to remove the errors like adversary thinking, partialism, time scale error, initial judgement, arrogance and conceit which are the major hindrance to lateral thinking. The students analyze the problem through six different perspectives with six thinking hats. It avoids partialism, biasness and helps in considering the issue or problem objectively. It is used to take one’s out of usual patterns of thinking and to generate new concepts and perceptions. So the block to lateral thinking is removed. Thus this strategy may be helpful in enhancing lateral thinking skills in high school students.

The study is further supported by Bala (2000) and Meenu (2013), who found their instructional package effective in developing lateral thinking i.e., training had a significant positive effect on the development of lateral thinking on experimental group. The six thinking hats strategy creates such an environment in classroom where students think laterally in a deliberate manner under each thinking hat about a topic or idea. It is perhaps because of this, that the strategy could effectively develop the lateral thinking of high school students.

Further, it can be noted that all the tools of thinking are simply the attention directing tools. As a self organizing system mind allows incoming information to organize itself into routine patterns resulting in concept prisons and pattern first introduced by de Bono(1972). Human brain is in habit of making patterns. It is well trained to adjust new information in relation to the old information and experiences. So a sort of sequence trap or a pattern is formed. This brings continuity in thoughts. So ultimately one ends up thinking in a very similar way. We can however, intervene so that this natural behavior is used more effectively for our purposes we can develop attention directing tools and structures. Six Thinking Hats in general along with six particular types of thinking brings discontinuing in one’s thoughts from one direction and channelizes them to a new direction. So the ultimate purpose of Six Thinking Hats as
a whole is to produce a totally new way of thinking by organizing all six ways of thinking. Therefore, the strategy helped in increasing the lateral thinking scores of the students. These results were supported by Chen (2000) and Ramlingam(2009).

Further de Bono (1972) asserted that our thinking has a unique pattern. It consists of two phases. Phase-I is the perception stage. Perception gives us a way to look at the things or situation. Second stage comes after perception stage. It is called the processing stage. Generally we are concerned with only the thinking that comes after perception. We don’t pay heed to perception as we believe that there could be only one way to look at things. We are habitual of recognizing patterns and reacting to them. These reactions come from our past experiences and logical expansions to those experiences. The strategy helps in changing the perceptions of the students and teaches them to look at the things with a new perspective. Under ‘Yellow Hat’ and ‘Black Hat’ thinking they can examine critically positive and negative points related to topic and find innovative and alternative views with ‘Green Hat’ thinking. The green hat gives an opportunity to find various possibilities. Therefore, it helps in providing them different ways to look at the problems as McGregor (2007) reported that green hat of thinking involves the cognitive processes of identification, clarification, generation of solutions, predicting consequences and evaluation of effectiveness of solutions. Probably, these characteristics of this strategy helped in enhancement of lateral thinking skills of a person. It also must be the reason for increase in the scores of lateral thinking after the teaching by six thinking hats strategy.

The results in the present study, about the effectiveness of six thinking hats strategy in lateral thinking are also in accordance with the researchers like Sheridan (1990) who found brain research based writing programs to be very useful and appealing in developing lateral thinking and suggested that the problem has some positive effects when implemented under typical class room situation. Moreover, this strategy gave exposure to different problems in teaching learning environment.

The result of the present study is supported by the study of Dimech and Pace (2003) which sought to apply the work of Edward de Bono to five kindergarten classes in Malta. This work is based on idea of ‘lateral thinking’, that divergent and creative approaches to problem solving can be more successful than linear learning. The children took part in age appropriate exercises in creative problem solving and the
kindergarten staff considered that intervention increased pupils’ self expression and confidence. So we can say that the result of the present study fall in consonance with all these findings.

6.1.3 Discussion of results pertaining to General Creativity

The present study also reveals that the general creativity of the high school students is also enhanced when taught through Six Thinking Hats strategy. The parallel thinking, lateral thinking and creative thinking are very close to each other. Therefore, it might have become possible for those who are lateral in thinking to be creative in general creativity. The reason for the enhancement of general creativity with Six Thinking Hats strategy can also be explained through Gestalt psychology. In Gestalt psychology, what an individual perceived is partly the result of the organization of the stimulus that falls on his receptors (visuals, audio or felling and brain). The training in metaphors helps in increasing the perception that puts into theoretical words all that comes up in the area of his experiences. De Bono (1995) stated “Everyone knows that instant judgment is the enemy of creativity.” It isn’t necessarily that all judgment is wrong; it’s allowing the ideas to emerge without screening them out. It is repeatedly mentioned that there is a need for a quantity of ideas for a good one to emerge. So, it is urgent to use such teaching methods/strategies which provoke students to find more and more ideas about a topic or problem to enhance creativity. Even Ristow(1988), has asserted that direct teaching of thinking skills can produce better, more creative thinkers. It can be further explained through the study of McKim (1986) who proposed that the conditions like challenge, information and flexibility can foster thinking that is productive and creative. All these characteristics lie with six thinking hats strategy. Probably, this may be the reason behind its effectiveness on development of general creativity in high school students.

The results may be explained through the findings of researchers like Stein 1975, Vengundy 1981, Feldhusen and Treffignes 1985, Feldhusen and Clinkenbeard 1986, Torrance 1972 & 1987, Feldhusen 1988 & 1990, which asserted that some deliberate instruction or strategy can help people become better creative thinkers and creative problem solvers. The study is further supported by the study of Rao (1994) and Meenu (2012) who observed that creative abilities can be developed by providing proper experiences i.e., training had a significant positive effect on the performance of
experimental group in developing creative thinking skills. The strategy used by the researcher was an effort in the same direction.

One another explanation is that variety of instructional materials and programs, both short term and long term have been developed for training creative thinking, critical thinking, problem solving in educational settings though mostly in the west. Research shows that the different techniques enhance the development of critical and creative thinking skills (Cotton 1988; Pearson 1982; Robinson 1987; Tenenbaum 1986). Baum 1990; Cotton 1988; Herrnstein 1986; Matthews 1989; Robinson 1987; Sternberg and Bhana 1986 found redirecting / probing reinforcement to effectively enhance the high order of thinking. In the present research also such strategy is adopted to redirect thinking in a new direction.

Still another plausible reason behind the effectiveness of the strategy in enhancement of general creativity of high school students is that six thinking hats strategy has a unique characteristic of overt responding with the use of six different colored hats. This calls for active participation from the students which also may be the reason for the effectiveness of the strategy. These results can be explained through Holand and Skinner (1961) who found that active participation was necessary for effective learning to take place. This type of learning encouraged them for constructive thinking. Individuals who have constructive thinking skills feel the need to improve themselves and revise what they have learned. Individuals who have not gained this skill remain rigid in relation to what was learned and are not generally creative and constructive (Demirici, 2003). Thus this strategy provided a platform to students to think creatively.

The efficacy of direct instruction in a variety of thinking skills is demonstrated in the work of Freseman (1990); Herrnstein et al. (1986); Pearson (1982) and Wong (1985), among others. The present study also adopted the direct instruction to teach the creative thinking skill instead of inferential method and found it effective. The present study based on Six Thinking Hats strategy mainly focuses on innovative and generative ideas with green hat thinking. Six Thinking Hats like any other technique of stimulating creativity, concentrates and suggests that the participants should feel with the problem or with the forces of the problem as in their Gestalt psychology. By sensing the forces in a problem and by allowing himself to follow its leads, and
individual is more likely to perceive the real problem correctly and hence to arrive at a solution. It means each aspect of problem analyze deeply with six points of view one at a time, which may represent best and creative solution of the problem. For these reasons it may be possible to enhance general creativity after exposure of the strategy.

Another plausible reason can be seen in the tests of general creativity like that of Torrance (1962). In all these tests, the main process of thinking centers around finding associations. In other words, the main items in creative tests are to test the similar uses of an element or similar name of an element, etc. In Six Thinking Hats strategy, the similar training is given to the participants in order to enhance fluency, flexibility and originality. In this way, the definition of creativity and process of creativity match that of Six Thinking Hats strategy. Six Thinking Hats is the main tool to develop parallel thinking, but through the use of this strategy general creativity has also been found to be enhanced in the present study.

The findings of the present study fall in consonance with Khatena (1973, 1975), Bates (1975), Perkins (1979), Brown (1980) and Sucheta (1990) who found that the students who could deliberate on metaphors had excellent chances of being good problem-solvers. These studies in other words, suggest that general creativity is enhanced with the help of particular method of teaching. As Marian, et al (2011) proposed that six thinking hats method is helpful in complex analysis in the field of organic food products. They used it to derive creative thinking and found that the leaders develop new competences which enable them to better analyse organic food market and to identify and gain competitive positions on it. They concluded in their paper that this method can be applied in almost any field of analysis. For perhaps, because of these reasons that general creativity is enhanced in the present study.

Further it was supported through the findings of Helgeson (1993) who asserted that there are three ingredients to teaching critical and creative thinking to children through the content areas: using relevant and real world issues; providing structure to solve problems and organize information; and a nurturing classroom environment. The six thinking hats strategy fulfilled all these conditions. As Scannell and Burnett (2010) reported that the Green hat especially stands for creative thinking. It is used to explore, investigate, decide, and, in so doing, give way to freewheeling thinking. Fisher (2005) stated that creative thinking is about generating ideas and increasing the
breadth of perception. The green hat gives direction to go-ahead to generate alternatives and explore ideas. According to Macdonald (2008) this type of thinking provides provocations, new ideas, and outrageous alternatives, with no effort to criticize or evaluate the merits of these ideas. One can use green hat thinking to shake things up and set off on a new direction. Serrat(2009) also reported that the Six Thinking Hats technique provides a common language that works in different cultures. It promotes collaborative thinking, sharpens focus, facilitates communication, reduces conflict, enables thorough evaluations, improves exploration, fosters creativity and innovation, saves time, and boosts thinking. The same was noted by Rebecca (2009) who suggested that the Six Thinking Hats technique can be applied to most topics, problems or activities. Probably, all these characteristics of the strategy may be the reasons in improving general creativity scores of high school students.

One more finding was about the effect of intelligence on the lateral thinking test scores. A significant effect of intelligence on the lateral thinking scores was noted in the study. Further the difference in the mean scores of middle and low intelligence group was very small. So we may conclude that although the high intelligence students tend to score better in lateral thinking test yet intelligence is not a determinant of lateral thinking.

When the effect of intelligence was studied in relation to the effect of testing occasions, no significant difference in the test scores of different groups with respect to intelligence was reported. It may be observed that all experimental groups scored much better than their counterparts in control group irrespective of their intelligence. So it can be concluded that the strategy was equally effective for all the students irrespective of their intelligence.

One more finding was about the effect of intelligence on the general creativity test scores. A significant effect of intelligence on the general creativity scores was noted in the study. The result is explained through Skinner (1958) who found that the active participation was necessary for effective learning. These results are at par with those of Pathak (1962), Dhailwal and Saini (1976), Dey (1984) who reported positive and significant relationship between intelligence and creativity. Researchers by Sharma (1974), Joshi (1974) and Chaudhary (1983) also reported positive and significant correlation between intelligence and creativity. These results are at par with the result
of Perkins(1995) who posits that intelligence is learnable and that it can be cultivated through reflective, meta-cognitive strategies, thinking attitudes and thinking styles. Further the difference in the mean scores of middle and low intelligence group was very small. So we may conclude that although the high intelligence students tend to score better in general creativity test yet intelligence is not a determinant of general creativity.

When the effect of intelligence was studied in relation to the effect of testing occasions, no significant difference in the test scores of different groups with respect to intelligence was reported. It may be observed that all experimental groups achieved higher than their counterparts in control group irrespective of their intelligence. So it can be concluded that the strategy was equally effective for all the students irrespective of their intelligence.

6.1.4 Discussion of results pertaining to Argumentativeness

The present study also revealed that six thinking hats strategy of teaching helped in improving argumentativeness of high school students. The reason for this may lie in the characteristics of argumentativeness. Argumentativeness is a trait that enables a person to recognise controversial issues, to present position on the issues, and to attempt refutations of other’s positions (Infante and Rancer,1982). This trait is seen as the interaction of the tendency to approach arguments and the tendency to avoid arguments. The strategy used in the present study forces the students to express their views about a topic or an idea under each thinking hat. It improves their communication skills and decision making abilities. Further it can be explained by the study of Andrews, et. al (2006) who reported that to improve argumentation skills there is need to find ways of stretching students’ understandings beyond their prior educational experiences, recognising argument that happens elsewhere, structuring activities to highlight this, and integrating argument more fully into the learning and assessment process as a whole. No doubt these results were in contrast with Infante and Rancer (1982) who reported that argumentativeness is a generally stable trait which predisposes the individual in communications situations to advocate positions on controversial issues and to attack verbally the positions which other people take on these issues. But with six thinking hats strategy it may be possible to improve argumentation level of a person. Because this strategy creates a framework for thinking that incorporates our primary thought modes into objective, subjective,
critical and creative manners. Conceptualizations of argumentativeness that have strong affective, attitudinal, and motivational as well as intellectual dimensions also need to be explored and this exploration can be done easily by six different imaginary thinking hats. It is necessary to determine the balance between affective, intellectual, attitudinal and motivational elements in argumentation. This strategy is also helpful in doing this. The ‘mapmaking’ style of six thinking hats strategy facilitates exploratory thinking and may provide a valuable alternate to supporting and defending a position through argument and debate. Probably, for these reasons, the strategy may be helpful in enhancement of argumentativeness of high school students.

Further, it can be noted that the results in the present study about the effectiveness of six thinking hats strategy in developing argumentativeness of high school students are in contrast with the study of Carl III (1995) who found that there is no significant relationship between argumentativeness and response to six thinking hats strategy. But the results of the present study are consistent with the findings of Bakhtin (1986), Entwistle et al. (2004) and Hounsell et al. (2004) who reported that students also need to be given opportunities to express their argumentation regarding an issue or topic in different disciplines in order to improve their argumentation level. Six thinking hats strategy provides such an environment which provokes the students for argumentativeness by using six colored thinking hats. This strategy improved communication skill and decision making ability among students and group members as advocated by de Bono. Thus it provides a smooth environment in which group members perceive argumentative interaction. According to Hirokawa (1982), arguments are the most frequently used rhetorical strategy in group communication, and that arguments supported by "good reasons" (fact opinion, or inference which members believe to be a good justification for changing their opinions) appear to have an exceedingly strong influence on group members. For these reasons, probably this strategy may be helpful in improving argumentativeness of high school students.

Further, it can be noted that argumentativeness is helpful to resolve conflicts harmoniously and constructively. Six thinking hats strategy in general along with its six different metaphoric hats resolves conflicts among students about the topic/issue. Another aspect of this strategy is that the hats may reduce negative ego-involvement during controversial discussions and may increase participation within the groups. So its ultimate purpose is to encourage the students for co-ordinated and co-operative
thinking which is constructive in nature. This allows them to use their argumentativeness in each thinking hat about an idea/topic. It also may be the reason for enhancement of argumentativeness in students after exposure of six thinking hats strategy.

The explanation and reasons given in the preceding paragraphs show that six thinking hats strategy of teaching, because of its process and activities involved under each thinking hats helpful in enhancing of parallel thinking, lateral thinking, general creativity as well as argumentativeness of high school students.