CHAPTER-VII

SUMMARY, CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH
The present study entitled, "An Evaluative Study of the Teaching of Mathematics in Elementary and Secondary Schools in Panjab with Special Reference to its Objectives," is directed towards the following objectives:

1. To identify objectives of teaching mathematics at elementary, secondary and senior secondary stages.

2. To find out how far the present curriculum, methods of teaching and evaluation techniques in mathematics at the elementary, secondary and senior secondary stages are relevant to the attainment of the objectives of teaching mathematics.

3. To know the degree of association among responses relating to curriculum, teaching methods and evaluation techniques for the attainment of objectives of teaching mathematics at elementary, secondary and senior secondary stages.

4. To know the difference in the attainment of objectives related to cognitive, affective and psycho-motor domain through curriculum, method of teaching and evaluation techniques at elementary, secondary and senior secondary stages.

5. To know the difference among elementary, secondary and senior secondary stages in respect of relevance of curriculum, method of teaching and evaluation techniques.
to the attainment of objectives of teaching mathematics.

6. To know the adequacy of (a) equipment (b) audio-visual aids (c) instructional material prepared by the teachers and (d) availability of funds for mathematics activities in elementary, secondary and senior secondary schools.

7. To know (a) about the facilities in the form of inservice training programme available for the mathematics teacher (b) about the help sought by secondary and senior secondary mathematics teachers from the education department/college of education/degree colleges or the people from other institutions (c) about the encouragement given by the head of the institution for the professional growth of mathematics teachers (d) about the secondary and senior secondary mathematics teachers' habit to keep themselves abreast of new knowledge and new material in the form of general book on mathematics materials. (e) about the incentives given to teachers to attend inservice programmes at elementary, secondary and senior secondary stages.

8. To know about the facilities available in the elementary, secondary and senior secondary schools for extra-coaching of (a) gifted and (b) backward children in mathematics.

9. To know about the class test given by mathematics teachers to the students of elementary, secondary and senior secondary stages and about the nature of the test (i.e. weekly, fortnightly, monthly).
10. To know about the regularity of mathematics teachers to assign homework to the students studying in elementary, secondary and senior secondary schools and about their checking of homework.

11. To know (a) about the existence of mathematics club in the elementary, secondary and senior secondary schools (b) about the membership of mathematics teachers to this club (c) about the organisation of mathematics fairs by mathematics teachers.

12. To know (a) about the availability of mathematics books in the school library (b) about the provision of separate mathematics library in the secondary and senior secondary schools (c) about the knowledge of mathematics teachers on different topics from the current literature on mathematics education (d) about the subscription of mathematics journals by secondary and senior secondary institutions (e) about the provision of separate mathematics section in school magazine (f) about the provision of mathematics bulletin board at secondary and senior secondary stage to display information regarding mathematics activities.

13. To know about the provision of feedback by the secondary and senior secondary teachers to the students and by the students to the mathematics teachers.
14. To know (a) about student's interest in learning of mathematics (b) about secondary and senior secondary teachers attitude to take students' critical questions supporting in their mathematics class. (c) About the adequacy of present syllabus to meet the needs of students. (d) about the discrepancy in the methods of teaching mathematics actually employed by the teachers and the methods of teaching given in the books. (e) about the factors which affect adversely the teaching of mathematics in elementary, secondary and senior secondary schools.

15. To pin point certain suggestions given by the mathematics teachers to improve the quality of teaching mathematics at the elementary, secondary and senior secondary stage and to get the suggestions (if any) from mathematics teachers regarding the changes which they want to introduce at school level to make the teaching of mathematics more meaningful and interesting.

HYPOTHESES

Consequent upon objectives of present study and research trends the following hypotheses have been formulated for the conduct of the present study:

1(a) Present curriculum in mathematics, methods of teaching and evaluation techniques are not relevant to the attainment of objectives (in the cognitive domain) of teaching mathematics at elementary stage.
1(b) Present curriculum in mathematics, methods of teaching and evaluation techniques are not relevant to the attainment of objectives (in the affective domain) of teaching mathematics at the elementary stage.

1(c) Present curriculum in mathematics, methods of teaching and evaluation techniques are not relevant to the attainment of objectives (in the psycho-motor domain) of teaching mathematics at the elementary stage.

2(a) Present curriculum in mathematics, methods of teaching and evaluation techniques are not relevant to the attainment of objectives (in the cognitive domain) of teaching mathematics at the secondary stage.

2(b) Present curriculum in mathematics, methods of teaching and evaluation techniques are not relevant to the attainment of objectives (in the affective domain) of teaching mathematics at the secondary stage.

2(c) Present curriculum in mathematics, methods of teaching and evaluation techniques are not relevant to the attainment of objectives (in the psycho-motor domain) of teaching mathematics at the secondary stage.

3(a) Present curriculum in mathematics, methods of teaching and evaluation techniques are not relevant to the attainment of objectives (in the cognitive domain) of teaching mathematics at the senior secondary stage.

3(b) Present curriculum in mathematics, methods of teaching and evaluation techniques are not relevant to the attainment of objectives (in the affective domain) of teaching mathematics at the senior secondary stage.

3(c) Present curriculum in mathematics, methods of teaching and evaluation techniques are not relevant to the attainment of objectives (in the psycho-motor domain)
4(a) There is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through curriculum and methods of teaching at the elementary stage.

4(b) There is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through methods of teaching and evaluation techniques at the elementary stage.

4(c) There is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through curriculum and evaluation techniques at the elementary stage.

5(a) There is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through curriculum and methods of teaching at the secondary stage.

5(b) There is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through methods of teaching and evaluation techniques at the secondary stage.

5(c) There is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through curriculum and evaluation techniques at the secondary stage.

6(a) There is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through curriculum and methods of teaching at the senior secondary stage.

6(b) There is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through methods of teaching and evaluation technique at the senior secondary stage.
6(c) There is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through curriculum and evaluation technique at the Senior Secondary Stage.

7(a) There are significant differences in the attainment of objectives of teaching mathematics (related to cognitive domain) through curriculum, methods of teaching and evaluation technique at elementary school stage.

7(b) There are significant differences in the attainment of objectives of teaching mathematics (related to affective domain) through curriculum, methods of teaching and evaluation technique at elementary school stage.

7(c) There are significant differences in the attainment of objectives of teaching mathematics (related to psychomotor domain) through curriculum, methods of teaching and evaluation technique at elementary school stage.

7(d) There are significant differences in the attainment of objectives of teaching mathematics (in terms of cognitive, affective and psychomotor domain taken conjointly) through curriculum, methods of teaching and evaluation technique at the elementary school stage.

7(e) There are significant differences in the attainment of objectives of teaching mathematics at three levels of domain i.e. cognitive, affective and psychomotor at elementary school stage.
8(a) There are significant differences in the attainment of objectives of teaching mathematics (related to cognitive domain) through curriculum, methods of teaching and evaluation technique at secondary school stage.

8(b) There are significant differences in the attainment of objectives of teaching mathematics (related to affective domain) through curriculum, methods of teaching and evaluation technique at secondary school stage.

8(c) There are significant differences in the attainment of objectives of teaching mathematics (related to psychomotor domain) through curriculum, methods of teaching and evaluation technique at secondary school stage.

8(d) There are significant differences in the attainment of objectives of teaching mathematics (in terms of cognitive, affective and psychomotor domains taken jointly) through curriculum, methods of teaching and evaluation technique at secondary school stage.

8(e) There are significant differences in the attainment of objectives of teaching mathematics at three levels of domain i.e. cognitive, affective and psychomotor domain at the secondary school stage.

9(a) There are significant differences in the attainment of objectives of teaching mathematics (related to cognitive domain) through curriculum, methods of teaching and evaluation technique at senior secondary stage.
9(b) There are significant differences in the attainment of objectives of teaching mathematics (related to affective domain) through curriculum, methods of teaching and evaluation technique at senior secondary stage.

9(c) There are significant differences in the attainment of objectives of teaching mathematics (related to psychomotor domain) through curriculum, methods of teaching and evaluation technique at senior secondary stage.

9(d) There are significant differences in the attainment of objectives of teaching mathematics (in terms of cognitive, affective and psychomotor domains taken conjointly) through curriculum, methods of teaching and evaluation technique at senior secondary stage.

9(e) There are significant differences in the attainment of objectives of teaching mathematics at three levels of domain i.e. cognitive, affective and psychomotor at senior secondary stage.

10. There are significant differences among elementary, secondary and senior secondary stage in respect of relevance of curriculum, methods of teaching and evaluation techniques to the attainment of objectives of teaching mathematics.

**IMPORTANCE AND NEED OF THE STUDY:**

In India as the new system of education (10+2+3) at the school level has been introduced, if the unplanned education
continues, it may lead to more wastage and heavy burden on Indian economy. In this context, the present investigation holds special significance at the crucial period in the history of Indian Education System, as the study would lead to greater crystallization of the objectives of teaching mathematics. Therefore, the present study is likely to have considerable implications; both theoretically and practically.

Fundamentally the success of education at any ladder not only depend on the definitions of aims or subject values but also equally on the objectives of teaching of that subject and methods of teaching. The present study would throw light how far curriculum, methods of teaching and evaluation techniques are relevant to the attainment of the objectives of teaching mathematics at elementary, secondary and senior secondary stages.

One of the most neglected field in the area of mathematical education programme in this country and abroad has been the negligence of objective-oriented education and as not much work of this nature has been done in India, the present study would suggest steps for making mathematics objective-oriented.

Also, there appears the need to look into the relationship among three groups—the curriculum, methods and evaluation techniques for the attainment of objectives of mathematics and to discover the contribution of curriculum, methods and evaluation
Another aspect of the significance of the present study is that it would clearly disclose how far the elementary, secondary and senior secondary institutions are equipped with regard to the library, teaching aids, mathematics club and the provision for extra coaching of gifted and backward students in mathematics.

It will also highlight whether or not the mathematics teachers get facilities and encouragement from the head of the institutions for their professional growth.

Likewise it would reveal the problems faced by the mathematics teachers in teaching elementary, secondary and senior secondary classes and their suggestions regarding the improvement in the present day teaching of mathematics in schools.

Needless to say that students, subject teachers, counsellors, parents, curriculum framers, government and society at large would all be benefitted by actively implementing the research findings of the present study into practice.

**DESIGN OF THE STUDY:**

The present investigation entitled, "An Evaluative Study of the Teaching of Mathematics in Elementary and Secondary Schools in Panjab with Special Reference to its Objectives", was completed in the following two phases:

1. **Phase 1:**
   - **Objective:**
     - Identify the current teaching methods and their effectiveness in achieving the educational objectives for mathematics at the elementary, secondary and senior secondary stages.
   - **Methodology:**
     - Conduct surveys, interviews, and focus group discussions with mathematics teachers, students, and parents to gather qualitative data on teaching practices and student performance.
     - Collect quantitative data through standardized testing to measure the impact of these teaching methods.

2. **Phase 2:**
   - **Objective:**
     - Evaluate the impact of the implemented changes on student learning outcomes and teacher satisfaction.
   - **Methodology:**
     - Compare the results from Phase 1 with the outcomes from Phase 2 to assess the effectiveness of the changes.
     - Use feedback from the schools and stakeholders to refine and improve the teaching strategies.

The findings from both phases would provide valuable insights into the best practices for teaching mathematics, particularly in the context of the Panjab region, and offer recommendations for future improvements in the education system.
Phase I:

It consisted of preparation of Scale of Objectives of Teaching Mathematics (based on cognitive, affective and psychomotor domains) separately for elementary, secondary and senior secondary stages. Besides, "Teacher Information Proformas" separately for elementary, secondary and senior secondary teachers were prepared.

Phase II:

In this phase various research tools namely, Scale of Objectives of Teaching Mathematics separately for elementary, secondary and senior secondary stages and Teacher Information Proformas separately for elementary, secondary and senior secondary teachers were administered to mathematics teachers and requisite informations were collected. As the assessment of the attainment of objectives of teaching mathematics had a direct relevance with survey technique of investigation, therefore, the attainment of the objectives of teaching mathematics at the school stage were evaluated in the prevailing environment conditions. In the light of the aforesaid approach of investigation, the analysis of data was completed in the following four stages of Phase II of the study.

Stage I:

To know how far the curriculum methods of teaching and evaluation techniques used at elementary, secondary and senior secondary stages separately are relevant to the attainment of objectives of teaching mathematics, chi-square test was used.
Stage 2:

Product-moment coefficient of correlations were worked out separately for elementary, secondary and senior secondary stages to find out correlation between score of subject worked on the basis of their responses related to curriculum items on one hand and scores of the subjects worked on the basis of their response relating to teaching method items on the other hand. Similarly, correlations between score of these subjects were worked out on the basis of their response relating to teaching methods items on one hand and the scores of these very subjects worked on the basis of their response relating to evaluation technique on the other hand.

Stage 3:

In this stage of the phase II, t-test was employed to find whether the attainment of objectives in question was more due to curriculum, method of teaching or due to evaluation techniques and to know the differences at elementary, secondary and senior secondary levels.

Stage 4:

Technique of percentage was employed to know the presence or absence of items and opinion and suggestions of teachers on the basis of Teachers Information Proforma for elementary, secondary and senior secondary teachers.
SAMPLE:

Keeping in view the design of the present study different sets of sample were drawn in the following stages:

Stage I:

This entailed sampling for construction of scale of objectives of teaching mathematics separately for elementary, secondary and senior secondary stages. The preliminary draft of the scales were given to 52 judges (Teachers of Education Department, Panjab University, Chandigarh N=3, Teachers of D.A.V.College of Education, Abohar N=7, Teachers of Dev Samaj College of Education, Ferozepur City N=5, Teachers and Head of D.A.V.Public School, Haripura, Abohar, N=6, Teachers and Head of the D.A.V. Senior Secondary School, Abohar, N=3, Teachers of Government Senior Secondary School, Abohar N=9, Teachers of Government Girls High School, Abohar N=11, Teachers of D.A.V.College, Abohar N=3), to find out any defect in the language and adequacy of items in different domains.

For final try out of the scales of objectives at three stages, three scales were administered over a sample of 98 teachers (48 primary school teachers, 30 secondary teachers and 20 senior secondary teachers).

Keeping in view the geography of Panjab, schools were selected from different districts and tehsils to give the representation to urban population. Few schools
consisting of rural population were also included to give representation to urban population. A few schools consisting of rural population were also included to give representation to rural population. In view of the above consideration the selection of sample can be regarded as a combination of random and purposive sampling. After deciding the catchment area, next step was to select the institutions. While selecting the institutions due consideration was given to boys and girls schools, the government and private schools and the urban and rural elementary, secondary and senior secondary institutions. Keeping this composition of population in mind 63 elementary, 62 secondary and 32 senior secondary institutions were selected from six districts of Panjab and U.T. Chandigarh (capital of Panjab) on the basis of multistaged stratified random sampling technique and, by the process of random sampling within each category.

Thus to begin with, the present study was conducted on a sample of 568 teachers (Elementary N=293, Secondary N=192 and Senior Secondary N=73) for the administration of scale of objectives and teacher information proformas. But due to the incomplete responses of some of the teachers in one test or the other 53 teachers were deleted and the final sample of the present study comprised of 515 teachers (Elementary N=270, Secondary N=175 and Senior Secondary N=70).
Following tools were used for conducting the present study:

1. **Criterion Test** - consisting of three sets of Scale of Objectives of Teaching Mathematics prepared on the basis of cognitive, affective and psychomotor domains for elementary, secondary and senior secondary stages separately. These tests were prepared by the investigator herself. The detail regarding the construction of these tests have been given in Chapter IV.

2. **Teacher's Information Proforma** - separately for elementary, secondary and senior secondary teachers. These proformas were prepared by the investigator herself, for collecting the informations from those teachers who were teaching mathematics at elementary, secondary and senior secondary levels and who had been taken in the final sample. Teacher Information Proforma for elementary teachers consist of 23 items, for secondary teachers consist of 30 items and for senior secondary teachers consist of 30 items.

The description of these proformas have been given in Chapter IV.

**STATISTICAL TECHNIQUES USED:**

For analysing the final data and arriving at the results, following statistical techniques were used:
(i) Chi-Square Test was used to find the relevance of curriculum, methods of teaching and evaluation techniques for all the three domains for the attainment of objectives of teaching mathematics at elementary, secondary and senior secondary stages.

(ii) Correlation analysis was done to study the degree of association among three groups (i.e. response related to curriculum, teaching methods and evaluation techniques) for the attainment of objectives of teaching mathematics for elementary, secondary and senior secondary stages separately.

(iii) t-test was employed to locate the true nature and direction of differences of different groups (i.e. curriculum, teaching methods and evaluation techniques) with respect to the attainment of objectives (in three domains) taken in the present study.

\[ \text{t-test was also used to locate the nature and} \]
\[ \text{direction of differences between three groups (i.e. elementary, secondary and senior secondary levels) divided on the basis of level of education.} \]

(iv) To know the presence or absence of item, or the opinion and suggestions of the teachers on Teacher\'s Information Proforma, technique of percentage was employed for three groups (i.e. elementary, secondary and senior secondary teachers).
CONCLUSIONS

(A) IDENTIFICATION OF OBJECTIVES OF TEACHING MATHEMATICS

Objectives at Elementary Stage:

I. Cognitive Domain

1. To provide good environment to the students in learning mathematics.

2. To help the child to develop knowledge and understanding for the mathematical concepts such as number, fraction, measurements, size and shape.

3. To help the child to develop knowledge about mathematical facts like place value of numbers, the meaning and significance of zero, grouping, sub-grouping and set-theory.

4. To help the child to develop understanding about the four fundamental operations, L.C.M., H.C.F., percentage, unitary method, simple interest, profit and loss and mensuration.

5. To develop the ability to represent verbal statements by diagrams and symbol.

6. To help the child to develop knowledge about the arithmetical terms and symbol for fundamental operations, fractions and percentage etc.

7. To help the child to develop the knowledge of mathematical games, puzzles and recreations.
3. To help the child to develop understanding about the relationship between different topics of Arithmetic.

9. To enable the child to solve elementary mathematical problems independently (orally as well as writing).

10. To enable the child to use elementary mathematical concepts and processes in everyday life.

II. Affective Domain

1. To help the child to develop self-confidence for solving elementary mathematical problems.

2. To help the child to read the problems carefully, analyse, collect all the known evidences and then draw proper inferences.

3. To help the child to develop the habit of regularity, neatness, truthfulness, honesty and hard work.

4. To enable the child to develop the habit of logical thinking and objective reasoning.

5. To enable the child to develop interest for learning the subject of mathematics.

6. To appreciate the contribution of mathematicians and get inspiration from their work.

7. To appreciate the recreational value of the subject of mathematics and learns to utilise the leisure time profitably.
3. To appreciate the power of computational skills.

### III. Psycho-motor Domain

1. To develop the reasonable speed and skill of accuracy and neatness in the computation of oral as well as written work in mathematics.
2. To develop skill in the use of multiplication tables.
3. To develop the skill of reading, writing and counting numbers.
4. To develop skill in four fundamental operations dealing with integral numbers and fractions.
5. To develop the skill of solving problems involving elementary mathematical processes and simple calculations.
6. To develop skill in making quantitative estimate of size and distance.

### Objectives at Secondary Stage

#### I. Cognitive Domain

1. To enable the students to acquire the knowledge of the language of mathematics (in terms of symbol, formulae, figures, diagrams, technical terms and definitions).
2. To help the students to acquire the knowledge of development of the subject and contribution of mathematicians.
3. To help the students to acquire the knowledge of the inter-relationship among different topics and branches of mathematics.

4. To help the students to acquire the knowledge of the basic nature of the subject of mathematics.

5. To help the students to develop the ability to perform calculations orally or mentally.

6. To help the students to develop the ability to think correctly, to draw inferences and to generalize.

7. To enable the students to solve the problems of mathematics independently.

8. To help the students to acquire the knowledge of concepts, principles, tools and processes and use these in every day life activities.

9. To help the students to develop the ability to make use of mathematics learning in learning of other subjects.

10. To help the students to equip themselves for higher mathematical studies.

II. Affective Domain

1. To help the students to analyse the problem.

2. To help the students to develop the habit of systematic thinking, reasoning and originality.

3. To enable the students to develop heuristic attitude
and try to discover the facts or solve the problems with his own independent efforts.

4. To help the students to express his/her opinion precisely, systematically and logically without any biases and prejudices.

5. To help the students to develop personal qualities like regularity, punctuality, honesty, neatness, truthfulness and hard work.

6. To help the students to develop self-confidence for solving the mathematical problems.

7. To help the students to appreciate the role of mathematics as the science of all sciences and art of all arts in understanding environment.

III. Psycho-motor Domain

1. To help the students to develop speed, precision, brevity and skill of accuracy and neatness in computation of calculation work.

2. To help the students to develop the skill of using mathematical apparatus and tools skillfully.

3. To help the students to develop the essential skill in drawing geometrical figures.

4. To enable the students to develop essential skill in drawing, reading and interpretation of graph and statistical tables.
To help the students to develop the skill to estimate and to check the results.

Objectives at the Senior Secondary Stage

I. Cognitive Domain

1. To prepare the students for technical professions, such as those of accounts, auditors, bankers, surveyors, cashiers, engineering scientists, statisticians and mathematics teachers.

2. To prepare the students for economic purposeful, productive, creativity and constructive living.

3. To prepare the students for the learning of mathematics of higher class (i.e. college and university stage).

4. To enable the students to learn other sciences meaningfully and thoroughly.

5. To initiate the students towards modern development of mathematics.

6. To prepare the students for advanced study of science and technology.

7. To help the students to apply probability and statistics to education, medicine, agriculture, physics, chemistry and economics.

II. Affective Domain

1. To help the students to develop mathematical perspective and outlook for observing the realm of nature and social world.
2. To help the students to think and express precisely, exactly and systematically by making proper use of mathematical language.

3. To enable the students to appreciate the role of mathematics as the science of all sciences and art of all arts in understanding their environment.

4. To help the students to appreciate the recreational value of the subject of mathematics and learn to utilize their leisure time profitably.

5. To help the students to acquaint themselves with the impact of mathematics on the development and advancement.

6. To help the students to develop interest in some vocation.

7. To help the students to develop an attitude for investigation and critical analysis.

8. To help the students to develop the interest of the students in independent library reading.

III. Psychomotor Domain

1. To help the students to develop essential skill in surveying, measuring and weighing processes.

2. To help the students to develop skill in the use of mathematical tables and ready reckoners.
3. To help the students to learn and develop the skill of problem solving.

4. To enable the students to learn the skill to recognise the adequacy or inadequacy of given data in relation to the problem.

5. To enable the students to develop the skill to make the precise statements and detect loose statements when these are made.

(B) CHI-SQUARE TEST

1. Present curriculum, methods of teaching and evaluation technique are not relevant to the attainment of objectives of teaching mathematics in cognitive, affective and psychomotor domains at the elementary stage.

2. Present curriculum, methods of teaching and evaluation technique are not relevant to the attainment of objectives of teaching mathematics in cognitive, affective and psychomotor domains at the secondary stage.

3. Present curriculum, methods of teaching and evaluation technique are not relevant to the attainment of objectives of teaching mathematics in cognitive, affective and psychomotor domains at the senior secondary stage.
1. At the elementary stage, significant positive correlation exists between the relevance of curriculum and methods of teaching, between methods of teaching and evaluation techniques, and between curriculum and evaluation techniques (in the three domains) for the attainment of objectives of teaching mathematics. Hence the hypotheses 4(a) that there is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through curriculum and methods of teaching at the elementary stage; 4(b) that there is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through methods of teaching and evaluation technique at the elementary stage and (4c) that there is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through curriculum and evaluation techniques at the elementary stage are retained here.

2. There is no significant positive correlation between the curriculum and methods of teaching between methods of teaching and evaluation techniques and between evaluation techniques and curriculum (in all the three domains) for the attainment of objectives of teaching mathematics at the secondary stage. Thus the hypotheses 5(a) that there is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains)
through curriculum and methods of teaching at the secondary stage; 5(b) that there is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through methods of teaching and evaluation techniques at secondary stage and 5(c) that there is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through curriculum and evaluation techniques at the secondary stage are not accepted.

3. There is significant positive correlation between relevance of curriculum and evaluation techniques for the attainment of objectives of teaching mathematics at the senior secondary stage. However, there is no significant correlation between the relevance of curriculum and methods of teaching and between methods of teaching and evaluation techniques for the attainment of objectives of teaching mathematics at senior secondary stage. Hence the hypothesis 6(a) that there is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through curriculum and methods of teaching at the senior secondary stage and 6(b) that there is significant positive correlation in the attainment of objectives of teaching mathematics (in all the three domains) through methods of teaching and evaluation technique at senior secondary stage are not retained but hypothesis 6(c) that there is significant positive correlation in the attainment of objectives of teaching
mathematics (in all the three domains) through curriculum and evaluation techniques at the senior secondary stage is retained here.

(D) t-RATIOS

1. At elementary stage, attainment of objectives of teaching mathematics in cognitive domain is higher through methods of teaching as compared to through curriculum and evaluation techniques. Therefore, hypothesis 7(a) that there are significant differences in the attainment of objectives of teaching mathematics (related to cognitive domain) through curriculum, methods of teaching and evaluation technique at elementary stage is accepted.

2. Attainment of objectives of teaching mathematics in affective domain is higher through methods of teaching followed by curriculum and evaluation techniques at elementary stage. Thus hypothesis 7(b) that there are significant differences in the attainment of objectives of teaching mathematics (related to affective domain) through curriculum, methods and evaluation technique at elementary stage is accepted.

3. Contribution to methods of teaching for the attainment of objectives (related to psychomotor domain) at elementary stage is higher as compared to the curriculum and evaluation techniques. Hence, hypothesis 7(c) that there are significant differences in the attainment of objectives of teaching mathematics (related to psychomotor domain) through curriculum,
At the elementary stage methods of teaching of the teachers prove to be a potential factor for the attainment of objectives of teaching mathematics (in cognitive, affective and psychomotor domain) as compared to the attainment of objectives through curriculum and evaluation techniques. Thus, the hypothesis 7(d) that there are significant differences in the attainment of objectives (in cognitive, affective and psychomotor domain) through curriculum, methods of teaching and evaluation techniques at the elementary school stage is accepted here.

5. Attainment of objectives of teaching mathematics in cognitive domain is higher as compared to the objectives in affective and psychomotor domain. Therefore, hypothesis 7(e) that there is significant difference in the attainment of objectives at three levels of domain i.e. cognitive, affective and psychomotor at elementary school stage is accepted.

6. At the secondary stage attainment of objectives of teaching mathematics in cognitive domain is higher through methods of teaching as compared to curriculum and evaluation techniques. Thus, the hypothesis 3(a) that there are significant differences in the attainment of objectives (related to cognitive domain) through curriculum, methods and evaluation techniques at the secondary school stage is partially accepted.
7. Like elementary stage, attainment of objectives of teaching mathematics at secondary stage in affective domain is higher through methods of teaching followed by curriculum and evaluation techniques.

Hence, hypothesis 3(b) that there are significant differences in the attainment of objectives of teaching mathematics (related to affective domain) through curriculum, methods of teaching and evaluation techniques at secondary school stage is accepted here.

8. Similarly, in psychomotor domain too, attainment of objectives of teaching mathematics through methods of teaching is higher as compared to curriculum and evaluation technique at the secondary school stage.

Thus the hypothesis 3(c) that there are significant differences in the attainment of objectives of teaching mathematics (related to psychomotor domain) through curriculum, method of teaching and evaluation technique at secondary school stage is accepted partially.

9. Likewise, attainment of objectives of teaching mathematics (in terms of cognitive, affective and psychomotor domain) through methods of teaching is higher when compared with attainment of objective through curriculum and evaluation techniques.

Thus hypothesis 3(d) that there are significant differences in the attainment of objectives of teaching mathematics
through curriculum, methods of teaching and evaluation techniques at secondary school stage is also accepted here.

10. Like elementary stage, at secondary stage also attainment of objective of teaching mathematics through cognitive domain is higher as compared to affective and psychomotor domain. Therefore, hypothesis 8(e) that there are significant differences in the attainment of objectives of teaching mathematics at three levels of domain i.e. cognitive, affective and psychomotor domain at secondary school stage is retained.

11. At the senior secondary stage attainment of objectives of teaching mathematics related to cognitive domain is higher through methods of teaching as compared to curriculum and evaluation techniques. Therefore, hypothesis 9(a) that there are significant differences in the attainment of objectives of teaching mathematics (related to cognitive domain) through curriculum, methods of teaching and evaluation techniques at senior secondary stage is accepted.

12. Unlike elementary and secondary stages, attainment of objectives at senior secondary stage at the affective domain can be achieved more through evaluation techniques as compared to curriculum and methods of teaching. Thus, hypothesis No.9(b) that there are significant differences in the attainment of objectives of teaching mathematics( related to affective domain)
through curriculum, methods of teaching and evaluation techniques at senior secondary stage is partially accepted.

13. At senior secondary stage, like elementary and secondary stages, attainment of objectives of teaching mathematics as related to psychomotor domain is higher through methods of teaching as compared to curriculum and evaluation techniques. Hence, hypothesis 9(c) that there are significant differences in the attainment of objectives of teaching mathematics (related to psychomotor domain) through curriculum, methods of teaching and evaluation techniques at senior secondary stage is accepted.

14. Dissimilar to the results of elementary and secondary stages, the results of senior secondary stage reveals that no significant differences exist between curriculum, methods of teaching and evaluation techniques in the attainment of objectives of teaching mathematics. Therefore, hypothesis 9(d) that there are significant differences in the attainment of objectives of teaching mathematics through curriculum, methods of teaching and evaluation techniques at senior secondary stage is rejected.

15. Contradictory to the results of elementary and secondary stages, at the senior secondary stage, the attainment of objectives of teaching mathematics, through affective domain is higher than the other two domains. Thus, hypothesis 9(e) that there are significant differences in the attainment of objectives of teaching mathematics at three levels of
domain i.e. cognitive, affective and psychomotor at senior secondary stage is retained here.

16. Maximum objectives of teaching mathematics can be achieved through curriculum at the elementary stage as compared to secondary and senior secondary stage. Similarly through methods of teaching higher number of objectives of teaching mathematics can be achieved at elementary stage as compared to other two stages. But through evaluation techniques maximum objectives of teaching mathematics can be achieved at the secondary stage as compared to elementary and senior secondary stage. Hence hypothesis 1C that there are significant differences among elementary, secondary and senior secondary stages in respect of relevance of curriculum, methods of teaching and evaluation techniques to the attainment of objectives of teaching mathematics is accepted.

17. At all the three stages i.e. elementary, secondary and senior secondary stages maximum objectives in cognitive domain can be achieved through methods of teaching.

18. At elementary and secondary stages, maximum objectives in the affective domain can be achieved through methods of teaching of the teacher rather than through curriculum and evaluation technique. But at the senior secondary stage maximum objectives in the affective domain can be achieved through evaluation techniques and not through teaching method and curriculum.
19. At elementary, secondary and senior secondary stages higher number of objectives in the psychomotor domain can be achieved through teaching methods.

20. Out of three domains maximum objectives at the elementary stage can be achieved only in cognitive domain. whereas at secondary and senior secondary stages maximum objectives can be achieved in affective domain.

21. Objectives of teaching mathematics in all the three domains can be achieved more through the methods of teaching of teachers at the elementary and secondary stages, whereas at the senior secondary stage, maximum objectives can be achieved through evaluation techniques.

22. In the present educational set up objectives of teaching mathematics are achieved in a maximum number at the elementary stage than at the secondary and senior secondary stages.

(E) RESULTS ON THE BASIS OF TEACHER'S INFORMATION PROFORMA:

61.1% elementary teachers and 34.25% secondary teachers get required equipment for the teaching of mathematics.

In about 50.7% elementary schools, and 61.79% secondary schools, equipments are available for the teaching of mathematics.

At the elementary stage aids are used by 70% of the teachers, at secondary stage these are used by about 66% teachers, whereas no aids are used by the senior secondary teachers.
Only 33.70% elementary school teachers and 40.57% secondary teachers get facilities to prepare instructional material for the teaching of mathematics.

No facility is provided from the government or from institution to the elementary and senior secondary class teachers to prepare some instructional material for teaching of mathematics. Only 35% of the teachers at secondary stage get this facility.

Mostly charts and models are prepared by the teachers at the elementary stage as an aid for teaching mathematics. Sufficient funds are not provided for mathematics activities in the schools. It hardly meets 4% of the need.

2. In the view of 50%, 63.87% and 41.42% elementary, secondary and senior secondary school teachers facilities do exist for the improvement of the subject competency. During the last five years, 39.92% elementary school teachers, 60% secondary school teachers and 41.42% senior secondary school teachers have got the chance to attend the seminar.

Only 35.43% teachers of secondary schools and 20% teachers of senior secondary schools do not hesitate to get some help from education department or from some senior teachers.

In the opinion of 38.14% elementary, 51.42% and 51.42% of senior secondary teachers, the heads of the institutions are cooperative.
Neither teachers are interested in reading general books nor books are provided by the institution.

In the opinion of elementary, secondary as well as senior secondary teachers; no incentives are given to the teachers to attend seminars.

3. Approximately 33% elementary and 34% senior secondary gifted children get the coaching from teachers whereas at the secondary stage this facility exists for 20% gifted children.

In other words about 33.33% elementary schools, 19.35% secondary schools and 31.25% senior secondary institutions have the provision of giving coaching to gifted children. Likewise, 42.30% elementary schools, 22.53% secondary schools and 46.87% senior secondary schools provide facility for the coaching of backward children.

4. 70.70% elementary school teachers, 90.85% secondary school teachers and 82.85% senior secondary teachers give class tests. It means maximum class tests are given by the teachers at secondary level. On the basis of results it is clear that most of the teachers give emphasis on monthly tests.

5. At elementary stage 87.77% teachers assign homework, at secondary stage 92.57% and at senior secondary stage 81.42% teachers assign homework to their students.
About 82.07% elementary teachers, 92.28% secondary teachers and 55.71% senior secondary teachers correct the home work with or without suggestions for improvement and rest of the teachers just sign the note book.

6. Mathematics club exist only in 9.52% elementary schools, 12.90% secondary schools and 15.62% senior secondary schools.

At the secondary stage 4% and at senior secondary stage 5.71% teachers have organised any mathematical fair.

7. Nearly 31.74% elementary schools, 37.09% secondary schools and 39.85% senior secondary institutions have well equipped library.

None of the schools has separate mathematics library. Only few institutions have an almirah for mathematics books.

Teachers do not know about the latest development in the field of mathematics and they express their inability to write any topic from current literature of mathematics.

None of the elementary, secondary and senior secondary institutions subscribed to any journal, magazine or periodical devoted to mathematical knowledge and information.

In 11.29% secondary schools and 25% senior secondary schools, there is a provision for separate mathematics section in school magazine. 40.32% secondary schools and 37.50% senior secondary schools provide special bulletin board or wall magazine to disseminate the informations.
8. 81.42% senior secondary teachers give feedback to their students. About 60% teachers teaching senior secondary classes are eager to get feedback from the students whenever they get the chance.

9. In the view of 63.52% elementary school teachers, 58.28% secondary school teachers and 52.83% senior secondary teachers, students do take interest in learning mathematics. About 72% teachers of secondary stage and 75.71% teachers of senior secondary stage, encourage their students to ask questions in the class.

According to 58.88% elementary school teachers, 44.57% secondary school teachers and 57.14% senior secondary teachers, present syllabus of mathematics meets the need of elementary, secondary and senior secondary stage respectively.

Lectures, inductive-deductive; analytical and synthetic; project and laboratory methods are the main methods given in books for the teaching of mathematics. But in actual practice, which was observed by the investigator, teachers generally teach with the help of inductive-deductive method and lecture method.

Investigator with the discussion of elementary, secondary and senior secondary teachers observed that lack of A.V. aids, physical facilities, heavy work load of teachers, less salary of teachers, lack of cooperation from parents, tuition work done by the teachers, lack of any orientation and inservice
programmes for teachers, lack of individual attention given by teachers and lack of interest by teachers are the factors which adversely affect the teaching of mathematics at the school stage.

10. Teachers of all the classes are of the opinion that syllabus should be light. Arithmetic portion should be given more stress and syllabus should be related to daily life problems at elementary and secondary stage. History of mathematics and life history of mathematicians should be added at senior secondary stage. In the opinion of all elementary, secondary and senior secondary teachers, to improve the teaching of mathematics and to create interest of the students in learning of mathematics; mathematical games, riddles, recreational topics must be included in the syllabus. Trained mathematical teachers, objective questions, reference books, presence of PTA, scholarship to gifted students, financial aid from community are the other measures which are required to take teaching and learning of mathematics more interesting and meaningful. More A.V. aids, T.V. programmes, sufficient equipment, well equipped library, mathematical club, fairs, quiz competitions, personal contact between the teacher and taught and entrance test for students to take mathematics at senior secondary stage are the other measures to be taken to make mathematics more interesting and meaningful at all the three stages.
EDUCATIONAL IMPLICATIONS

1. After having reported the findings in the preceding paragraphs, the study suggests that among the various things (e.g. equipment, funds, incentive given to teachers, library books, facilities for gifted and backward children etc.) some are missing in most of the institutions. Therefore, in order to make the teaching of mathematics meaningful and interesting, these facilities must be provided by the authorities.

2. At present most of the schools in India make an attempt to produce good grade getters. Any attempt to develop the understanding of mathematical concept among the students of elementary, secondary and senior secondary stages should start from identification of objectives of teaching mathematics at these levels. Findings of the present study may help in this direction.

3. The present study has theoretical as well as practical educational implications. By planning mathematical education in our schools and avoiding wastage of human as well as material resources of the country.

4. The findings of the present study can be useful for authorities responsible for construction and implementation of mathematics curriculum and educational policies because they will come to know most of the problems faced by mathematics teachers teaching in elementary, secondary and senior secondary institutions.
5. The results of the present study can be beneficial to the teachers, curriculum framers and the authorities at the higher level to make necessary changes in mathematics curriculum, methods of teaching and evaluation techniques at the elementary, secondary and senior secondary stages to meet the needs of the children and society at large.

6. The findings of the present study may form a part of the refresher courses, seminars, workshops and discussion groups organised for principals, headmasters/headmistresses and teachers teaching mathematics in elementary, secondary and senior secondary schools.

SUGGESTIONS FOR FURTHER RESEARCH

Based upon the findings and limitations of the present study the following suggestions are given to conduct further research in this field:

1. The study may be of a developmental nature so that attainment of objectives of teaching mathematics may be studied in various grade.

2. A comparative study of the attainment of objectives of any two teaching subjects may be made.

3. Study can be conducted on a larger and different sample.

4. An evaluative study of the teaching of any school subject can be studied instead of studying the teaching of mathematics.
5. The study may be conducted by taking the variable of rural-urban background and sex of the teacher into consideration.

6. Replicative studies involving larger and different population, as also follow up studies may be undertaken to establish the validity of findings of the present study.