CHAPTER – VII

SUMMARY, FINDINGS, EDUCATIONAL IMPLICATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

INTRODUCTION

School Education is important for every child. During school a child studies many subjects English, Hindi, Punjabi, Social Science and Mathematics. All the subjects have their relative importance. Science subjects like Mathematics play an important role in the development of critical reasoning. The new scientific, industrial and educational revolution in our country makes it important to study Mathematics as it plays vital role in technical profession and educational researches. All the useful occupations now depend up on the knowledge of Mathematics. Mathematics is mandatory subject in school curriculum.

The origin of mathematics is hidden in the evolution of nature. Creation of nature and mathematics is closely related. Mathematics is an exact science and involves high cognitive abilities and powers. The accuracy and exactness of a science is determined to a major extent by the amount of mathematics utilized in it. According to Chamber's Twentieth Century Dictionary (1987) says, “Mathematics is the science of magnitude and number and of all their relations.” Mathematics runs in the veins of natural sciences like physics and astronomy and is inextricably incorporated in the natural phenomena. It is fascinating because of its opportunities for creation and discovery as well as for its utility. It is basic to the understanding of every science. National Policy on Education (1986) has considered the importance of mathematics in general education and suggested that, “Mathematics should be visualised as the vehicle to train a child to think, reason, analyse and to articulate logically.

Apart from being a specific subject, it should be treated as concomitant to any subject involving analysis and reasoning”. Mathematics is fascinating because of its opportunities for creation and discovery as well as for its utility. It enters every walk of life. Krishnamurthy (1990) while discussing the importance of mathematics says that the mathematical form of today has more and more new applications for day today life and the rapid growth of desired application helps to develop more and more.
new fields of mathematics. Therefore, in schools much impetus is given to the study of mathematics. Academic achievement in mathematics most likely seems to be one of the predictors of people's success in their career in particular. The term “achievement” refers to the degree of level of success attained in some general and specified areas.

There can be many variables which can have negative or positive relationship with academic achievement. In the present study three factors namely self concept, creativity and personality were discussed.

EMERGENCE OF THE PROBLEM

All scientific education is based on mathematics. Its neglect means to remain ignorant about all other sciences. Mathematics helps us to develop our intellectual powers like power of imagination, memorization, logical thinking and reasoning. Study of mathematics is helpful in learning most of the school subjects. As discussed above

Number of studies has been reported in the area of under and achievement of students in various school subjects in general and in mathematics particularly but a very few studies reported where comparative study have been done in area of under and over achievement. Therefore it was thought imperative to study the under achievement and over achievement in mathematics of the students studying in Moga district of state Punjab.

Various studies has shown that researchers tried to study the intelligence level, motivation, and emotional intelligence, study habits of the underachievers and over achievers. None of the study has been done on the sample of Moga (Punjab).students are residing in rural as well as urban area. Therefore there is need to compare the self concept, personality and creativity of students who either score high and below average level. Therefore for the present investigation it was decided to conduct a comparative study on under and over achievement in relation their self concept, personality and creativity.
It is difficult to know the true personality of a person. Personality is always studied as personality factors or personality type etc. in the present study personality is studied as personality type.

Prosperity of a nation and human resource development largely depend upon the development of creativity of an individual. The school climate provides the framework within which students, teachers, administrators, and parents function cooperatively and creatively. In an educational system, creativity in the student is mostly neglected. Teachers in the schools are so busy in their academic routine that they find little time to think of creativity and the means to foster it.

Looking at the importance of Personality type self concept and creativity is the achievement of Mathematics, the investigator was inspired to explore this field further.

In the present investigation, the investigator tries to find out the answer of the question: what is the difference in self concept of under and over achievers? What is the difference in self concept of under and over achievers? What they think about themselves and accordingly they put their efforts. Do they feel worth of themselves for achieving something extraordinary? Personality is a persona of a person? In the present investigation, the investigator tries to find out if a personality type affects the achievement of students in mathematics. Learning or happy-go-lucky extroverts have high achievement in mathematics.

Every person is creative but in the childhood in the school if proper environment or guidance is given then creativity may bloom to a large extent. Mathematics learning involves logical thinking, reasoning, and these factors which are involved in creative work. In the present investigation, whether creativity is a contributor to mathematical achievement or not.

Finding of the present study may be helpful to the parents and school authorities including teachers and principals to know and understand over and under achievement of students. Present study in mathematics will answer how self concept, creativity, and personality of students contribute to under and over achievement and up to what extent.
STATEMENT OF THE PROBLEM

A COMPARATIVE STUDY OF UNDER-ACHIEVERS AND OVER-ACHIEVERS IN MATHEMATICS OF SECONDARY SCHOOL STUDENTS IN RELATION TO THEIR SELF-CONCEPT, CREATIVITY AND PERSONALITY

OBJECTIVES

1. To study the difference in self concept of under achievers and over achievers.

2. To study the difference in creativity of under achievers and over achievers.

3. To study the difference in personality type of under achievers and over achievers.

4. (a) To study the difference in self concept of male under achievers and over achievers.

4. (b) To study the difference in creativity of male under achievers and over achievers.

4. (c) To study the difference in personality of male under achievers and over achievers.

5. (a) To study the difference in self concept of female under achievers and over achievers.

5. (b) To study the difference in creativity of female under achievers and over achievers.

5. (c) To study the difference in personality of female under achievers and over achievers.

6. (a) To study the difference in self concept of under achievers and over achievers studying in Govt. schools.
6. (b) To study the difference in creativity of under achievers and over achievers studying in Govt. schools.

6. (c) To study the difference in personality of under achievers and over achievers studying in Govt. schools.

7. (a) To study the difference in self concept of under achievers and over achievers studying in private schools.

7. (b) To study the difference in creativity of under achievers and over achievers studying in private schools.

7. (c) To study the difference in personality of under achievers and over achievers studying in private schools.

8. (a) To study the difference in self concept of under achievers and over achievers residing in rural area.

8. (b) To study the difference in creativity of under achievers and over achievers residing in rural area.

8. (c) To study the difference in personality of under achievers and over achievers residing in rural area.

9. (a) To study the difference in self concept of under achievers and over achievers residing in urban area.

9. (b) To study the difference in creativity of under achievers and over achievers residing in urban area.

9. (c) To study the difference in personality of under achievers and over achievers residing in urban area.

10. To study the relationship between achievement in Mathematics and self concept of under achievers.
11. To study the relationship between achievement in Mathematics and creativity of under achievers.

12. To study the relationship between achievement in Mathematics and personality of under achievers.

13. To study the relationship between achievement in Mathematics and self concept of over achievers.

14. To study the relationship between achievement in Mathematics and creativity of over achievers.

15. To study the relationship between achievement in Mathematics and personality of over achievers.

16. To study the contribution of independent variables self concept, creativity and personality towards achievement in Mathematics of under achievers.

17. To study the contribution of independent variables self concept, creativity and personality towards achievement in Mathematics of over achievers.

HYPOTHESES

\( H_{01} \) There will be no significant difference in self concept of under achievers and over achievers.

\( H_{02} \) There will be no significant difference in creativity of under achievers and over achievers.

\( H_{03} \) There will be no significant difference in personality type of under achievers and over achievers.

\( H_{04(a)} \) There will be no significant difference in self concept of male under achievers and over achievers.

\( H_{04(b)} \) There will be no significant difference in creativity of male under achievers and over achievers.
$H_{04(c)}$ There will be no significant difference in personality of male under achievers and over achievers.

$H_{05(a)}$ There will be no significant difference in self concept of female under achievers and over achievers.

$H_{05(b)}$ There will be no significant difference in creativity of female under achievers and over achievers.

$H_{05(c)}$ There will be no significant difference in personality of female under achievers and over achievers.

$H_{06(a)}$ There will be no significant difference in self concept of under achievers and over achievers studying in Govt. schools.

$H_{06(b)}$ There will be no significant difference in creativity of under achievers and over achievers studying in Govt. schools.

$H_{06(c)}$ There will be no significant difference in personality of under achievers and over achievers studying in Govt. schools.

$H_{07(a)}$ There will be no significant difference in self concept of under achievers and over achievers studying in private schools.

$H_{07(b)}$ There will be no significant difference in creativity of under achievers and over achievers studying in private schools.

$H_{07(c)}$ There will be no significant difference in personality of under achievers and over achievers studying in private schools.

$H_{08(a)}$ There will be no significant difference in self concept of under achievers and over achievers residing in rural area.

$H_{08(b)}$ There will be no significant difference in creativity of under achievers and over achievers residing in rural area.
There will be no significant difference in personality of under achievers and over achievers residing in rural area.

There will be no significant difference in self concept of under achievers and over achievers residing in urban area.

There will be no significant difference in creativity of under achievers and over achievers residing in urban area.

There will be no significant difference in personality of under achievers and over achievers residing in urban area.

There will be no significant relationship between academic achievement and self concept of under achievers.

There will be no significant relationship between academic achievement and self concept of over achievers.

There will be no significant relationship between academic achievement and creativity of under achievers.

There will be no significant relationship between academic achievement and creativity of over achievers.

There will be no significant relationship between academic achievement and personality of under achievers.

There will be no significant relationship between academic achievement and personality of over achievers.

The Contribution of independent variables self concept, creativity and personality toward academic achievement of under achieves will not be significant.

The Contribution of independent variables self concept, creativity and personality toward academic achievement of over achieves will not be significant.
SAMPLE SELECTION

Sample of students was taken from the Moga dist. of Punjab. To ensure representativeness, multistage random sampling technique was employed. List of various government and private schools of Moga dist. was taken from district Education officer. Govt. and private schools of urban and rural area were selected randomly to collect the data.

Secondly achievement test prepared by the investigator and Raven matrix test of intelligence (detail of the test given under title tools to be used) were given to 614 students of ix class of various schools. Twelve schools were selected for the study. Care was taken to select schools on the following criteria.

1. Government or Private
2. Female only or Male only or co-education.
3. Rural or urban

TOOLS USED

A researcher needs data gathering tools or techniques which may vary in their complexity, design, administration and interpretation. Each tool is appropriate for the collection of certain type of evidence or information. The researcher has to select from the available tools. Which were provided data to test the hypotheses. In some situations researcher may find the existing research tools which do not fulfill the purpose and so the researcher may have to construct a new tool. For this purpose researcher should be familiar with the nature merits and limitations of the existing research tools and should also develop skill in the construction and use of research tools. The following tools were used for the present study

1. Raven’s standard Progressive Matrices Intelligence test(1984)
2. Test of achievement in Mathematics was constructed by researcher herself
5. Self-Concept scale was constructed by investigator herself.
METHOD ADOPTED FOR THE STUDY

In the present study, descriptive survey method of research was used. It involved the description, recording, analysis and interpretation of conditions that now exists. Survey research in education involves the collection of information and analysis of this information to illuminate important educational issues.

The descriptive research method is most popular in educational investigation. Descriptive research studies are designed to obtain pertinent and precise information about the current status of phenomena and to draw valid general conclusions from the facts discovered. It involves measurement, classification, analysis, comparison and interpretation. Descriptive method is an exploratory method.

A survey gathers relatively limited data for a relatively large number of cases. The purpose is to get information about variables rather than about individual. When the researcher studies only a portion of the population, the survey is called a sample survey. We can study the interests, aptitudes, attitudes, habits and many other temperamental and personality characteristic of a group with the help of the survey method. Thus, we can define a survey method as its representative sample to derive the desired specific information for the realization of the objectives of the study.

The purposes of surveys fall into two main categories: first; surveys may be used to obtain descriptive information about a target population. Second; a survey may be designed to examine relationships between various factors, typically seeking to explain differences between students on some criterion, for example in the present study, to examine relationship between the academic achievement in mathematics of secondary school students; and to check the type of personality, creativity and self concept.

COLLECTION OF DATA

After finding the sample and tools to be used the investigator met the head of the schools and the teachers and discussion with them. Date and time was fixed and most of schools allotted the time after lunch break in schools for administration of tools.
Collection of data was completed in two stages. In the first stage, data was collected for checking intelligence level (I.Q.) and achievement in Mathematics. For which Raven Matrix Test of Intelligence and Achievement test in Mathematics constructed by the investigator was used.

After identification of under and over achievers in second stage the students were given self concept, creativity and personality test. All possible efforts were made to make the students feel at ease and respond to the various tests with full concentration. All their queries were answered so as to satisfy their curiosity and motivate them to answer the questions carefully. All efforts were made to get maximum co-operation from the students. They were assured that their results would be kept strictly confidential.

MAJOR FINDINGS AND CONCLUSIONS

1. Significant difference is obtained between self concept of under and over achievers. CR value is 10.32 which is significant at 0.01 level (CR>2.58)

   Therefore hypothesis $H_{01}$ that there will be no significant difference in self concept of under achievers and over achievers was rejected and the alternate hypothesis that there exists significant difference in self-concept of under and over achievers stands accepted.

2. Significant difference is obtained between creativity of under and over achievers. CR value is 3.48 which is significant at 0.01 level (CR>2.58)

   Therefore hypothesis $H_{02}$ that there will be no significant difference in creativity of under achievers and over achievers was rejected and the alternate hypothesis that there exists significant difference in creativity of under and over achievers stands accepted.

3. Significant difference is obtained between personality of under and over achievers. CR value is 12.40 which is significant at 0.01 level (CR>2.58)

   Therefore hypothesis $H_{03}$ that there will be no significant difference in personality type of under achievers and over achievers was rejected and the alternate
4. Significant difference is obtained in self concept of male under achievers and male overachievers under investigation. CR value is 6.16 which is significant at 0.01 level (CR>2.58).

Therefore hypothesis $H_{04(a)}$ that there will be no significant difference in self concept of male under achievers and over achievers was rejected and the alternate hypothesis that there exists significant difference in self concept of male under and over achievers stands accepted.

5. Significant difference is obtained in creativity of male under achievers and male overachievers under investigation. CR value is 3.53 which is significant at 0.01 level (CR>2.58).

Therefore hypothesis $H_{04(b)}$ that there will be no significant difference in creativity of male under achievers and over achievers was rejected and the alternate hypothesis that there exists significant difference in creativity of male under and over achievers stands accepted.

6. Significant difference is obtained in personality of male under achievers and male overachievers under investigation. CR value is 11.33 which is significant at 0.01 level (CR>2.58).

Therefore hypothesis $H_{04(c)}$ that there will be no significant difference in personality of male under achievers and over achievers was rejected and the alternate hypothesis that there exists significant difference in personality of male under and over achievers stands accepted.

7. Significant difference is obtained in self concept of female under achievers and male overachievers under investigation. CR value is 8.44 which is significant at 0.01 level (CR>2.58).

Therefore hypothesis $H_{05(a)}$ that there will be no significant difference in self concept of female under achievers and over achievers was rejected and the alternate
hypothesis that there exists significant difference in self concept of female under and over achievers stands accepted.

8. Significant difference is obtained in creativity of female under achievers and male overachievers under investigation. CR value is 2.35 which is not significant at 0.01 level (CR>2.58), but it is significant at 0.05 level.

Therefore hypothesis H05(b) that there will be no significant difference in creativity of female under achievers and over achievers was rejected and the alternate hypothesis that there exists significant difference in creativity of female under and over achievers stands accepted.

9. Significant difference is obtained in personality of female under achievers and male overachievers under investigation. CR value is 6.81 which is significant at 0.01 level (CR>2.58).

Therefore hypothesis H05(c) that there will be no significant difference in personality of female under achievers and over achievers was rejected and the alternate hypothesis that there exists significant difference in personality of female under and over achievers stands accepted.

10. Significant difference is obtained in self concept of under achievers and overachievers studying in Govt. schools under investigation. CR value is 8.20 which is significant at 0.01 level (CR>2.58).

Therefore hypothesis H06(a) that there will be no significant difference in self concept of under achievers and over achievers studying in Govt. schools was rejected and the alternate hypothesis that there exists significant difference in self concept of under and over achievers studying in Govt. schools stands accepted.

11. Significant difference is obtained in creativity of under achievers and overachievers studying in Govt. schools under investigation. CR value is 4.16 which is significant at 0.01 level (CR>2.58).

Therefore hypothesis H06(b) that there will be no significant difference in creativity of under achievers and over achievers studying in Govt. schools was
rejected and the alternate hypothesis that there exists significant difference in creativity of under and over achievers studying in Govt. schools stands accepted.

12. Significant difference is obtained in personality of under achievers and over achievers studying in Govt. schools under investigation. CR value is 10.50 which is significant at 0.01 level (CR>2.58).

Therefore hypothesis $H_{06(c)}$ that there will be no significant difference in personality of under achievers and over achievers studying in Govt. schools was rejected and the alternate hypothesis that there exists significant difference in personality of under and over achievers studying in Govt. schools stands accepted.

13. Significant difference is obtained in self concept of under achievers and male over achievers studying in private schools under investigation. CR value is 7.87 which is significant at 0.01 level (CR>2.58).

Therefore hypothesis $H_{07(a)}$ that there will be no significant difference in self concept of under achievers and over achievers studying in private schools was rejected and the alternate hypothesis that there exists significant difference in self concept of under and over achievers studying in private schools stands accepted.

14. Significant difference is obtained in creativity of under achievers and over achievers studying in private schools under investigation. CR value is 1.75 which is not significant at 0.01 level (CR>2.58), not significant even at 0.05 level.

Therefore hypothesis $H_{07(b)}$ that there will be no significant difference in creativity of under achievers and over achievers studying in private schools was accepted. This means there is no significant difference in creativity of under and over achievers studying in private schools.

15. Significant difference is obtained in personality of under achievers and over achievers studying in private schools under investigation. CR value is 6.99 which is significant at 0.01 level (CR>2.58).

Therefore hypothesis $H_{07(c)}$ that there will be no significant difference in personality of under achievers and over achievers studying in private schools was
rejected and the alternate hypothesis that there exists significant difference in personality of under and over achievers studying in private schools stands accepted.

16. Significant difference is obtained in self concept of under achievers and over achievers residing in rural area. CR value is 7.89 which is significant at 0.01 level (CR>2.58).

    Therefore hypothesis $H_{08(a)}$ that there will be no significant difference in self concept of under achievers and over achievers residing in rural area was rejected and the alternate hypothesis that there exists significant difference in self concept of under and over achievers residing in rural area stands accepted.

17. Significant difference is obtained in creativity of under achievers and over achievers residing in rural area. CR value is 3.34 which is significant at 0.01 level (CR>2.58).

    Therefore hypothesis $H_{08(b)}$ that there will be no significant difference in creativity of under achievers and over achievers residing in rural area was rejected and the alternate hypothesis that there exists significant difference in personality of under and over achievers residing in rural area stands accepted.

18. Significant difference is obtained in personality of under achievers and over achievers residing in rural area. CR value is 8.49 which is significant at 0.01 level (CR>2.58).

    Therefore hypothesis $H_{08(c)}$ that there will be no significant difference in personality of under achievers and over achievers residing in rural area was rejected and the alternate hypothesis that there exists significant difference in personality of under and over achievers residing in rural area stands accepted.

19. Significant difference is obtained in self concept of under achievers and over achievers residing in urban area. CR value is 4.14 which is significant at 0.01 level (CR>2.58).

    Therefore hypothesis $H_{09(a)}$ that there will be no significant difference in self concept of under achievers and over achievers residing in urban area was rejected.
and the alternate hypothesis that there exists significant difference in self concept of under and over achievers residing in urban area stands accepted.

20. Significant difference is obtained in creativity of under achievers and over achievers residing in urban area. CR value is 3.34 which is significant at 0.01 level (CR>2.58).

Therefore hypothesis $H_{09(b)}$ that there will be no significant difference in creativity of under achievers and over achievers residing in urban area was rejected and the alternate hypothesis that there exists significant difference in personality of under and over achievers residing in urban area stands accepted.

21. Significant difference is obtained in personality of under achievers and over achievers residing in urban area. CR value is 7.08 which is significant at 0.01 level (CR>2.58).

Therefore hypothesis $H_{09(c)}$ that there will be no significant difference in personality of under achievers and over achievers residing in urban area was rejected and the alternate hypothesis that there exists significant difference in personality of under and over achievers residing in urban area stands accepted.

22. There is positive and significant relationship between achievement in Mathematics and self concept ($r=0.168$) in case of under achievers.

Therefore hypothesis $H_{10}$ that there will be no significant relationship between achievement in Mathematics and self concept of under achievers stands rejected.

The positive relationship between academic achievement and self concept among under achievers depicts that higher the self concept was more was the achievement in Mathematics in case of under achievers.

23. There is low positive and significant relationship between academic achievement and self concept ($r=0.185$) in case of over achievers.

Therefore hypothesis $H_{11}$ that there will be no significant relationship between academic achievement and self concept of over achievers stands rejected.
The positive relationship between achievement in mathematics and self concept among over achievers depicts that higher the self concept was more was the achievement in Mathematics in case of over achievers.

24. There is positive and significant relationship between achievement in mathematics and creativity of under achievers.

Therefore hypothesis H_{12} There will be no significant relationship between achievement in Mathematics and creativity of over achievers stands rejected.

The positive relationship between achievement in mathematics and creativity among under achievers depicts that higher the creativity was more is the achievement in Mathematics in case of under achievers.

25. There is positive and significant relationship between achievement in mathematics and creativity of over achievers.

Therefore hypothesis H_{13} that there will be no significant relationship between achievement in mathematics and creativity of over achievers stands rejected.

The positive relationship between achievement in mathematics and creativity among over achievers depicts that higher the creativity was more was the achievement in Mathematics in case of over achievers.

26. There is positive and non significant relationship between achievement in mathematics and personality of under achievers.

Therefore hypothesis H_{14} that there will be no significant relationship between achievement in mathematics and personality of under achievers stands accepted.

27. There is positive and significant relationship between achievement in mathematics and personality of over achievers.

Therefore hypothesis H_{14} that there will be no significant relationship between achievement in mathematics and personality of over achievers stands accepted.
28. Personality and creativity contribute toward achievement in mathematics in case of under achievers.
29. Creativity and self concept contribute toward achievement in mathematics in case of over achievers.

EDUCATION IMPLICATIONS

Findings from the present study demonstrate that on the whole, the independent variables were predictors of academic achievement.

If teachers indeed hope to promote self concept among their students in class settings, they should let students feel free to express what they find valuable in their thoughts and experiences.

Creativity influences the achievement of students in mathematics. It has positive correlation with mathematical achievement of the students. Therefore, parents and teachers should provide congenial and free home and school environment to their children so that they can produce some original solutions to the mathematical problems. In this way, they may be able to device some new innovative techniques to solve mathematical problems in a simple way. Parents and teachers should also try to provide maximum facilities with the help of which children can create something new in the field of mathematics. Teacher should try to make the classroom environment as stimulating, encouraging and provide other facilities in order to channelise the potentialities and talents in right direction instead of blocking its way. Teachers should also try to teach the children with the help of problem solving method.

The present study directly confirms the positive relationship between the personality and the academic achievement of secondary school students. Therefore it can be said that if parents, teachers, school and society together identify and recognize these traits and build up them by nurturing, then the positive growth in academic achievement can be observed. Schools should take care of the factors responsible for the growth of these traits. Since the education of a child begins at home therefore the family especially the parents should try to nurture these personality traits and making child grow in a positive direction.
The educationists and planner should identify such other traits also that are associated with child’s cognitive development and this will help them to rethink and develop new, modern and latest research based curriculum.

The present study has implications for the teachers teaching at school level that good academic achievement is not the product of rote memorization and hard work but academic achievement has close relationship with personality traits undertaken here by the investigator. Therefore the total attention should not only be focused on academic activities and spoon feeding but due attention should also be paid to development of self-confidence, sociability and ambitious traits.

SUGGESTIONS FOR FURTHER RESEARCH STUDY

Every piece of research which is well executed tends to provide clues for further exploration. The present study is humble but pioneer attempt of explore the concept of over and under achievement in mathematics in relation to certain variables namely self concept, creativity and personality at secondary stage. The present study opens up certain new avenues for further research which are as following

- In the present study investigation, conclusions were based on the study of 614 students of ix standard only. It may be replicated for different levels of educational ladder and for different type of schools in state of Punjab.
- Research study can also be planned to investigate achievement in mathematics of under and over achievers in relation to other variables like aptitude, interest, motivation, emotional intelligence and study habits etc.
- Comparative studies may also be conducted on different categories of children e.g. gifted, backward and slow learners etc.
- The present study was limited to over and under achievers studing in schools affiliated to P.S.E.B. A similar study may be conducted in the schools affiliated to C.B.S.E or I.C.S.E.
- Similar study may be done in other states also belonging to different socio-cultural status.
- A comparative study of under and over achievers of college and university students may also be undertaken.
• Under and over achievements in other subjects except mathematics can also be undertaken.
• Study may be conducted on a larger sample in order to test the reliability of findings of the present study.