CHAPTER - 7

SUMMARY,
FINDINGS,
IMPLICATIONS
AND
RECOMMENDATIONS
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SUMMARY, FINDINGS, IMPLICATIONS AND RECOMMENDATIONS

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7.1 INTRODUCTION

The purpose of the study was to find out effectiveness of the metacognitive thinking programme for the students of class IX. Use standardized metacognitive thinking inventory while development and implementation of the metacognitive thinking programme during this research study. This chapter helps to get overview of this research study. The detailed report of the present study has been given in the previous chapters. In the present chapter the summary of the report has been presented along with the finding, implications, observations, suggestions and recommendations for prospective researches.

7.2 SUMMARY

The summary with outlines of the whole study is given under:

7.2.1 Title Of The Present Study

"EFFECTIVENESS OF METACOGNITIVE THINKING PROGRAMME AND FOR 9th STANDARD STUDENTS OF GUJARAT STATE"

7.2.2 Objectives Of The Present Study

The objectives of the study were as follows:

1. To develop programme for enhancing metacognitive thinking for students of class IX.
2. To implement programme for enhancing metacognitive thinking on students of class IX.
3. To study the effectiveness of programme enhancing metacognitive thinking programme.
4. To study the effectiveness of programme enhancing metacognitive thinking programme in relation to gender.
5. To study the effectiveness of programme enhancing metacognitive thinking programme in relation to SES.
6. To study the effectiveness of programme enhancing metacognitive thinking programme in relation to IQ.
7. To study the opinion of students of standard IX for the metacognitive thinking programme.
7.2.3 Variables Of The Study

The variables for the present study were as under:

1. Independent variable

   The independent variable for the present study was
   • Metacognitive Thinking Programme

2. Second Independent Variable

   The Second Independent variable for the present study were
   (a) Gender
       - Boy
       - Girl
   (b) SES
       - High SES
       - Low SES
   (c) IQ
       - High IQ
       - Low IQ

3. Dependent variable

   The dependent variable for the present study was
   • Score obtained by the student of class IX on metacognitive thinking inventory.

4. Control variable

   The control variable for the present study were
   1. Standard - 9
   2. Content Matter

7.2.4 Hypotheses Of The Study

   The hypotheses were formulated in pursuance of the objectives and variables of the study as given in Table 7.1.

7.2.5 Population And Sample Of The Study

   The main purpose of the present study was to develop metacognitive thinking programme and study its effectiveness for the students of standard-9. Students of Anand High School, Anand were selected as a sample for the study of effectiveness of metacognitive thinking programme.
7.2.6 Tools

The tools used in the present study were:

1. Metacognitive Thinking Programme
   Cognitive thinking activities and metacognitive thinking programme were developed by investigator.

2. Metacognitive Thinking Inventory
   Metacognitive thinking inventory was constructed and standardized by the Dr. R. S. Patel.

3. Socio-Economic Status Scale
   Socio-Economic Status Scale constructed and standardized by Prof. Pallavi P. Patel was used to measure Socio-Economic status of the students. Reliability of SES scale was 0.85 by test retest method and 0.82 by split half method. Concurrent validity of the scale was 0.88. Scale showed positive relationship between factors for factor validity.

4. Intelligence Test
   Verbal Non-verbal Intelligence Test for students of standard 8 to 12 constructed and standardized by Dr. R.S Patel was used to measure intelligence of the students. Reliability of the test was 0.79 by test retest method and 0.87 by split half method. Criterion and construct validity were 0.83 and 0.87 respectively.

7.2.7 Research Design

In the present study investigator had selected one-group pretest-posttest design. Metacognitive thinking programme was given to students and metacognitive inventory were administered as a pre-test and post-test to find out effectiveness of the programme.

7.2.8 Data Collection

Metacognitive thinking inventory used constructed and standardized by Dr. R. S. Patel was given to Anand High School, Anand students of standard 9th as a pre-test and post-test to study the effectiveness of metacognitive thinking programme. SES scale constructed and standardized by Prof. Pallavi P. Patel and Verbal-nonverbal intelligence test constructed and standardized by Dr. R. S. Patel was used to collect data regarding Socio Economic Status and Intelligence of the experimental group.
### 7.2.9 Analysis of Data

Descriptive statistics of data collected from metacognitive thinking inventory used as a pre-test and post-test for the experimental group were computed. Significance of hypotheses was found by using t-test.

### 7.2.10 Results of Hypotheses Testing

Results obtained after testing the hypotheses are presented below:

**Table 7.1**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Hypotheses</th>
<th>t</th>
<th>Sig</th>
<th>Rejected/Accepted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking for pre-test and post-test.</td>
<td>8.66</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>2</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of Boys for pre-test and post-test.</td>
<td>6.52</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>3</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of Girls for pre-test and post-test.</td>
<td>6.21</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>4</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking for Boys and Girls in pre-test.</td>
<td>1.05</td>
<td>0.01</td>
<td>Accepted</td>
</tr>
<tr>
<td>5</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking for Boys and Girls in post-test.</td>
<td>1.33</td>
<td>0.01</td>
<td>Accepted</td>
</tr>
<tr>
<td>6</td>
<td>There will be no significant difference between the mean scores of Metacognitive thinking of students having High SES and Low SES in pre-test.</td>
<td>10.72</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>7</td>
<td>There will be no significant difference between the mean scores of Metacognitive thinking of students having High SES and</td>
<td>14.28</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td></td>
<td>Low SES in post-test.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>----------------------</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>There will be no significant difference between the mean scores of Metacognitive thinking of boys having High SES and Low SES in pre-test.</td>
<td>6.27</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>9</td>
<td>There will be no significant difference between the mean scores of Metacognitive thinking of boys having High SES and Low SES in post-test.</td>
<td>9.58</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>10</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of girls having High SES and Low SES in pre-test.</td>
<td>3.81</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>11</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of girls having High SES and Low SES in post-test.</td>
<td>18.20</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>12</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of students having High SES in pre-test.</td>
<td>0.32</td>
<td>0.01</td>
<td>Accepted</td>
</tr>
<tr>
<td>13</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of students having High SES in post-test.</td>
<td>1.10</td>
<td>0.01</td>
<td>Accepted</td>
</tr>
<tr>
<td>14</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of students having Low SES in pre-test.</td>
<td>0.19</td>
<td>0.01</td>
<td>Accepted</td>
</tr>
<tr>
<td>15</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of students having Low SES in post-test.</td>
<td>2.56</td>
<td>0.01</td>
<td>Accepted</td>
</tr>
<tr>
<td></td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of High SES students in pre-test and post-test.</td>
<td>16.27</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
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</tr>
<tr>
<td>17</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of Low SES students in pre-test and post-test.</td>
<td>6.90</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>18</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of High IQ and Low IQ students in pre-test.</td>
<td>9.81</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>19</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of High IQ and Low IQ students in post-test.</td>
<td>17.31</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>20</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of boys having High IQ and Low IQ in pre-test.</td>
<td>6.43</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>21</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of boys having High IQ and Low IQ in post-test.</td>
<td>9.58</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>22</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of girls having High IQ and Low IQ in pre-test.</td>
<td>9.30</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>23</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of girls having High IQ and Low IQ in post-test.</td>
<td>18.20</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>24</td>
<td>There will be no significant difference</td>
<td>4.01</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
</tbody>
</table>
between the mean scores of metacognitive thinking of students having High IQ in pre-test.

<table>
<thead>
<tr>
<th></th>
<th>Hypothesis</th>
<th>t-value</th>
<th>p-value</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of students having High IQ in pre-test.</td>
<td>3.92</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>26</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of students having Low IQ in pre-test.</td>
<td>0.19</td>
<td>0.01</td>
<td>Accepted</td>
</tr>
<tr>
<td>27</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of students having Low IQ in post-test.</td>
<td>2.56</td>
<td>0.01</td>
<td>Accepted</td>
</tr>
<tr>
<td>28</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of students having High IQ in pre-test and post-test.</td>
<td>16.62</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
<tr>
<td>29</td>
<td>There will be no significant difference between the mean scores of metacognitive thinking of students having Low IQ in pre-test and post-test.</td>
<td>8.06</td>
<td>0.01</td>
<td>Rejected</td>
</tr>
</tbody>
</table>

7.3 FINDINGS OF THE STUDY

After testing the hypotheses, obtained findings are as given below:

1. The mean score of students in post-test is higher than that of pre-test which shows the effectiveness of metacognitive thinking programme.

2. Metacognitive thinking score of boys in post-test is higher than that of pre-test, which shows metacognitive thinking programme is effective for boys. Metacognitive thinking of boys enhances considerably after metacognitive thinking programme.
3. Metacognitive thinking score of girls in post-test is higher than that of pre-test, which shows metacognitive Thinking Programme is effective for girls. Metacognitive thinking of girls enhances considerably after metacognitive thinking programme.

4. Metacognitive thinking programme is found equally effective for boys and girls in pre-test.

5. Metacognitive thinking programme is found equally effective for boys and girls in post-test.

6. Metacognitive thinking of students having High SES is higher than that of students having Low SES in pre-test.

7. Metacognitive thinking of students having High SES is higher than that of students having Low SES in post-test.

8. Metacognitive thinking of boys having High SES is higher than that of boys having Low SES in pre-test.

9. Metacognitive thinking of boys having High SES is higher than that of boys having Low SES in post-test.

10. Metacognitive thinking of girls having High SES is higher than that of girls having Low SES in pre-test.

11. Metacognitive thinking of girls having High SES is higher than that of girls having Low SES in post-test.

12. Metacognitive thinking programme is found equally effective for boys and girls having High SES in pre-test.

13. Metacognitive thinking programme is found equally effective for boys and girls having High SES in post-test.

14. Metacognitive thinking programme is found equally effective for boys and girls having Low SES in pre-test.

15. Metacognitive thinking programme is found equally effective for boys and girls having Low SES in post-test.

16. Metacognitive thinking programme is effective on the students having High SES since the mean score in post-test is higher than pre-test.

17. Metacognitive thinking programme is effective on the students having Low SES since the mean score in post-test is higher than pre-test.

18. Metacognitive thinking of students having High IQ is higher than that of students having Low IQ in pre-test.
19. Metacognitive thinking of students having High IQ is higher than that of students having Low IQ in post-test.
20. Metacognitive thinking of boys having High IQ is higher than that of boys having Low IQ in pre-test.
21. Metacognitive thinking of boys having High IQ is higher than that of boys having Low IQ in post-test.
22. Metacognitive thinking of girls having High IQ is higher than that of girls having Low IQ in pre-test.
23. Metacognitive thinking of girls having High IQ is higher than that of girls having Low IQ in post-test.
24. Metacognitive thinking of Students having High IQ is higher than that of students having Low IQ in pre-test.
25. Metacognitive thinking of students having High IQ is higher than that of students having Low IQ in post-test.
26. Metacognitive thinking programme is found equally effective for boys and girls having Low IQ in pre-test.
27. Metacognitive thinking programme is found equally effective for boys and girls having Low IQ in post-test.
28. Metacognitive thinking programme is effective on the students having High IQ since the mean score of post-test is higher than pre-test.
29. Metacognitive thinking programme is effective on the students having Low IQ since the mean score of post-test is higher than pre-test.

7.4 IMPLICATIONS OF THE STUDY

Following are the educational implications of the present study,

1. Metacognitive thinking programme can be used to enhance metacognitive thinking of students of standard - 9.

2. Metacognitive thinking programme can be used to enhance metacognitive thinking of students of any gender as there is no gender effect found on metacognitive thinking of boys and girls.

3. Components of metacognitive thinking like metacognitive knowledge (Declarative knowledge, Procedural knowledge and Conditional knowledge) and metacognitive regulation (Planning, Monitoring and Evaluation) can be used during curriculum transaction to enhance metacognitive thinking of students.
4. Metacognitive thinking could be developed to students for their thinking steams like thinking, noticing, wondering, picturing, seeing, telling etc.

5. Metacognitive thinking process what to do, to check learning and have done could be developed for the metacognitive regulation.

6. It can be used to change the right cognitive tool for the task and play a metacognitive role in successful learning.

7. Metacognitive thinking programme can be used to study strategies for thinking skills.

8. It can be used to organize prior to a task to focus their attention on what they know to identify what they want to learn.

9. Think about ways to solve the problem of more than one is used in a particular strategic.

10. Inference could be promoted for data interpretation to metacognitive thinking programme.

11. For the practice problem solving and complex queries can be used to remove the students.

12. Activities promoting analysis could be designed and used in classroom to promote analysis component of metacognitive thinking.

13. Practice for converting data into figure should be promoted for easy understanding of components of text and their interrelationship. Students find it easy to understand data and problems if their components and relationships are presented in form of figure.

14. Inference drawing could be promoted from given statements or data to promote metacognitive thinking.

15. Evaluation of subject data, sentences and arguments could be promoted.

16. While applying metacognitive thinking programme, well organized questions needs to be asked as to lead students think logically and critically.

17. Metacognitive thinking programme could be helpful to students in future during entrance exams.

18. The worksheet should be developed for the textbook curriculum similar to the worksheets developed during the programme as it enhances metacognitive thinking.
7.5 OBSERVATION OF THE STUDY

Following are the observations of the present study,

1. Students found metacognitive thinking programme very interesting and found willing to undergo such programme in future.

2. By the investigators experience with metacognitive thinking programme it was seen that it could be easily adopted by students of secondary school.

3. Students found that metacognitive thinking programme helped them to improve their thinking.

4. Students found items of metacognitive thinking programme thought provoking and they had enjoyed solving such problems.

5. Students were willing to undergo such metacognitive thinking programme in future.

6. Students felt change in their thinking level at the end of metacognitive thinking programme.

7. Worksheets used during the programme were very effective and all students found it very useful.

7.6 SUGGESTION FROM THE STUDY

1. Metacognitive thinking programme could be included in pre-service and in-service training programmes for teachers to develop understanding of metacognitive thinking.

2. Teacher Educators could also be under go this metacognitive thinking programme, so that they can be competent enough to train their students teachers regarding this.

3. Basic concept of metacognitive thinking, its components and programme could be included at M.Ed. level to aware students about metacognitive thinking.

4. Areas of metacognitive thinking could be found in curriculum to enhance metacognitive thinking.

5. Metacognitive knowledge could be included in classroom teaching to promote thinking.

6. Components of metacognitive thinking could be kept in mind while designing curriculum.
7. Assignments and Exercises could be designed promoting metacognitive Thinking.

8. Questions assessing metacognitive thinking could be included in exam papers.

7.7 RECOMMENDATIONS FOR THE FURTHER STUDIES

Based on the present study, the investigator felt the need for undertaking the following studies regarding metacognitive thinking.

1. Similar study could be conducted on large sample. Similar study could be conducted on students of standard VIII, and X, primary and college students.

2. The present study was undertaken for the content other than secondary curriculum. Metacognitive thinking programme could be prepared for the various secondary school subjects like mathematics, science, social science etc.

3. The effectiveness of metacognitive thinking programmes under individual and collaborative learning modes can be studied.

4. Similar study could be conducted with variables other than variable used in present study.

5. Study to develop thinking skills strategies could be done.

6. Metacognitive thinking programme could be developed and its effectiveness could be studied for the content oriented to human life.

7. A long term study on the same line could be done to study effectiveness of metacognitive thinking programme on student's achievement.

8. Effect of different stages of human development on metacognitive thinking could be studied to design learning strategies.

9. Studies to correlate metacognitive Thinking with other types of thinking skills could be done.

10. Effectiveness of various metacognitive thinking models could be studied in Indian context.

11. Effectiveness of teaching strategies for enhancing metacognitive thinking of gifted and talented students could be studied.

12. Construction and standardization of metacognitive thinking could be done to get idea of present metacognitive thinking of the students of Gujarat state. Study regarding development of activities, assignments, pre-tasks, post-tasks etc could be done for the existing text book curriculum.
13. Metacognitive thinking training programme for parents could be developed and studied.


15. A study regarding roots of metacognitive thinking in Indian mythology could be done.

16. Metacognitive thinking programme based on poetry, Jokes, Short Stories, films, SMS, pictures could be developed and study its effectiveness.