CHAPTER 8
FINDINGS, IMPLICATIONS AND SUGGESTIONS

This chapter is devoted to report the findings of the study based on the analyses of data. It is followed by the educational implications and few suggestions for further study in this direction.

8.1.0 Findings of the study

The present study was conducted with respect to the effectiveness of the creativity training program on different factors of concept map performance test as well as on its summative scores and summative scores of scientific creativity test. Concept map performance test has four main factors of components. These are: proposition, hierarchy, cross links and examples. Besides this, the relation between scientific creativity and concept mapping ability was also found out to know the extent to which both are related. The results are based on quantitative as well as qualitative analysis. The salient findings, emerged out of the experiment, relating to the same have been presented in the following section.

8.1.1 Quantitative analysis

In the present study the concept map performance test was considered to be having four factors viz. proposition, hierarchy, cross links and examples. The results have been reported first of all for each factor and then for summative scores of all these four factors called as concept mapping ability respectively.

A) Findings related to effectiveness of creativity training program on concept map performance test.

Proposition

1) It was observed from the analysis that proposition factor of concept map has obtained the F- ratios highly significant for all the simple effects namely methods (F=26.69), occasions (F=975.1) except grade levels and intelligence level.
2) The testing occasions had significant interaction effect with all other simple effects and other higher order interactions. Testing occasions were very well interacting with method (F= 75.05) clearly indicated that the students of experimental group was more creative as compared to the control group when creativity training program was used. However, testing occasions have not shown any indication of interaction with class and intelligence groups.

3) From the analyses of mean scores, it was found that the students of experimental group achieved higher scores (M=8.06) than control group (M=6.5). So, it was concluded that creativity training program was effective in enhancing proposition component of concept mapping ability in experimental group.

4) Further, it was noticed that class and intelligence was not found to affect the results of proposition factor of concept map performance test. There was no significant difference between the grade IX & X and level of intelligence regarding the same.

5) The analyses further clarified that significant difference existed among the students of control and experimental group when they were pre –tested and post- tested. The experimental group achieved higher mean score (M=9.2) on the post test than their counterparts (M=6.2).

6) So, it is evident that creativity training program was helpful in increasing proposition ability of secondary school students.

Hierarchy

1) The analysis revealed that the creativity training program applied on simple effects were highly significant for different grades (F=31.83), methods of teaching (F=43.5) and testing occasions (F=188.5) but not with intelligence levels.

2) The testing occasions had significant interactional effect with all other simple effects and other higher order interactions except with intelligence levels. Testing occasions were very well interacting with grade levels (F= 4.20) and method (F= 46.0) clearly indicated that the students of experimental group of both grade levels were more creative as compared to the control group when creativity
training program was used. However, testing occasions have not shown any indication of interaction with intelligence groups.

3) From the analyses of mean score it was found that the students of experimental group achieved much higher mean scores (M=7.3) on hierarchy component of concept map performance test than their counterparts in the control group (M=5.3). It indicted that hierarchy ability was much higher in the students of experimental group than control group.

4) It was also found that the different grade levels have different effect of creativity training program. Grade X was having higher mean score (M=7.3) than the grade IX ( ). This means the ability to differentiate the concepts (on the basis of how important they are) was more in grade X students (M=5.5). It can be attributed to the fact that maturity level of class X students was high pertaining to their age, experience, knowledge and understanding. Therefore, these students performed better than grade IX students.

5) Also, there was significant effect of testing occasions on the hierarchy factor of concept map performance test. It was clear from the mean scores that students achieved higher (M=7.4) in their post test rather in their pre-test (M=5.2). It meant that after experiment, students scored higher scores on concept map performance test.

6) It was found that grade X students of middle and low intelligence group achieved highest scores (M=8.5) in hierarchy. Grade X students of high intelligence group achieved second highest scores (M=7.5) in hierarchy. The middle intelligence group of grade IX achieved lowest scores (M=4.2). Moreover, the students of both grades who were taught through conventional method achieved lower in all the three intelligence groups than the students who were taught the creativity training program.

7) Concept mapping ability with regard to hierarchy has shown good impact of creativity training program over the conventional method of teaching.

Cross link

1) The analysis revealed that the creativity training program applied on simple effects for cross link factor of concept map performance were highly significant in
case of methods of teaching (F=23.08) and testing occasions (F=122.2) but not with grade levels and intelligence levels.

2) The testing occasions for cross link factor of concept map performance had significant interaction effect with all other simple effects and other higher order interactions except with intelligence levels. Testing occasions were very well interacting with grade levels (F= 18.56), intelligence levels (F= 3.51) and method of teaching (F= 106.2) clearly indicated that the students of experimental group of both grade levels belonging to different intelligence levels were more creative as compared to the control group when creativity training program was used.

3) Further, the students of experimental group achieved higher mean scores (M= 4.1) for cross link factor of concept map performance than their counterparts in control group (M= 1.7).

4) Testing occasion has also shown a significant difference in the mean scores. It means that the students of experimental group and control group, when pre-tested and post tested collectively, showed major differences for cross link factor of concept map performance in the mean scores of post test (M=4.4) and pre-test (M=1.5).

5) Grade IX students of low intelligence group achieved highest scores (M=5.8) for cross link factor of concept map performance. Grade IX students of middle intelligence group achieved second highest scores (M=4.4) in cross link. The low intelligence group who were taught through conventional method of grade IX achieved lowest scores (M=0.5).

6) Moreover, the students of both grades who were taught through conventional method achieved lower in all the three intelligence groups than the students who were taught the creativity training program. This indicated that irrespective of intelligence creativity training program was proved to be effective in enhancing cross link factor of concept mapping ability than conventional method of teaching after the experiment.
Example

1) The creativity training program applied on simple effects were highly significant for different grade levels \((F=9.57)\), methods of teaching \((F=23.76)\) and testing occasions \((F=383.0)\) for example factor of concept map performance test.

2) The testing occasions had significant interactional effect with all other simple effects and double, triple and quadruple interactions for example factor of concept map performance test except with intelligence levels. The testing occasions were very well interacting with grade levels \((F=12.20)\) and method of teaching \((F=57.3)\) clearly indicated that the students of experimental group of both grade levels were more creative for example factor of concept map performance test as compared to the control group when creativity training program was used.

3) The students of experimental group achieved slightly higher mean scores \((M=2.2)\) of example component on concept map performance test than their counterparts in the control group \((M=1.4)\).

4) Moreover, the different grade levels have different effect of creativity training program for example factor of concept map performance test. Students of grade X was having higher mean score than the grade IX. Also, there was significant effect of testing occasions on the example factor of concept map performance test. It was clear from the mean scores that students achieved higher \((M=2.6)\) in their post test rather than in their pre-test \((M=1.0)\).

5) Students of Grade X belonging to middle intelligence group achieved highest scores \((M=3.0)\) in example. The low intelligence group who were taught through conventional method of class IX control group achieved lowest scores \((M=0.7)\).

6) Creativity training program was proved to be effective in enhancing example factor of concept mapping ability than conventional method of teaching after the experiment.

Total Concept Map Performance or Concept Mapping Ability

1) The creativity training program applied on simple effects were highly significant for methods \((F=60.8)\) and testing occasions \((F=338.04)\) but not with grade levels, intelligence levels having value and respectively.
2) Testing occasions were very well interacting with grade levels \((F= 4.84)\) and method of teaching \((F= 106.38)\) clearly indicating that the students of experimental group of both grade levels were more responding to concept map performance test as compared to the control group when creativity training program was used.

3) From the analyses of mean scores, it was found that the students of experimental group achieved higher scores \((M=21.8)\) than control group \((M=15.0)\) on concept map performance test. So, it was concluded that creativity training program was effective in enhancing overall concept mapping ability.

4) The significant difference was existed among the students of control and experimental group when they were pre -tested and post- tested. The experimental group achieved higher mean score \((M=22.7)\) on the post test than their counterparts \((M=14.2)\).

5) Further, students of grade X belonging to middle intelligence group achieved highest scores \((M=23.7)\) in overall concept map performance test. The low intelligence group who were taught through conventional method of class IX control group achieved lowest scores \((M=12.1)\).

6) Overall mean scores of concept map performance test of experimental group were also better than control group who were taught through the conventional method of teaching. So, it is evident that creativity training program was helpful in increasing concept mapping ability of secondary school students in concept map performance test.

**B) Findings related to effectiveness of creativity training program on summative scores on scientific creativity test.**

1) The creativity training program applied on simple effects of scientific creativity test were highly significant for different methods of teaching \((F=29.41)\), intelligence levels \((F=17.97)\) and testing occasions \((F=1367.16)\).

2) The testing occasions were very well interacting with grade levels \((F= 33.85)\) and method of teaching \((F= 91.28)\), intelligence levels \((F= 186.94)\) clearly indicating that the students of experimental group of both grade levels of all intelligence
groups were more creative in scientific creativity test as compared to the control group when creativity training program was used.

3) The students of experimental group scored higher (M=66.3) than their counterparts (M=57.9) on scientific creativity test.

4) The students of high intelligence group achieved higher mean scores (M=67.5) on scientific creativity test. Low intelligent group achieved lowest scores in the scientific creativity test (M=56.2).

5) Testing occasion has also shown a major difference. Post test scores (M=70.6) were much higher than pre test scores (M=53.7) on scientific creativity test.

6) Students of grade IX belonging to high intelligence scored highest scores on the post test for overall scores of scientific creativity (M=70.3). Grade IX students of low intelligence achieved lowest scores (M=53.6) on the post test for overall scores of scientific creativity.

7) The experimental group achieved higher mean score (M=70.6) on the post test than their counterparts (M=53.7). So, it is evident that creativity training program was helpful in increasing scientific creativity of secondary school students.

C) Findings related to relationship between concept mapping ability and scientific creativity of secondary school students.

There was positive relationship between scientific creativity and concept mapping ability of secondary school students. This finding indicates that the students who performed better on scientific creativity test scored better in concept map performance test.

D) Findings related to effect of creativity training program on depth of understanding of concepts in secondary school students.

The students of experimental group were more attentive during concept map designing. These students were also creative while making new linkages as well as providing new meanings to the older ‘concepts’. Thus, this type of collaborative learning helped the students of experimental group to understand the deeper meaning underlying a particular ‘concept’ after creativity training program. Therefore, it can be concluded that
creativity training program enhanced the depth of understanding the concepts in secondary school students.

8.1.2 QUALITATIVE ANALYSIS

The qualitative analysis was carried out on selected students as it was not possible to carry analysis on all the students. Therefore, two students from each category (i.e. achieving top score, achieving lowest score and top gain score after treatment) were selected. Analysis was carried out by three approaches (i.e. analysis of structural change and learning quality, use of expert terms, analysis of richness and individuality of student understanding) to study the conceptual richness score, linkage quality score, propositional score and hierarchy & structural score along with the quality of the learning i.e. deep, surface or non-learning. In addition, as the concept mapping was a new technique for students, therefore, it was of utmost importance for the investigator to know whether the low scores in concept map test were due to less practice on the part of students or creativity training program has not shown any effect on these students. For this purpose semi-structured interview had been conducted on both topics i.e. concept mapping technique and creativity training program. Interview was also scheduled to know the process that goes in the minds of children during training by creativity training program and preparing the concept maps.

A) The findings regarding the effectiveness of training program in term of analysis of structural change and learning quality in concept map performance test of secondary school students

1) It was found that creativity training program has affected the structure of concept map of students positively. Prior structure of concept map of students of the all three categories (top scorers, low scorers, and top gain scorers) was ‘spoke’ type. After creativity training program the concept map structure was ‘net’ type. A ‘net’ type structure is thought to be “a highly integrated and hierarchical network demonstrating a deep understanding of the topic” (Kinchin, Hay, and Adams 2000).
2) Analysis of learning quality revealed that the students who achieved top scores in the concept map performance post test showed surface-learning. The students who achieved low score on the post test showed non-learning quality of learning and the students who achieved highest gain score showed deep learning.

B) The findings regarding the effectiveness of training program in terms of use of expert linking terms in concept map performance of secondary school students

The students of the three categories selected for the purpose of qualitative analysis have used more than 15 expert terms in their concept maps in comparison to the expert map. There was a considerable change in the use of expert linking terms after exposure to creativity training program.

C) The findings regarding the effectiveness of training program in term of analysis of richness and individuality of understanding of secondary school students

The analysis was done on four sub-aspects (Concept richness score, Linkage quality score, propositional score and hierarchy & structural score) of richness and individuality of understanding aspect of the concept map performance test. The findings of this have been given in the proceeding paragraphs.

1) The students who achieved highest in concept map performance test showed a gain of +1 conceptual richness score, +7 to +9 in propositional scores, +1 to +2 in linkage quality score and no gain in hierarchy & structural score in their concept map performance test. The students who achieved low scores in their concept map performance post test showed gain of +/-1 conceptual richness score, +0 to +2 in linkage quality score, +2 to +3 propositional scores, +1 gain in hierarchy & structural score. The students who achieved highest gain score in their concept map performance test showed gain of +8 to +9 in conceptual richness aspect, +8 to +15 in linkage quality score, +5 to +10 in propositional scores, +1 to +3 gain in hierarchy & structural score.

2) The students who achieved highest in gain scores of concept map performance test have the highest conceptual richness score. The students who achieved
highest in gain scores of concept map performance test have the highest linkage and linkage quality score.

3) The students who achieved highest gain scores in the post test have a broad range in gain of propositional score.

4) The students who achieved highest score in concept map performance test post scores showed even a good gain in hierarchy score revealing the better complexity and validity of the concept map structure.

5) Moreover, the students showing deep learning quality have represented highest conceptual richness score and the students showing surface learning quality showed higher conceptual richness score in comparison to the students having non-learning quality.

Since these students have shown gain in their conceptual richness score, propositional scores, linkage quality score and hierarchy & structural score, therefore, it can be concluded from the above discussion that there was positive effect of creativity training program.

D) The findings regarding the effectiveness of training program in term of Interviews and Case-study of secondary school students

The case studies and the interview of top scoring and lowest scoring students showed that there was a perceived change in the moral and social values of students along with the effect on their creative thinking abilities after the exposure with creativity training program. Findings of the case study and interviews can be summarized as under:

1) There was a change in the creative thinking ability of all the students as they could put forward their ideas more fluently. They became more open-minded in their thinking. They began to think in multiple directions and became more active thinkers.

2) On individual level each one became confident in solving problems and open to take challenges in real life situation.

3) All the students admitted that creativity training program had helped them to think solutions to a problem in another direction rather than the one path beaten by
everyone. Concept mapping technique had helped them to know their misunderstanding about the concepts and better understanding of topic.

4) There was a considerable change with regard to social and moral values, of course. They showed a change in their viewpoint about other students after the treatment. Now they were able to accept views given by any individual in better way and put forward their ideas in decent manner. The participation in group activities increased in the subjects after the treatment.

It is concluded that treatment played an important role in developing positive attitude and generated more flexibility in them. They became more systematic in dealing with social problems, became active in discussions, cooperative and innovative in their ideas as well as in action.

8.2 EDUCATIONAL IMPLICATIONS

The overall findings of previous studies and results of the present study demonstrated that creativity can be taught and creativity training can be beneficial for improving creative abilities of students of varying abilities. The study revealed that teaching children to become effective creative thinker is increasingly recognized as an immediate goal of education. In recent years societal demand for higher order thinking has generated a strong interest among educators in the teaching of thinking skills. The students require high order thinking skills i.e. problem recognition, findings new solutions etc. so that they can become effective learners. If students are to function successfully in a highly technical society then they must be equipped with lifelong learning and thinking skills necessary to acquire and process information in an ever changing world.

Concept mapping appears to be a technique worthy of use by teachers to teach their students because it is a valuable technique “for helping students learn about the structure of knowledge and knowledge of production, or meta-knowledge” (Novak and Gowin, 1984, p. 8). Additionally, as students become more proficient or engaged in constructing concept maps, they learn how to learn and become better at learning (Novak, 1998). Furthermore, as a tool for learning, concept maps are well supported by cognitive theories of learning. More importantly, experimental investigators have concluded that
concept mapping technique has positive effects on the learning of both student with and without learning problems, and improves their learning in a wide variety of subject areas such as reading, writing, biology, chemistry, and mathematics.

The study further asserts that training in a method of direct thinking skills affects the thinking of students. Instruction in direct thinking skills promotes intellectual growth and foster lateral as well as creative thinking. Consequently, it becomes the duty of educators to realize the importance of teaching thinking skills to students. The creativity training program in the present study provides real life problems in front of the students and helps them to find out the solutions in more practical way through unorthodox methods or elements which would normally be ignored by logical thinking. So the training programs like this are urgently needed. This method is not only effective in developing creative thinking; it also was also found to inculcate positive attitude among students. The findings of the present study have implications for all those linked with education programme in general and particularly to students, teachers, parents, educationists, curriculum planners, administrators and policy making apex bodies like NCERT etc. The study is even beneficial for management people, firms, industries, companies and institutions which pay millions on their Research and Development sections yet are in dearth of new ideas.

1) Students: The study has its implications for the students in general in every sphere of life. Being a skillful thinker in this new millennium is of paramount importance. Today, because of the information explosion, a child is bombarded with a lot of information. Out of this huge pile, searching for the relevant information is a cumbersome task in itself. The left over information gets accumulated as information garbage. The call of the day is to recycle this waste i.e. converting this information garbage into the wonderful new ideas, which are definitely a must for equipping students to stay competitive in this ever changing and highly competitive world. This creativity training program as well as concept mapping technique program can help students in developing a thinking that is essential for innovations, generating new ideas and being open to new perspectives and new dimensions. It can open a new Pandora of opportunities for the students. They can learn to use the discarded or even the absurd information in a meaningful way.
Students can well understand and utilize the tool. They can practice techniques like PMI, AGO, C&S, random juxtaposition for generating new ideas and later may switch to some other methods and techniques for development of creative thinking. The method can prepare them in searching various alternatives in their life-situations. The progress in this direction will surely help them while facing competitive exams like admission tests, intra and inter school competitions etc. Even the program and its thinking exercises can provide them great leisure time activity and when used in a group with friends, they can use the strategies in form of interactive games where a child who suggests maximum ideas wins. It can be developed as a hobby also.

The techniques challenges for change that can prepare the students in encountering obsolete ideas, which in spite of losing their practical value, are still prevalent in our Indian system. Various customs, superstitions and beliefs are product of such things, initiating a revolutionary change in the Indian system which even today is more based on traditions and not on scientific observations and justifications.

The student life is full of stress and strain that generally gives birth to rage, anger and aggression. The students become adamant and inconsiderate to the other people’s views. They do not accept others ideas easily. They have their own moral values and ethics and do not want to be changed by anyone’s pressure. Consequently, during the most difficult circumstances whether domestic problems, study related or peer group pressure, they are prone to suicidal attacks or drug addiction for escapism from the difficult times. A trained student will be able to face the most difficult images in their life. It would train them in finding way out even in the most complicated situations. This would help in counteracting suicidal tendencies, escapism through drug addiction or aggressions in the most sensitive periods of student life. The present research clearly indicates that the students trained in this method were more accepting to other people’s views and became more tolerant to opposition.

The creativity training method is equally suitable to students of all age group as well as mental abilities i.e. from college going students to school going kids, from gifted children to mentally retarded children (Alkhatani, 2009; Russel and Meikamp 1997). Creativity training program has a positive influence upon not only the thinking abilities but also generates great moral and social values like flexibility in outlook, open
mindedness, positive attitude, cooperation and problem-solving. So they must make all the possible arrangements for encouraging students to perform such activities. They must make more and more of these programs available to the students.

2) Parents: The study has its implications for the parents also. Through the creativity training program they can develop creative thinking skills in their children as well as in themselves. The exposure to such methods can shape their own thinking and belief systems. The mother and father have the responsibilities to organize such an environment that can help in fostering higher thinking skills in their child. The exposure to creativity training program can give a bounce to the thinking of the parents also. It can help in filling the generation gap. The study provides the parents an opportunity to reflect back as they are the first person who can start the training of their children in thinking skills at an early age. Their acceptance for the new methods as the idea generating tools can significantly help the children who themselves are good thinkers. They would become more understanding to the thinking of their new generation after exposure to such thinking methods. The fear to experiment something new and the rigidity in the belief system make them conservative which become intolerable to their children. The creativity training program can give them an opportunity to broaden their vision and accept even the rarest possibility. In this manner they may feel more connected to their own children.

After themselves being trained in such a method they can provide such a congenial environment to their child where the child also gets mastery over such methods bringing in positive changes in his own behavior. The parents trained may resort to the discussions and free talk with their children instead of imposing their discussions on them. They can also create situation where the child gets an opportunity to learn and use this techniques at a very early stage. Even simple issues like what to cook or pocket money can become a matter of producing new ideas and thinking laterally.

3) Teachers: The majority of today's schools include students with a wide variety of abilities and learning characteristics. The students bring these different mental abilities and learning characteristics to the classroom without a doubt. Creativity training program
is equally suitable for them all. Moreover, Concept maps (which represent the student's knowledge structure on a particular topic and own understanding of a specific material) are very supportive in helping teachers in celebrating and highlighting individual differences in learning among their students. In addition, teachers can employ concept maps to take advantage of the students' diversity by using it as a collaborative tool. Collaborative mapping allows teachers to teach students in group and correct student’s misconceptions while discussing the concept maps in group. More importantly, it gives students who have difficulty in understanding a topic, the chance to get an explanation from their teachers as well as from the peers.

4) **Teacher educators:** The study has its implications for teacher-educators and those teachers who are engaged in the training of new generation of teachers. The teacher educator must be trained in creativity training program so that after building up their own experience, they may help in developing such thinking skills in would be teachers. The findings of the study strengthen the assumption that teacher themselves are good learners. They can master just any new teaching strategy and implement almost any kind of sensible curriculum if appropriate conditions are provided. Through the creativity training program, teacher educators can orient themselves and improve themselves and their own thinking skills. The teacher-educators by using such methods can produce such teachers who will be the investigators of new thinking among students. If the teacher-educators train the teachers in such alternative method/models/strategies of teaching, it will enable them to apply these methods during their class-room teaching.

Creativity training program can also help the teacher educators in developing the competence in idea generation in themselves as well as among pre-service and in-service teachers. Therefore, educators should encourage students to think and behave creatively by teaching them creativity enhancing techniques. Educators also should nurture students' creativity by providing them with creativity training. Given the intricate relationship between creativity training and improved creative abilities, educators are supposed to integrate creativity enhancing techniques (e.g. brainstorming, analogies, problem solving, questioning techniques and, open-ended activities) as an essential part of the activities performed daily in each subject of the school curriculum. These techniques develop
creative abilities (fluency, flexibility, originality, and elaboration) which are essential to the students' learning and future successes. For example, creativity enhancing techniques encourage and assist students in thinking not only about what they think, but how they think. Thus, they will learn how to learn and take an active role in their learning.

5) Student teacher/Trainee teacher: The study has its implications for the training of new generation of the teachers. A teacher needs to be prepared in relation to the needs and demands arising in the school context, to engage with questions of school knowledge, the learner and the learning process. The creativity training program as well as concept mapping technique can provide a very strong base for bringing a change in thinking of our future teachers as well as making the educational reforms a smooth pathway. It can train the future teachers with some latest idea generating tools. The student-teachers after achieving the mastery over it can use the method in their class and practice the strategies individually or in groups to be able to effectively use them to generate new ideas about the given topic. Circumstances and situation in the job area often restrict the choices of alternatives. Such challenges open new path for alternatives by blocking the routine path. By using the simple techniques given in the training program would present numerous alternatives and choices.

6) In-service Teachers: The study has its implications for in-service teachers. A teacher functions within the broad framework of the school education Teacher who themselves are effective thinkers, serve their students well. It is therefore imperative that the in-service teacher are trained, which will make inputs to the teachers so that they may develop a new thinking that can match to the thinking of further generations. Moreover, academic staff colleges may run such faculty development programs (FDP) that emphasize on creativity training program and concept mapping technique. Further, after the training, the teachers will be able to make use of these methods in their classroom situation and ultimately provides their students a teaching environment involving higher order thinking skills. They can help their students in findings as many ideas as possible by arranging and rearranging their thinking manners in different situations. They can help them in searching for as many alternatives or choices as
possible in every field of life whether making educational or vocational choices. The teacher trained in creativity will themselves be full of ideas.

For example the strategies like “challenge for change” can bring a major change in the outlook of the teachers. They will realize that even the established facts can be challenged to bring some change in them. This will definitely change their perspective about authority, about the conventional methods of teaching. They will become more open to the students’ problems and will be more democratic in the class-room. After learning such methods they will be full of ideas so will learn to improvise instead of cribbing about lack of facilities. They will learn to use even anything and everything to illustrate the content instead of complaining about unavailability of fancy teaching aids.

Further, one of the biggest challenges before the new generation teachers is maintaining the discipline without corporal punishments. After exposure with the training program, the teachers will be able to convert even the most provoking situations into some fruitful and productive situations. They will learn to replace conflicts and aggression with discussions and cooperation. Inclusion of new teaching methodologies and active participating from the students will further help in attaining the interest of students and keeping them well motivated. This would ultimately make not only the students but even the teachers internally disciplined.

7) Curriculum Planners, Policy maker and Administrators: The findings of the present research once more asserted the need of thinking skills among students. The biggest challenge today is to develop educational programs that assume that all individuals and not just genius can become complete thinker. There is an urgent need to develop such educational programs which will transform the teaching of ordinary school subjects in a way to focus on creative thinking and strengthen the skill of creativity in students. The creativity training program as well as concept mapping technique can efficiently strengthen the present curriculum without bringing any major change in the curriculum. It can be integrated in the curriculum also. Just like the other subjects, some special time can be planned based on the module that may invoke the interest of the students in such programs and ultimately make the students well trained in such methods. For this purpose, the curriculum planners, policy makers and administrators can make it
essential for educational institutions to form Thinking Clubs where the students can practice different thinking tools and concept mapping technique.

8) Business and Management Studies: As opposed to the traditional belief, the study focuses on the ideas that are not immediately obvious. So the study and the method have its implications for the firms and companies who always feel the dearth of new ideas. The management people also need to be trained in such methods so that they can have a change in their outlook towards the problems and may become capable of findings novel ideas to solve these problems. The study has its implications even for a common man who can learn the methods suggested in the module to bring change in their attitude as well as solve their day to day problems.

The results of the study and implications delineated in the preceding paragraphs show that the creative thinking skills are of utmost importance in today’s human life. If the name and fame of the country has to be enhanced for brighter society, conscious efforts need to be made to develop creative thinking. The teacher-educators, teachers, parents, students and country-men in general have to adapt to such new methods and skills.

9) Media: The result of the study and the implications delineated in the preceding paragraphs show that creativity is the *summun bonum* of individual’s life. If the future of India has to be enhanced for brighter society, then the students have to be made creative in their thinking. The writers, the media men of India have to bring in creative thinking tools in their teaching, writings as well as projection of ideas. These personnel can adopt different thinking tools as per the demands of their profession to make creative use of language.

8.3 SUGGESTIONS FOR FUTURE RESEARCH

As with all studies, the current study has raised many further questions and issues for future work. These suggestions are either derived directly from the results of the present study or made based on the literature reviewed for this study. The present study has its own limitations and delimitations. Therefore it is desired that similar studies may be
conducted after overcoming the limitations. Further, the experimental studies like this need to be repeated and done in a different cultural setting so as to test the reliability and validity of the findings and arrive at generalization. However a few suggestions regarding further research possibilities in the field have been put forward as under:-

- There has been more than fifty five years of research on the topic of creativity, yet, among both investigators and leaders of this field there is no agreement on what creativity is, or how to assess it. However, the need for more qualitative and quantitative research for assessing and developing creativity is one point that was clear and approved by everyone who works in the field of creativity. Additionally, concept mapping technique has been a research topic for more than three decades, yet, to date, it is rarely used as a research topic in our country with creativity. Therefore, more research still needs to be done in these areas.

- Experimental results from the present study have demonstrated the feasibility of creativity training in enhancing students' creativity scores and performance on the concept maps. These results are interesting and highly promising for further study using different research designs which may be provide us with more information and details.

- Since the present study did not address the effect of the creativity training on students' self-concept/self-efficacy, students' behavior and social skill development, and students' academic achievement achieved in a variety of curriculum areas such as reading, writing, and mathematics further studies could investigate these areas.

- Future research also could evaluate the effect of creativity training over a longer duration, and the long-term advantages of it by following up retest after several months of the training.

- Results of the present study add to a large number of experimental results on the CoRT thinking lessons which have confirmed the usefulness of using it to enhance students' thinking skills. However, the present study used only twenty lessons from CoRT 1, 4, and 6. Therefore, an examination of the other parts or the entire programme is suggested for further study.
➢ Since the present study was conducted on secondary school students, therefore, a similar study for the effectiveness of the creativity training program on concept map can be conducted on primary school, senior secondary and college going children.

➢ A similar study for effectiveness of the creativity training program on concept map can be conducted on management students, teachers (in-service and pre-service) and professionals.

➢ A comparative study of effectiveness of the creativity training program on concept map of students from government aided institution may be conducted.

➢ A comparative study of effectiveness of the creativity training program on concept map for female and male students may be conducted separately.

➢ The concept maps can be converted in an ICT enables program quite conveniently. The effectiveness of such a program can be studied and even compared with pen-pencil concept maps.

➢ An experimental study can be undertaken to explore the attitudes, willingness, reaction and perception of students, teachers, principals and teacher-educators towards the creativity training program.

➢ A similar study can be designed for students belonging to different socio-economic status.

Conclusion

An eye opener in this study was the important difference between what teachers typically consider learning and what it really is. Many teachers believe that learning is simply asking students to cram certain part of text in their best way. This is what happens with many teachers in their school and this situation might have contributed to the difficulties encountered by the teachers. This is why, in my opinion, teachers need to be introduced to a variety of creativity training methods and concept mapping technique that can be applied in the classroom. Teachers also need to be aware of the difference between visual technique and oral techniques. Visual teaching offers an effective tool for students to develop understanding in better way. Investigators and theorists have made the observation that today's students are the most visually stimulated generation to have
come through the educational system. It is both professional and logical to teach these students in the way that they learn best—with visual stimulation as an accompaniment to other strategies of quality teachers.

Another insight that I gained from this study is the difficulty of applying new teaching strategies in isolated classrooms and the need for a combined effort to apply these strategies across subject areas and grades for them to result in positive outcomes. By the time the students reach secondary class, they have 9 and 10 years of experience with traditional teaching strategies that have considered them as passive rather than active learners. This history might result in students having a mindset that considers memorization the only successful strategy that leads to success; something that I have seen as a teacher. It may be there that applying a new teaching approach i.e. concept mapping technique (that is not aligned with students’ mindsets) might take a long time to be successful and might require a deliberate and planned process of conceptual change.

A final insight that I gained from this study is the difference between practical and statistical significance. The group that showed best results in the use of concept mapping was known to be the average achieving group academically among the other groups that participated in the study. Therefore, even though the differences between this group and the other groups were not statistically different, they were practically significant because this group was equivalent to the other groups in terms of achievement at the end of the study.

Human creativity, to date, is difficult to define and evaluate, but it is valuable and can be taught. Teaching creativity to children through the CoRT thinking lessons was the focus of this study. The initial results which are very interesting and highly promising show that creativity training did benefit children. Therefore, teachers should design and establish educational activities and environments in which the creative abilities of children can be developed. Additionally, children should also have the opportunity to enter creativity programmes in their schools. However, since research in this area is limited, further works still needs to be done.