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.

8.1.0 FINDINGS
The study was conducted with respect to the effectiveness of the training module in PO method in developing lateral thinking. For the same the investigator constructed a lateral thinking module as well as a lateral thinking test. Then the effectiveness of the module was studied by Pre-test Post-test design. The results are based on quantitative as well as qualitative analysis. The findings relating to the same have been presented in the following section: -

8.1.1 Quantitative analyses
The module was tested quantitatively for its effectiveness. In the present study the lateral thinking was considered to be having four factors viz. vertical thinking, escape, originality and outrageousness. The results have been reported first of all for each factor and then for summative scores of all these four factors called as lateral thinking, respectively.

The module was found to be highly effective in developing lateral thinking on the basis of following findings: -

a) Effect of training module in PO method on the factor, Vertical thinking of lateral thinking:

1) It can be observed from the analyses that the student-teachers of experimental group achieved much lower mean scores of vertical thinking than their counterparts in control group. The vertical thinking ability was much lower in experimental group and PO method is not effective in the development of vertical thinking.

2) Intelligence was found to affect the results on vertical thinking test. The student-teachers with high intelligence achieved slightly lower vertical thinking mean scores than their counterparts with medium or low intelligence. Further tendency to think vertically decreased after the treatment, i.e. post-test. The student-teachers achieved lower mean scores at post-test than at pre-test.

3) Significant differences existed among student-teachers of experimental and control groups when they were pre-tested and post-tested. The experimental group achieved the lower
mean score on the post-test than their counterparts in control group on vertical thinking. So the training module in PO method was helpful in escaping from the obvious thinking of the student-teachers resulting in discouraging vertical thinking and thus encouraging lateral thinking.

b) **Effect of training module in PO method on Escape factor of lateral thinking**

1) The escape ability was much higher in experimental group. The student-teachers of experimental group achieved much higher mean scores of escape factor on lateral thinking than their counterparts in control group. So the module on PO method was effective in improving escape from the obvious and thus encouraged lateral thinking.

2) Also there was significant effect of testing occasion on the escape factor of lateral thinking. The student-teachers achieved much higher mean scores for escape factor on post-test than at pre-test.

3) Significant differences existed among student-teachers of experimental and control groups when they were pre-tested and post-tested. The experimental group achieved much higher mean score on the post-test than their counterparts in control group on escape factor. So the training module in PO method was helpful in providing escape from the obvious thinking of the student-teachers thus stimulating lateral thinking.
c) Effect of training module in PO method on Originality factor of lateral thinking

1) The student-teachers of experimental group achieved much higher mean scores for originality factor on lateral thinking than their counterparts in control group and it was observed that the originality factor of lateral thinking ability was much higher in experimental group.

2) Intelligence affected the results on originality factor of lateral thinking test significantly. The student-teachers with high intelligence achieved slightly higher originality mean scores than their counterparts with medium or low intelligence. They achieved higher mean scores for originality after the experimentation i.e. on post-test than at pre-test. So the tendency to think originally increased after presenting the module on PO method.

3) Significant differences existed among student-teachers of experimental and control groups when they were pre-tested and post-tested. The experimental group achieved the higher mean score on the post-test than their counterparts in control group for originality. It indicated that the training module in PO method was helpful in stimulating originality in the student-teachers.

d) Effect of training module in PO method on Outrageousness factor of lateral thinking

1) The student-teachers of experimental group achieved much higher mean scores of outrageous thinking than their counterparts in control group. So the outrageous thinking ability was much higher in experimental group.

2) It was found that the student-teachers with high intelligence achieved higher outrageousness mean scores than their counterparts with medium or low intelligence leading to the conclusion that the intelligence affected the results on outrageousness factor on lateral thinking test significantly.

3) It is also evident that the student-teachers achieved higher mean scores for outrageous thinking at post-test than at pre-test as the tendency to think outrageously increased after the treatment in PO method, i.e. post-test. So the module in PO method was most effective in making thinking of student-teachers outrageous.

4) It is interesting to note that the training module in PO method was more effective in stimulating outrageousness in the high intelligent student-teachers. High intelligence
experimental group achieved much higher mean scores than their counterparts in control group for outrageousness.

5) There was a significant difference among student-teachers of different levels of intelligence when they were pre-tested and post-tested indicating that the training module in PO method was more effective in improving outrageousness factor in lateral thinking scores of the student-teachers of high intelligence group in comparison to middle or low intelligent. The experimental group achieved the higher mean score on the post-test than their counterparts in control group on outrageousness factor on lateral thinking indicating that the training module in PO method was helpful in stimulating outrageousness factor on lateral thinking of the student-teachers.

6) The high intelligence experimental group achieved the higher mean score on the post-test than their counterparts in control group on outrageousness factor on lateral thinking. So the training module in PO method was helpful in stimulating outrageousness factor on lateral thinking of the student-teachers.

e) Lateral thinking

As already mentioned, lateral thinking was divided into four factors viz. vertical thinking, escape, originality and outrageousness. The results have already been reported for each factor individually. The summative scores of all the four factors were studied separately.

1) The student-teachers of experimental group achieved much higher mean scores than their counterparts in control group. So the lateral thinking ability was much higher in experimental group.

2) It was further noted that the student-teachers with high intelligence achieved slightly higher mean scores at lateral thinking test than their counterparts with medium or low intelligence showing that the intelligence affected the results on lateral thinking test significantly.

3) There was a significant effect of testing occasion on the lateral thinking scores as was evident from the fact that the student-teachers achieved higher mean scores at post-test than at pre-test showing that the lateral thinking increased after the treatment, i.e. post-test

4) The experimental group achieved the higher mean score on the post-test than their counterparts in control group indicating that the training module in PO method is helpful in improving lateral thinking test scores of the student-teachers.

f) Comparative study of effect of training module in PO method on lateral thinking and vertical thinking.
In order to compare the effect of training module in PO method on lateral and vertical thinking, a comparative study between lateral and vertical thinking scores was undertaken. As has already been mentioned that lateral thinking was measured on four factors viz. vertical, escape, originality and outrageous. In the present study, if the person selects/chooses from any of the given alternatives, that is considered as vertical thinking and the sum of the scores of other three factors was considered as lateral thinking.

1) It was noted that student-teachers achieved much higher mean scores on post test for lateral thinking than post test for vertical thinking after the treatment. Further whereas the mean scores for lateral thinking improved greatly after the treatment, the mean scores for vertical thinking decreased after the treatment.

2) Further whereas there was no significant difference in the lateral thinking test scores as well as vertical thinking test scores of experimental and control group student-teachers before the treatment, a significant difference existed between the lateral and vertical thinking test scores of student-teachers of the two groups after the treatment. It further confirmed that the treatment i.e. training module in lateral thinking affected the thinking style of student-teachers. the module was effective in developing lateral thinking.

g) Results for Trend Analyses:

1) The mean gain scores of student-teachers of experimental group were much higher than mean gain scores of control group.

2) While mean gain scores of student-teachers of different intelligence groups were different. Whereas there was big difference in mean gain scores of high and middle intelligence student-teachers, the difference between middle and low intelligence student-teachers was very small.

3) The mean gain scores of student-teachers increased linearly with the module presentation.

4) It was also clearly visible that the growth was maximum at the last occasion i.e. occasion 5, after the completion of module.

5) Further the trends of occasions were highly affected when exposed to different treatment groups. The gain scores of experimental groups were much higher than control groups. The score increased linearly in experimental group whereas this trend was insignificant in control groups.
So the trend of the improvement in the gain scores in lateral thinking test at all occasions was linear and the direction of trend was positive and upward in case of escape, originality, outrageousness factors and cumulative score of lateral thinking but negative in vertical thinking factor of lateral thinking.

8.1.2 QUALITATIVE ANALYSIS

The qualitative analysis was carried out to study the process that goes in the minds of children during training by the module, their willingness towards module.

a) The findings regarding the effectiveness of training module in term of student teachers’ Willingness towards module

Student-teachers of all the three intelligence groups, irrespective of their intelligence level had high willingness to adopt the method and strategies. More than 90% student-teachers agreed that the module was self-sufficient. 10% student-teachers suggested some orientation from the teacher may be required. 90% student-teachers found the module free of hindrances. 7% students suspected that the callous attitude of institutions towards adopting something new may be a hindrance. 2% student-teachers believed that the module was time consuming. 1% student-teachers believed, without follow-on, the method may remain unused. 50% student-teachers suggested general awareness campaign for the strategy. 40% student-teachers believed that preparation of computer-assisted program on the same may help. 75% student thought that the training must be made compulsory for the teachers. Once the teachers are trained, they will develop a positive attitude towards it, which will ultimately help.

The willingness of student teachers of experimental group to implement the module in PO method in real classroom situation was very high. When asked for the suggestions, student-teachers suggested that the module can be used in the classroom and no special instrumental material is required to implement the module. The student-teachers further felt that the module could improve the quality of the teacher education and could bring improvement in teacher education program without adding to any extra burden on the staff as well as students. The method also was not time consuming. The student teachers were also willing to implement the method as they found it highly effective in developing lateral thinking in the students.

b) The findings regarding the effectiveness of training module in term of student teachers’ reactions towards module
Student-teachers of all the three intelligence groups, irrespective of their intelligence level had highly positive reactions towards the method, strategies and overall towards the module. They found the module interesting, simple and highly appreciated that. They agreed with the theory part and could well understand it.

c) The findings regarding the effectiveness of training module in term of student teachers’ Interviews and Case-study

The case studies and the interview of top scoring and lowest scoring student-teachers showed that there was a perceived change in the moral and social values of student-teachers along with the effect on thinking abilities of them after the exposure with the module. Findings of the case study and interviews can be summarized as under:

There was a change in all the six cases with regard to social and moral values. Of course, they showed a change in their thinking after the treatment. They began to think rationally and became more active thinkers. They could put forward their ideas more fluently. They became more open-minded in their thinking.

They showed a preference for acceptance than aggression after the exposure to the module. They were more open in their stands on controversial issues and could accept others’ view points better. 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.

The results revealed that the willingness of student teachers of experimental group to implement the module in PO method in real classroom situation was very high. This means that student-teachers felt that the module can be used in the classroom and no special instrumental material is required to implement the module. The student-teachers further felt that the module could improve the quality of the teacher education. The first reason for the high willingness of the student teachers was that the module was in form of a self-instructional package and required no extra apparatus, instrument or material. So the student-teachers found is feasible to be applied in general classroom. Further, the student teachers felt that the module could bring improvement in teacher education program without adding to any extra burden on the staff as well as students. The method also was not time consuming. The student teachers were also willing to implement the method as they found it highly effective in developing lateral thinking in the students.
8.2 IMPLICATIONS

The study reveals that teaching children to become effective thinkers is increasingly recognized as an immediate goal of education. In recent years societal demands 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, finding 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.

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 fosters lateral as well as creative thinking. Consequently, it becomes the duty of educators to realize the importance of teaching thinking skills to students. Module in the present study trains students in lateral thinking which provides the solution to intractable problems through unorthodox methods or elements which would normally be ignored by logical thinking. So the training programs like this module are urgently required to bring reforms in traditional thinking style. The study also reveals that the training module in PO method is not only effective in developing lateral thinking; it also could generate positive reactions and high willingness among student-teachers towards the method as well as the content. It was also found to inculcate positive attitude among student-teachers. The findings of the present study have implications for all those linked with teacher 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) **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 educators must be trained by the module 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 teachers 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 module, 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 instigators of new thinking
among students. In order to do that they will have to master the module themselves. If the teacher-educators train the teachers in such alternative methods/models/strategies of teaching, it will enable them to apply these methods during their class-room teaching.

As the study reveals that the training module in PO method was highly effective in developing lateral thinking of the student-teachers. It was also found that focusing directly on thinking sharpens perceptions and lateral thinking is one of the best means to achieve that objective. Lateral thinking is concerned with changing preconceived notions to bring out new ideas and can be acquired and practiced as a skill. The teacher-educators can use such methods in their teaching so as to process the thinking of their students. The three strategies i.e. PO-1, PO-2, and PO-3 along with PO method in general have been extensively discussed in the module presented in the study. All these strategies individually as well as in combined way were found to be successful in developing lateral thinking.

So the module 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. Moreover the module can be used by them as guideline for developing other similar thinking exercises or modules on thinking. Understanding the need of direct teaching of thinking skills may ultimately build up an environment for the inclusion of these skills in the teacher-training courses.

2) **Student teachers / Trainee teachers**: The study has its implications for the training of new generation of 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 module 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 discuss the method in their class and practice the strategies individually or in groups to be able to effectively use them to generate new ideas. The module being a self-instructional module can help the future teachers to be well acquainted about development of thinking skill among their own students in their future years.

The module trains not only in generating ideas but also in productively using these ideas through the strategy like intermediate impossible. Such strategies provide creative challenge. The creative challenge is a challenge to exclusivity, which does not accept status-quo and is particularly relevant in those areas where ideas have become obsolete with time.
Circumstances and situations often restrict the choice of alternatives. Such challenges open new paths for alternatives by blocking the routine path. By using the simple techniques given in the module even a dictionary would present numerous alternatives and choices. Student-teachers can learn to give their students simple exercises related to random juxtaposition or even intermediate impossible so as to start the training in lateral thinking skills in an early age. De Bono along with some other educationists have regarded that the society kills the one third creativity of a child whereas the school kills the other two third. But if students are timely exposed to such exercises, this greatest gift of god to the child in form of creative thinking can not only be protected but also stimulated in a big way.

3) In-Service Teachers: - The study has its implications for in-service teachers. A teacher functions within the broad framework of the school education system – its goals, curricula, materials, methods and expectations from the teacher. Teachers who themselves are effective thinkers, serve their students well. It is therefore imperative that the in-service teachers are trained by this module, which will make teaching effective with respect to learning outcomes as it provides desired teaching inputs to the teachers so that they may develop a new thinking that can match to the thinking of future generations.

Further, after the training from module, 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 finding 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 this method will themselves be full of ideas.

The strategy like intermediate impossible leads to making a statement first and then seeing where it leads. Even the most absurd ideas can be utilized purposefully to give birth to new ideas using such methods. The teachers trained by this method will become thus more welcoming to the numerous questions and quarries in the minds of students all the time.

Further 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 using corporal punishments. After exposure with the module, 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 participation 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.

3) **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 in itself is a cumbersome task. The left over information gets accumulated as information garbage. The call of the day is recycling 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 module 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 module. They can practice techniques like random juxtaposition for generating new ideas and later may switch to some other methods and techniques for development of thinking. The method can prepare them in searching various alternatives in their life-situation. The progress in this direction will surely help them while facing competitive exams like admission tests, intra and inter school competitions etc. The module and its thinking exercises can provide them a 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 technique, challenge for change can prepare the students in countering 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 ideas. The students after training with this method would be able to challenge such things, initiating a revolutionary change in the Indian value system which even today is more based on tradition and not on scientific observations and justifications.

A student trained in methods like intermediate impossible will be able to face the most difficult times in their life. It would train them in finding a way out even in the most complicated and situation. This would help in countering suicidal tendencies, escapism through drug addiction or aggressions in the most sensitive periods of student life. The student life is full of stress and strain that generally gives birth to rage, anger and aggression. They become adamant and inconsiderate to the other people’s views. 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.

Colleges and school systems also need to consider that the module in lateral thinking 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.

5) Parents: The study has its implications for the parents also. Through this module they can develop these thinking skills in their children as well as in themselves. The exposure to such methods can shape their own thinking and belief system. The mother and father have the responsibility to organize such an environment that can help in fostering higher thinking skills in their child. The exposure to the module can gives a flip to the thinking of the parents. 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 makes them conservative which becomes intolerable to their children. The module
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 in this module may resort to the discussions and free talk with their children instead of imposing their decisions on them. They can also create situations where the child gets an opportunity to learn and use this technique 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.

6) **Curriculum Planners, Policy makers 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 elite 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 thinking and strengthen the skill of thinking in students. This module can efficiently strengthen the present curriculum without bringing any major change in the curriculum. So the module can be integrated in the curriculum also. Just like the other subjects, some special time can be set for such exercises initially, which may ultimately lead to the inclusion of the exercises in routine teaching. Some activities, competitions and games also 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.

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 to be able to generate new ideas. Even the bureaucrats and officials should get training in such methods so that they can have a change in their outlook towards the problems and may become capable of finding 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 lateral 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 lateral thinking. The teacher-educators, teachers, parents, students and country-men in general have to adapt to such new methods and skills.

8.3 SUGGESTIONS

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:

1) A similar study for the effectiveness of the module can be conducted on high school, senior secondary and college going children.
2) A similar study for the effectiveness of the module can be conducted on management students, teachers and professionals
3) A comparative study of effectiveness of the module for teacher-trainees from government aided institutions and teacher-trainees from self-financed institutions may be conducted.
4) A comparative study of effectiveness of the module for female and male teacher-trainees may be conducted.
5) The module can be converted in an ICT enabled program quite conveniently. The effectiveness of such a program can be studied and even compared with this module in a book form.
6) An experimental study can be undertaken to explore the attitudes and perception of students, teachers, principals and teacher-educators towards the module.
7) A similar study can be designed for students belonging to different socio-economic status.

CHAPTER 9

SUMMARY

9.1.0 Introduction

In the twentieth century the ability to engage in careful, reflective ‘thinking’ has been viewed in various ways; as a fundamental characteristic of an educated person; as a requirement for responsible citizenship
in a democratic society, and more recently, as an employability skill for an increasing wide range of jobs. Earlier supposed to be innate and inherent, it is now proved to be trainable and learnable. In his study Ristow asserted that direct teaching of thinking skills can produce better thinkers that are more creative. Further a large number of researchers (like Bamba and Merchant 1990, Bass and Parkins 1984, Robinson 1987, Freseman 1990, Kagan 1988) have emphasized that thinking skills instructions enhance academic achievement. So it becomes imperative to pay more attention to ‘thinking’ in education also.

Out of different types of thinking, emergence of ‘Lateral Thinking’ in recent years is a natural reaction to the enormous increase of information, a human being is bombarded with in the post industrial revolution era. De Bono defines lateral thinking as methods of thinking concerned with changing concepts and perceptions. It aims at freeing the mind from the imprisonment caused by already established thinking patterns and generating new ideas. This low probability sideways thinking is used not only in generating new ideas but also in problem solving, in periodic assessment of idea that seem beyond doubt, in processing perceptual choice and in prevention of sharp divisions and polarization. Developing ‘Lateral Thinking’ has already become a pedagogical challenge to modern educators. The present study revolves around one of such methods called ‘PO’ or ‘Provocative Operation’ which is an anti-judgment device that is based on forward movement which includes making a statement and seeing where it leads to. Explaining the strategies like PO I (Intermediate impossible), PO II (Random Juxtaposition), and PO III (challenge for change) along with the general use of PO as de-patterning device and preparing a training module for Indian Student teachers based on these is the main attribute of the present study.
9.2.0 Rationale of the study

The world is in a constant state of change. People think differently as they gain knowledge and skills in thinking. Whatever was considered to be a fact in the past has now become inappropriate due to changes which have happened since then. Still the education system places very little value upon the un-quantifiable traits a designer uses as the principal source of their inspiration. The education system is so information oriented that it gives readymade answers killing the natural tendency of students to explore, experiment and to experience. As creative individuals we have managed to escape an education system that has deprived us access to many qualities of the right brain. Education system is designed to cultivate the verbal, rational, time based left hemisphere, resulting in half of the brain of every student being ignored.

While a lot of research has been done in the field of critical and creative thinking, very less has been done in the field of lateral thinking, which is a must to cope up with the changing needs of the society as well as is much helpful in making discoveries and innovations. In the face of fast-changing trends, fierce competition and the need to work miracles despite tight budgets, better quality and service are not enough. Creativity and innovation are the only engines that will drive lasting success. Thus the Lateral Thinking is essential along with linear or vertical thinking, which relies solely on logic. Although Indian Education System has started recognizing urgent need to bring changes in teacher education and thinking as a hot topic is making place in curriculum yet no such provision for the same is suggested even in National Curriculum Framework. The researcher not only wanted to draw the attention towards the need for inculcation of thinking exercises in our curriculum but also developed a self learning module to develop lateral thinking. The program is developed for the student teachers with a firm belief that if our future teachers are trained in such a method, an automatic change in our education system can be initiated. The module has been developed keeping in view the Indian students, their belief, custom, culture and educational environment.
9.3.0 Statement of Problem

“EFFECTIVENESS OF TRAINING MODULE IN PROVOCATIVE OPERATION ON LATERAL THINKING OF STUDENT-TEACHERS”

9.4.0 Objectives of the Study:

8. To develop and standardize the training module on Provocative Operation method for the development of lateral thinking.
9. To develop and standardize a lateral thinking test.
10. To study the effect of the training module on lateral thinking abilities of student teachers.
11. To develop a willingness scale.
12. To find out the willingness of student teachers towards the module.
13. To develop a reaction scale.
14. To find out the reactions of student teachers towards the training module.

9.5.0 Hypothesis of the Present Study

In absence of any research evidences, null hypothesis was framed in order to achieve the objectives of the study.

9.6.0 Delimitations of the Study

The study has its delimitations with respect to title, sample selected, experimentation process and treatment applied. Apart from this, other delimitations of the study are:

9. The study applied only one method i.e. PO method along with its strategies. There could be some other effective methods also to develop lateral thinking.
10. As already mentioned the study has adopted the definition of lateral thinking as given by de Bono. The basic components of lateral thinking, considered in the study i.e. escape, originality, and outrageousness were the core components for the lateral thinking test.
11. The experiment continued for nearly full session. Student-teacherss may have received some extra information or knowledge about the method during this period.
12. The home environment, marital status and age of the student-teachers were not included in
the study. Further, viewing television or other gadgets by student-teachers for developing lateral thinking were not the part of study.

13. The sample was selected from a private, teacher education, Women College located in an urban area.

14. The other variables like use of computers, internet and extra study materials available through any other source, that may have affected the thinking process have not been accounted for.

15. Various extraneous variables might have affected the results. The variables that the researcher could not think of, or the variables which were beyond the control of the researcher, have not been included in the study.

16. The study is also limited to teacher variable. Teachers of varying aptitude, with different culture, ideologies and background, teaching the student-teachers have not been taken care of. This variable has neither been controlled nor matched for different groups of student-teachers.

9.7.0 Method and Procedure

The study was undertaken to find out the effects of training module of PO method on lateral thinking. The following steps were taken for the same:

10. Research Design
11. Sample
12. Tools used
13. Treatment Employed
14. Identification of variables
15. Experimental Controls Used
16. Procedure of Experimentation
17. Data collection
18. Statistical Analysis
9.7.1 Research Design

In order to study the effectiveness of training module in provocative operation on lateral thinking of student teachers, Nesting-cum-Crossing design was followed. The experiment resembled three-way factorial (2X3X2) nesting-cum-crossing design. In order to study the effect of on dependent variable (lateral thinking), a three way factorial (2X3X5) design of trend analysis was followed. The objective of this design was to test the improvement in the gain scores from one occasion to another occasion after the treatment. Each student-teacher was tested for five times. The difference in first score i.e. pre-test score and other scores was termed as gain score. These scores were taken to see the effect of previous treatment. To see the trend of improvement, factorial design of trend analysis was adopted.

In order to see the effectiveness of the module, data was analyzed qualitatively. The willingness of the student-teachers for the module and their reactions towards it were analyzed qualitatively. Case study approach was followed to know the process that goes on in the mind of the student-teachers during the experimentation.

9.7.2 Sample

In the present study, one college of education was selected from the urban area of Sonepat District. Out of 200 female student-teachers of the college, 160 student-teachers were selected randomly. The student-teachers were matched on socio-economic status test and the scores proposed that majority of student-teachers belonged to the same i.e. average socio-economic status. Now the sample student-teachers were administered the Raven’s Progressive matrices. On the basis of mean and standard deviation, student-teachers were divided in three parallel groups; high intelligent, middle and low intelligent. In the study, initially 40 student-teachers were selected from each category of intelligence randomly, making for 120 student-teachers in total. These student-teachers were further divided into two groups randomly in such a way that there were 20 student-teachers of each intelligence level in all the categories. For the analysis 17 student-teachers from each category were retained, making for 102 student-teachers in all, for the fear of sample death.

9.7.3 Tools Used

The study employed two types of tools i.e. treatment tools and measuring tools.

i. Treatment Tools:
These were the tools which were used to impart instructions to the students. The instructions varied in two ways viz. Training module in PO method and conventional method. For these instructional variations, a self-learning material (Module to develop lateral thinking by provocative operation method for the student-teachers) was developed.

**a) Construction and Standardization of Module in PO method**

A self learning module on PO method was constructed by the investigator. The module was provided in form of a booklet consisting of six activities relating to the method and a worksheet.

**b) Standardization of the module**

The standard procedure for the standardization of module was adopted which included

Writing a module, Editing and reviewing, Try out phase and Evaluation

Evaluation: the module was analyzed and evaluated in terms of

1) Error rate: Error rate of the module was calculated separately for each of the five activities and exercise sheet which was found to be less than five. So all the activities in the module were comprehensible to the student-teachers.
2) Density : The module has a high density (TTR=9.969)
3) Gain ratio: The gain ratio for the module was 0.4382

From all the considerations derived by computing the various module elements- the error rate, gain ratio, density etc. it was concluded that the module is satisfactory and ready for administration as well as experimentation.

**ii. Measuring tools:**

These were employed to measure changes in student-teachers’ abilities for thinking laterally.

1. Lateral thinking test developed by investigator.
2. Raven’s progressive Matrices developed and standardized by J.C. Raven (1961).
3. Reaction scale developed by investigator.
4. Willingness scale developed by investigator.
5. Socio-economic status scale developed by Dr. Meenakshi (2004).
6. Interviews and case study

**a) Lateral Thinking Test**
General Description

The lateral thinking test was devised to measure lateral thinking of student teachers as well as children above age twelve. The test permits freedom of responses along with the given responses. The subjects were supposed to either tick any of the given answer or write their responses on the blank space provided as option four in the test booklet. There were twenty four test items in all. The scoring of the lateral thinking test centered on following four factors: Vertical thinking, Escape, Novelty and Provocation.

The following steps were followed while developing and standardizing the test.

3. Preparation of a preliminary draft
4. Standardization of the lateral thinking test

To prepare the first draft, steps like item formulation, item selection and item analysis were followed and ultimately 24 items that followed all the requisite conditions were retained.

Reliability - Test-retest reliability coefficient for the module was 0.74 whereas parallel form reliability coefficient was 0.66.

Validity - The ‘face’ validity was employed in selection of items. The content validity was acquired from the judgment of the subject matter specialists. A panel of experts from the field found the test thoroughly valid.

b) The Raven’s Progressive Matrices:

In order to measure the intelligence of the student teachers, Raven’s progressive matrices were used. This test is useful for the persons of all ages from 8 to 65 years. The scale has a test-retest reliability varying with age from 0.83 to 0.86 with “Terman Merrill Scale of Intelligence”.

c) Willingness Scale

The scale was constructed to check the willingness of the examinees towards the module. There are 14 questions in form of statements, the answers of which can be given by ticking any of the options like strongly agree, agree undecided, disagree and strongly disagree. The last three questions (Q. No. 12, 13, 14) are subjective questions regarding suggestions to improve the module and its shortcomings.

Preparation of preliminary draft: Blue print of the test was prepared, which after passing through the stages underneath, formed the first draft of the scale. These stages were: item formulation, item selection and item analysis.

Reliability and Validity – Reliability of the scale was established through test-retest method. The correlation was significant (0.81). - The ‘face’ validity and content validity were employed.


d) Reaction scale

The scale was constructed to see the reactions of the examinees towards the module. There are 19 questions in form of statements, the answers of which can be given by ticking any of the options like strongly agree, agree, undecided, disagree and strongly disagree.

Preparation of preliminary draft: blue print of the test was prepared, which after passing through the stages underneath, formed the first draft of the test. These stages are: item formulation, item selection and item analysis.

Reliability - It was established through test-retest method. The reliability coefficient was significant (0.81).

Validity - The ‘face’ validity and the content validity was employed in selection of items.


e) Socio-economic status scale

A socio economic status scale developed and standardized by Dr. Meenakshi (2004) was used to check the socio economic status of the student-teachers. The test was a standardized verbal test which can be administered in group with ease. The test was divided in seven parts. The scores could be further categorized in five categories ranging from poor (49 or below) to high (105 and above).The test has high test-retest reliability (0.82) and was found to be sufficiently valid.

f) Scheduled Interview

Two student-teachers who scored highest marks in lateral thinking test and two student-teachers who scored lowest marks were chosen for the interview. Two student teachers who gained maximum from the
module were also interviewed. Standardized open ended interview was held. The items in the interview were 13.

Validity: To make the interview valid, the content validity was used.

Reliability: The reliability or the consistency of the response was evaluated by restating a question in slightly different form at a later time in the interview. The questions of the interview were found to be sufficiently reliable and valid.

9.7.4 Treatment employed

There were two different groups of student-teachers who were given two different types of treatments that lasted for two months. One was called experimental group and the other was control group. The experimental group student-teachers were given training in PO method with the help of a training module on lateral thinking and were designated as A₁. The second group of student-teachers was taught lateral thinking and its exercise in a traditional manner, through expositional method and was designated as A₂. In the end, both groups were given the lateral thinking test. Willingness scale and reaction scales were also administered at the student-teachers of experimental group followed by the interviews of two top scorer and two least scorer student-teachers along with two student-teachers who gained maximum.

9.7.5 Identification of variables

In the present study, three types of variables were undertaken. These variables were independent variables, dependent variables and intervening variables.

Independent variables were manipulated to see their effect on the lateral thinking of student-teachers. These included: Two treatment groups; (experimental and control), Three level of intelligence; (high, middle and low) and two testing occasions (pre-test and post-test).

Dependent variables were those which acted as criterion to test the effect of different independent variables. This was the scores on different factors of lateral thinking i.e. vertical thinking, escape, originality and outrageousness as well as summative scores of these called as lateral thinking scores.

Intervening variables were those that could not be measured directly but had their effect on the outcome of treatment. Before conducting the experiment, it was considered necessary to identify and control all the variables that can affect the dependent variable. These variables were: socio-economic status, grade level, existing abilities, teacher behavior, sex of the student-teacher, other pupil variables (i.e. pupil’s cast, home environment etc.), school variable, physical environment of the classroom, contamination
effect and study habits etc. All these variables were either controlled experimentally, statistically or equalized by the ways of controlling them.

9.7.6 Experimental Control Used

Every possible attempt was made to control those factors, which could create bias. In order to control the inter-group variation in different treatment groups, the researcher herself provided treatment to all the groups. Every effort was made to maintain the experimental conditions similar in all experimental groups. The experimental process was controlled by keeping experimental situation, classroom environment, duration of experiment and mode of testing same for all the treatment groups. The student-teachers who were irregular or non-serious in any of the teaching groups were kept out of sample.

9.7.7 Procedure of Experimentation

The procedure of this study involved selection of student-teachers for treatment groups and experimentation. It involved stages like administration of intelligence test, Administration of SES scale then formation of the groups based on these tests and then assigning treatments to groups.

9.7.8 Data collection

In this study, the data was collected keeping in view the objectives of the study. The data to study the effectiveness of the module was collected on two occasions. One was pre-test (before the treatment) called as occasion I and the other after the treatment was called occasion II. Willingness scale, Reaction scale and Interview technique was used to know the process that goes on in the mind of children during thinking.

Data collection for trend analysis:- To study the trend i.e. effect of different activities of module on the lateral thinking of the student-teachers, the lateral thinking test was conducted on five occasions. One as pre test, one after activity 2, one after activity 3, one after activity 4 and lastly one after complete module i.e. on the last day.

9.7.9 Statistical Techniques Used

7) The measures of central tendency and the measures of dispersion such as mean and standard deviations were worked out to know the nature of the data.
8) Multivariate analysis was used to assess the data in order to find out the effect of different groups (i.e. experimental and control), levels of intelligence and testing occasions on Lateral thinking. The lateral thinking tests were employed and three way analysis of variance (2X3X2) factorial design was used.

9) Multivariate analysis were used to assess the data in order to find out the effect of different groups (i.e. experimental and control), levels of intelligence and testing occasions on different components of lateral thinking i.e. vertical thinking, escape, outrageousness and originality.

10) A paired t- test was conducted to compare the effect of training module on lateral thinking and vertical thinking.

11) (2X3X5) three way analysis of variance was used for the trend analysis.

12) The percentages were calculated for qualitative analyses.

Whenever F-ratio was significant, it was interpreted through mean scores and t test.
9.8 Findings

The study was conducted with respect to the effectiveness of the training module in PO method in developing lateral thinking. For the same, the investigator constructed a lateral thinking module as well as a lateral thinking test. Then the effectiveness of the module was studied by Pre-test Post-test design. The results are based on quantitative as well as qualitative analysis. The findings relating to the same have been presented in the following section:

a) Effect of training module in PO method on the factor, Vertical thinking of lateral thinking:

1) It can be observed from the analyses that the student-teachers of experimental group achieved much lower mean scores of vertical thinking than their counterparts in control group. The vertical thinking ability was much lower in experimental group and PO method is not effective in the development of vertical thinking.

2) Intelligence was found to affect the results on vertical thinking test. The student-teachers with high intelligence achieved slightly lower vertical thinking mean scores than their counterparts with medium or low intelligence. Further tendency to think vertically decreased after the treatment, i.e. post-test. The student-teachers achieved lower mean scores at post-test than at pre-test.

3) Significant differences existed among student-teachers of experimental and control groups when they were pre-tested and post-tested. The experimental group achieved the lower mean score on the post-test than their counterparts in control group on vertical thinking. So the training module in PO method was helpful in escaping from the obvious thinking of the student-teachers resulting in discouraging vertical thinking and thus encouraging lateral thinking.

b) Effect of training module in PO method on Escape factor of lateral thinking

1) The escape ability was much higher in experimental group. The student-teachers of experimental group achieved much higher mean scores of escape factor on lateral thinking than their counterparts in control group. So the module on PO method was effective in improving escape from the obvious and thus encouraged lateral thinking.

2) Also there was significant effect of testing occasion on the escape factor of lateral thinking. The student-teachers achieved much higher mean scores for escape factor on post-test than at pre-test.
3) Significant differences existed among student-teachers of experimental and control groups when they were pre-tested and post-tested. The experimental group achieved much higher mean score on the post-test than their counterparts in control group on escape factor. So the training module in PO method was helpful in providing escape from the obvious thinking of the student-teachers thus stimulating lateral thinking.

c) Effect of training module in PO method on Originality factor of lateral thinking

1) The student-teachers of experimental group achieved much higher mean scores for originality factor on lateral thinking than their counterparts in control group and it was observed that the originality factor of lateral thinking ability was much higher in experimental group.

2) Intelligence affected the results on originality factor of lateral thinking test significantly. The student-teachers with high intelligence achieved slightly higher originality mean scores than their counterparts with medium or low intelligence. They achieved higher mean scores for originality after the experimentation i.e. on post-test than at pre-test. So the tendency to think originally increased after presenting the module on PO method.

3) Significant differences existed among student-teachers of experimental and control groups when they were pre-tested and post-tested. The experimental group achieved the higher mean score on the post-test than their counterparts in control group for originality. It indicated that the training module in PO method was helpful in stimulating originality in the student-teachers.

d) Effect of training module in PO method on Outrageousness factor of lateral thinking

1) The student-teachers of experimental group achieved much higher mean scores of outrageous thinking than their counterparts in control group. So the outrageous thinking ability was much higher in experimental group.

2) It was found that the student-teachers with high intelligence achieved higher outrageousness mean scores than their counterparts with medium or low intelligence leading to the conclusion that the intelligence affected the results on outrageousness factor on lateral thinking test significantly.

3) It is also evident that the student-teachers achieved higher mean scores for outrageous thinking at post-test than at pre-test as the tendency to think outrageously increased after the treatment in PO method, i.e. post-test. So the module in PO method was most effective in making thinking of student-teachers outrageous.

4) It is interesting to note that the training module in PO method was more effective in stimulating outrageousness in the high intelligent student-teachers. High intelligence experimental group achieved much higher mean scores than their counterparts in control group for outrageousness.
5) There was a significant difference among student-teachers of different levels of intelligence when they were pre-tested and post-tested indicating that the training module in PO method was more effective in improving outrageousness factor in lateral thinking scores of the student-teachers of high intelligence group in comparison to middle or low intelligent. The experimental group achieved the higher mean score on the post-test than their counterparts in control group on outrageousness factor on lateral thinking indicating that the training module in PO method was helpful in stimulating outrageousness factor on lateral thinking of the student-teachers.

6) The high intelligence experimental group achieved the higher mean score on the post-test than their counterparts in control group on outrageousness factor on lateral thinking. So the training module in PO method was helpful in stimulating outrageousness factor on lateral thinking of the student-teachers.

e) Effect of Training Module in PO method on Lateral thinking

The summative scores of all the four factors were called as lateral thinking scores. Accordingly results are given in the following paragraph:

5) The student-teachers of experimental group achieved much higher mean scores than their counterparts in control group. So the lateral thinking ability was much higher in experimental group.

6) It was further noted that the student-teachers with high intelligence achieved slightly higher mean scores at lateral thinking test than their counterparts with medium or low intelligence showing that the intelligence affected the results on lateral thinking test significantly.

7) There was a significant effect of testing occasion on the lateral thinking scores as was evident from the fact that the student-teachers achieved higher mean scores at post-test than at pre-test showing that the lateral thinking increased after the treatment, i.e. post-test

8) The experimental group achieved the higher mean score on the post-test than their counterparts in control group indicating that the training module in PO method is helpful in improving lateral thinking test scores of the student-teachers.

f) Effect of training module in PO method on lateral thinking and vertical thinking.

In order to compare the effect of training module in PO method on lateral and vertical thinking, a comparative study between lateral and vertical thinking scores was undertaken. As has already been mentioned that lateral thinking was measured on four factors viz. vertical, escape, originality and outrageous. In the present study, if the person selects/chooses from any of the given alternatives, that is considered as vertical thinking and the sum of the scores of other three factors was considered as lateral thinking.
2) Student-teachers achieved much higher mean scores on post test for lateral thinking than post test for vertical thinking after the treatment. Further whereas the mean scores for lateral thinking improved greatly after the treatment, the mean scores for vertical thinking decreased after the treatment.

3) Further whereas there was no significant difference in the lateral thinking test scores as well as vertical thinking test scores of experimental and control group student-teachers before the treatment, a significant difference existed between the lateral and vertical thinking test scores of student-teachers of the two groups after the treatment. It further confirmed that the treatment i.e. training module in lateral thinking affected the thinking style of student-teachers. in other words, the module was effective in developing lateral thinking of student-teachers.

TREND ANALYSIS:

1) The mean gain scores of student-teachers of experimental group were much higher than mean gain scores of control group.

2) While mean gain scores of student-teachers of different intelligence groups were different. Whereas there was big difference in mean gain scores of high and middle intelligence student-teachers, the difference between middle and low intelligence student-teachers was very small.

3) The mean gain scores of student-teachers increased linearly with the module presentation.

4) It was also clearly visible that the growth was maximum at the last occasion i.e. occasion 5, after the completion of module.

5) Further the trends of occasions were highly affected when exposed to different treatment groups. The gain scores of experimental groups were much higher than control groups. The score increased linearly in experimental group whereas this trend was insignificant in control groups. It was also visible that the score increased linearly after each activity.

So the trend of the improvement in the gain scores in lateral thinking test at all occasions was linear and the direction of trend was positive and upward in case of escape, originality, outrageousness factors and cumulative score of lateral thinking but negative in vertical thinking factor of lateral thinking. Further the scores increased linearly after each activity.

The qualitative analysis was carried out to study the process that goes in the minds of children during training by the module, their willingness towards module.
a) The findings regarding the effectiveness of training module in term of student teachers’ willingness towards module

Student-teachers of all the three intelligence groups, irrespective of their intelligence level had high willingness to adopt the method and strategies. More than 90% student-teachers agreed that the module was self-sufficient. 10% student-teachers suggested some orientation from the teacher may be required. 90% student-teachers found the module free of hindrances. 7% students suspected that the callous attitude of institutions towards adopting something new may be a hindrance. 2% student-teachers believed that the module was time consuming. 1% student-teachers believed, without follow-on, the method may remain unused. 50% student-teachers suggested general awareness campaign for the strategy. 40% student-teachers believed that preparation of computer-assisted program on the same may help. 75% students thought that the training must be made compulsory for the teachers. Once the teachers are trained, they will develop a positive attitude towards it, which will ultimately help.

The willingness of student teachers of experimental group to implement the module in PO method in real classroom situation was very high. When asked for the suggestions, student-teachers suggested that the module can be used in the classroom and no special instrumental material is required to implement the module. The student-teachers further felt that the module could improve the quality of the teacher education and could bring improvement in teacher education program without adding to any extra burden on the staff as well as students. The method also was not time consuming. The student teachers were also willing to implement the method as they found it highly effective in developing lateral thinking in the students.

b) The findings regarding the effectiveness of training module in term of student teachers’ reactions towards module

Student-teachers of all the three intelligence groups, irrespective of their intelligence level had highly positive reactions towards the method, strategies and overall towards the module. They found the module interesting, simple and highly appreciated that. They agreed with the theory part and could well understand it.

c) The findings regarding the effectiveness of training module in term of student teachers’ Interviews and Case-study

The case studies and the interview of top scoring and lowest scoring student-teachers showed that there was a perceived change in the attitude of student-teachers along with the effect on thinking abilities of them after the exposure with the module. Findings of the case study and interviews can be summarized as under:
There was a change in all the six cases with regard to their behaviour. Of course, they showed a change in their thinking after the treatment. They began to think rationally and became more active thinkers. They could put forward their ideas more fluently. They became more open-minded in their thinking.

They showed a preference for acceptance than aggression after the exposure to the module. They were more open in their stands on controversial issues and could accept others’ view points better. 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.

9.9 Educational implications:

The study reveals that the lateral thinking skills of the student-teachers improved on exposure with the module. It further asserted that the thinking skills are trainable. The study paves a way for more of such studies that include packages for the training in thinking skills. The findings have their implications for student-teachers, teachers, parents, administrators, teacher educators, policy makers and even the curriculum planners.

The study 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. The utmost need to get trained in such method may be felt by the student-teachers so as to keep the pace with the fast changing society.

In-Service teachers, teacher educators, curriculum planners, policy makers and administrators will also recognize the need to include such strategies in the teaching learning process so as to inculcate thinking skills in the children. They will acknowledge the importance of PO method as an idea generating tool which is the need of time. The module is a must for the in-service teachers as it provides desired teaching inputs to our teachers so that they may develop a new thinking that can match to our future generations.

As the study finds the module highly effective in developing the lateral thinking skills, the module can be used to 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. Students at the adolescence stage can well understand and utilize the module.

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.
As opposed to the traditional belief, the study focuses on the ideas that are not immediately obvious. So the study and the method has its implications for the firms and companies who always feel the dearth of new ideas.

The study finds lateral thinking skills independent of the intelligence. It becomes a new challenge to develop educational programs that assume that all individuals and not just an elite or a genius, can become complete thinker. The module on lateral thinking can efficiently strengthen the present curriculum without bringing any major change in the curriculum.

9.10 SUGGESTIONS

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: -

1) A similar study for the effectiveness of the module can be conducted on high school, senior secondary and college going children.

2) A similar study for the effectiveness of the module can be conducted on management students, teachers and professionals.

3) A comparative study of effectiveness of the module for teacher-trainees from government aided institutions and teacher-trainees from self-financed institutions may be conducted.

4) A comparative study of effectiveness of the module for female and male teacher-trainees may be conducted.

5) The module can be converted in an ICT enabled program quite conveniently. The effectiveness of such a program can be studied and even compared with this module in a book form.

6) An experimental study can be undertaken to explore the attitudes and perception of students, teachers, principals and teacher-educators towards the module.

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