Preceding chapter, namely analysis and interpretation of data was concerned with analysis of individual lessons taught by the effective mathematics teachers in terms of the methodology of teaching, techniques of teaching, total number of questions and types of questions asked during the lesson. The chapter besides the individual analysis of the mathematics lessons taught by the effective teachers contained the comparative analysis of the lessons taught by the sample teachers and the validation of the evolved effective methodology by the researcher. Chapter in hand namely, findings, conclusions and implications is concerned with the display of the findings and conclusion of the study and writing the implications is concerned with display of the findings and conclusion of the study and writing the implications of the findings for the persons and institutions. More precisely it can be said that the fifth chapter has been presented under the following headings.

- Discussion of results regarding teaching methodology evolved
- Findings of the study
- Implications of the findings
- Suggestions of research topics for further studies.

1. Discussion of results regarding teaching methodology evolved:

The methodology for mathematics teaching has been analysed into four categories; questioning, techniques, methods of teaching and validation of effective methodology.
The analysis was attempted teacher wise with regard to methodology used. The observations have been summarized in the terms of, its percentage and ranks were also assigned on the basis of percentage. These have been reported in the following tables:

**Table 5.1**

**Showing Types of Questions Used by Effective Teachers of Mathematics**

<table>
<thead>
<tr>
<th>Types of Question</th>
<th>Percentage of use</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factual</td>
<td>97.7</td>
<td>I</td>
</tr>
<tr>
<td>Probing</td>
<td>60</td>
<td>II</td>
</tr>
<tr>
<td>Student’s Initiated</td>
<td>42.2</td>
<td>III</td>
</tr>
<tr>
<td>Higher Order</td>
<td>40</td>
<td>IV</td>
</tr>
<tr>
<td>Problem Solving</td>
<td>20</td>
<td>V</td>
</tr>
</tbody>
</table>

In the sample of 45 most effective mathematics teachers, majority of teachers, (97.7%) used factual questioning. Therefore, it was assigned the rank I. Second widely used questioning type was probing. It was used by (60%) teachers. Whereas student’s initiated questioning was used by (42.2%) teachers. Therefore, it was assigned rank III. Higher order questioning was used by (40%) teachers and was given the rank IV. Similarly, rank V was given to problem solving questioning which was used by only (20 %) teachers.
### Table 5.2

Showing Teaching Techniques Used by Effective Teachers of Mathematics.

<table>
<thead>
<tr>
<th>Sr. Number</th>
<th>Teaching Technique</th>
<th>Percentage</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B.B technique</td>
<td>93.3</td>
<td>I</td>
</tr>
<tr>
<td>2</td>
<td>Question &amp; Answer</td>
<td>64.4</td>
<td>II</td>
</tr>
<tr>
<td>3</td>
<td>Sketching Diagrams</td>
<td>46.6</td>
<td>III</td>
</tr>
<tr>
<td>4</td>
<td>Exampling</td>
<td>8.8</td>
<td>IV</td>
</tr>
<tr>
<td>5</td>
<td>PPT</td>
<td>6.7</td>
<td>V</td>
</tr>
<tr>
<td>6</td>
<td>Think Pair &amp; Share</td>
<td>2.2</td>
<td>VI</td>
</tr>
</tbody>
</table>

The teaching techniques acts as the supporting pillars for the methods of teaching. When the effective teachers were classified in terms of percentage of their use of teaching techniques, it was revealed from the table that 93.3% teachers used B.B technique in their teaching. Therefore, it was assigned rank I. Question and answer technique has been practiced by 64.4% teachers and hence was given rank II. Rank III was given to sketching diagrams techniques as it was used by 46.6% teachers. Similarly exampling and PPT techniques were used by 8.8% and 6.66% teachers respectively therefore rank IV and V were assigned to them. There was one more technique called as think pair share technique which was used by just 2.22% teachers so it was given rank VI.

Teaching through black board is the integral part of any classroom instruction therefore maximum teachers incorporated this technique for
the content delivery and hence it stands on rank 1. Questioning in case of mathematics almost always deal with factual data and objective responses. Therefore, it is second widely used technique by the effective teachers. Since conic section is part of the Euclidean geometry which involves drawing of figures and diagrams therefore the effective teachers also extensively used the sketching diagrams technique for the figures related to the conic section. Apart from that some teachers used examples while others incorporated PPT technique for the effective delivery of their lessons. There was also one more unique technique which was not used by many teachers but it was unique and different in its own ways. The name of the technique was think pair and share. In this technique, a problem is posed, students have time to think about it individually, and then they work in pairs to solve the problem and share their ideas with the class.

Table 5.3

Showing Teaching Methods Used by Effective Teachers of Mathematics

<table>
<thead>
<tr>
<th>Sr. Number</th>
<th>Methodology</th>
<th>Percentage</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Integrated</td>
<td>55.6</td>
<td>I</td>
</tr>
<tr>
<td>2</td>
<td>Lecture cum question and answer</td>
<td>17.8</td>
<td>II</td>
</tr>
<tr>
<td>3</td>
<td>Lecture</td>
<td>15.5</td>
<td>III</td>
</tr>
<tr>
<td>4</td>
<td>Lecture cum Student’s Participation</td>
<td>6.6</td>
<td>IV</td>
</tr>
<tr>
<td>5</td>
<td>Lecture cum Problem Solving</td>
<td>4.4</td>
<td>V</td>
</tr>
</tbody>
</table>
Methodology of teaching is an important aspect of any classroom functioning and plays a vital role in making it effective or non-effective. It is evident from the table 4.3 that nearly 55.6% teachers used integrated method in their teaching therefore it was assigned rank I. 17.8% teachers used lecture cum question and answer method therefore it stands at rank II. Similarly 15.5% teachers used lecture method so it was given rank III. Lecture cum student’s participation was used by 6.6% teachers whereas lecture cum problem solving method was used by just 4.4% teachers only. So they were assigned rank IV and V respectively. So, integrated method stands at first position. It is further supported by the student’s rating as is evident from the table 4.3 that out of the 25 lessons taught through the integrated method 14 lessons were rated as very good by the students whereas 11 lessons were rated good and none was rated average or below average. On the other hand, out of the 20 lessons taught through other methods comprising of (lecture method, lecture cum question and answer method, lecture cum student’s participation and lecture cum problem solving method), 10 lessons were rated average, 9 good and only 1 lesson was rated very good by the students. This clearly indicates that the students preferred integrated method over other methods.

Since the integrated method was used by most of the effective teachers hence it stood on rank I and we can conclude that it is the evolved effective methodology of teaching of mathematics.

Integrated method connects the different areas and emphasizes on unifying the concepts. The teacher organizes the material with the help of integrated method to interrelate or unify content frequently taught in separate academic compartments. Therefore, it helps the students to make connections across the curriculum allowing them to engage in relevant meaningful activities.
Out of the four other methods used by the effective teachers, **lecture method was identified as the traditional method of teaching.**

Lecture method of teaching is one of the oldest method of teaching. This method involves the one-way channel of communication where the teacher plays the central role and the students are at the back seat. Therefore we grade it as the traditional method of teaching.

**Table 5.4**

**Conclusions on the Basis of Achievement Test:**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Group</th>
<th>Mean</th>
<th>S.D</th>
<th>t- Value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Traditional Method</td>
<td>11.83</td>
<td>6.82</td>
<td>8.88</td>
<td>Significant at both the levels.</td>
</tr>
<tr>
<td>2</td>
<td>Integrated Method</td>
<td>24.70</td>
<td>4.03</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The comparison of the scores of the student’s group of one section of the class taught through identified traditional method i.e. lecture method and the other group of students of other section taught through the evolved method i.e. integrated method enabled us to understand if there is difference in the performance of the students. ‘t’ Test was applied to test the significant difference of the means of two groups in order to test the formulated null hypothesis. The same is given in the table above. Thus from the above table it is clear that the students taught through integrated method performed far better than the students taught through lecture method. The calculated ‘t’ value is 8.88 with the 58df, we get entries 2.66 at 0.01 level and 2.0017 at 0.05 level of significance. Since the obtained ‘t’ value is less than the calculated one both at 0.05 level and .01 level of significance, it can be concluded that there is significant difference between the two sections of students taught through traditional method and evolved method in academic achievement of mathematics.
Thus, it may be concluded that the difference in the academic achievement of the two groups i.e. one taught through integrated method and other lecture method is not due to chance. Therefore the null hypothesis: \( H_0 \) : There is no significant difference in the academic achievement of students taught through identified traditional method and evolved method stands rejected. Hence it can be inferred that the two groups differ significantly from each other in terms of academic achievement.

**FINDINGS OF THE STUDY:**

On the basis of the analysis of the data concerning mathematics lessons taught by the mathematics teachers following findings were drawn:

- The highest percentage of teaching method used by teachers of mathematics at senior secondary level is integrated method.
- Teaching methods can be turned into very effective teaching methods only by using the right combination of teaching techniques and skills.
- What teachers do in the classroom affects pupils’ achievement.
- The effectiveness of any teaching method largely depends upon the qualities of the teacher. How the teacher has used the method in her pedagogy. Classroom observation gradually started to find patterns which indicated that more effective teachers tended to actively teach the whole class.
- Effectiveness of a method is associated with a number of general. Teacher teaching factors such as:

  ✓ Good subject knowledge
✓ Good questioning skills
✓ Good teaching techniques
✓ Good time management
✓ Effective planning
✓ Good classroom organization

- The effective teaching components, which make a method effective, are: Structured teaching; covering only one curriculum area at a time; High levels of interaction with the whole class; providing ample, challenging work; High levels of pupil involvement in tasks; a positive atmosphere in the classroom; High levels of praise and encouragement.
- Methods which used class interactions and factual questioning as teaching techniques proved to be effective.
- Questioning and answering technique is effective at the senior secondary level in mathematics. The following points make this method more effective:
  - When and How Often to Use Questioning
  - Eliciting a Student Response
  - The Cognitive Level of Questions
  - Open and Closed Questions
  - Responses to Answers
  - Prompting
  - What is the Correct Wait Time?
- Good classroom management creates the conditions under which high quality teaching and learning can occur.
- Right momentum can be sustained by good lesson planning on the part of the teacher and avoiding over dwelling.
• Classroom climate is also one of the important aspect of effective teaching. A good learning atmosphere is created through the rules that are set out, the way the teacher interacts with students, and the way the physical environment is set out.

• An important component of effective method is the enthusiasm shown by the teacher. If the teacher him/herself is unenthusiastic about the subject or lesson being taught, this attitude is likely to rub off on students. Teachers who enjoy teaching and their subject and can put their enthusiasm across are more likely to motivate their students.

• The lesson should have a clear structure, so students can easily understand the content of the lesson and how it relates to what they already know. The lesson should be started with review and practice of what was learnt during the previous lesson for example by going over homework, as this will allow the teacher to find out to what extent students have grasped the content of previous lessons, and therefore to what extent this content will need to be retaught. At the end of the lesson the main points should once again be summarized, either by the teacher, or, preferably by the students themselves, e.g. through asking them what they have learnt during the lesson.

• Pacing of the lesson is an important part of effective direct instruction. For more demanding content the pacing needs to be slower to allow students more time to develop understanding. The proper intonation is also very important aspect to make the lesson clear to the students.

• Interaction between teachers and students, whether for teaching basic skills as part of direct instruction or for addressing higher
order skills through scaffolding or open-ended discovery activities is very important.

3. Implication of the findings:

Any research effort goes waste if it does not contribute to the existing knowledge or help the discipline in which it has been made. It must have certain implications and should facilitate the growth of the discipline. The investigator in the following paragraph has made humble attempt to delineate the implications based on the findings of the study.

- Teaching is the most important factor in the whole formal system of education. The findings of the study have implications in both theory as well as practice of methodology of mathematics teaching at senior secondary level.
- The study contributes new knowledge regarding the teaching methodology for competent mathematics teachers. The mathematics teacher educator may also provide of mathematics teaching to their pupil teachers. Thus, the information about mathematics teaching methodology may be useful for both pre service and in service teacher for improving their class room teaching.
- The evolved teaching methodology may be used in our class room situations for improving the results of the students.
- The present system of education focuses to the objectives which are to be achieved by the students rather than the content field. From this point of view of interpretations, these evolved methodologies are not only based on the objectives related to the
students’ growth but also it is capable of ringing better improvement in respect of classroom teaching.

- The practical usefulness of the research finding is for preparing competent mathematics teacher in teaching education programme. Micro teaching as a feedback device may be used effectively for developing the methodology for preparing mathematics teacher.

- UGC is the regulatory body of higher education. It may organise programs to identify effective teachers of different disciplines. On the basis of method used by the subject teachers of different fields it can evolve unique methodology for teachers of subjects belonging to varied streams. It may improve the quality of higher education.

- The evolved teaching methodology may be used by research scholars for new research studies in different subjects at various levels.

- The study can also be useful for other educators for applying the evolved effective teaching method in mathematics at senior secondary level to other levels in the same field or other related fields.

- The evolved methodology can be used by less effective teachers in mathematics to improve upon their teaching methods and skills based on the findings of this study.

- Thus viewed, this evolved methodology accelerates the growth of the students in competitive capacity and provides some basis for sustained growth and development. It may raise academic standard of mathematics teaching.

**Suggestions of further research topics:**
On the basis of findings of the study, the experiences and insight of the researcher the following research topics may be conducted.

- Evolving teaching methodology for effective mathematics teaching at primary level.
- Evolving teaching methods for science teaching at secondary level.
- A study of problems of mathematics teachers working in the C.B.S.E affiliated schools or other state boards.
- Evolving a teaching module for mathematics at senior secondary level.
- A study of the effectiveness of e-learning mode of instruction in mathematics at senior secondary level.
- Evolving teaching methods for effective value education teaching at higher secondary level.
- Evolving teaching methods for effective Hindi teaching at secondary level.
- Developing teaching methods for effective sociology teaching at senior secondary level.
- Developing teaching methods for effective chemistry teaching at secondary level.
- Identification of teaching skills and activities of effective teachers at secondary level.
- To study effect of teaching style and competency on students’ achievements.
- Evolving teaching strategy for effective teaching at secondary level.