Chapter III

Planning and programme development

3.0 Introduction:

Planning is a necessary aspect even of ordinary day-to-day work. It is an essential step in any kind of research without that the satisfactory result would not be possible. It is often at this stage of planning that decisions are made that will make the difference between a sound study and a faulty one.

Research design is a mapping strategy like the architect’s plan. The researcher must consider certain fundamental steps those are essentially the same regardless of the type of research design. Borg stated very important point that:

“The factor that most often differentiate between good and poor research is not the funds available, the size of the sample or sophistication of the statistics, it is the care and thought that goes into research plan.”\(^1\)

Thus, planning is an essential step in the process of research. In other words, planning is a mapping strategy. As McGrath puts it:

“The activities related to design in research are comparable to those of the architect in designing an intricate structure. As the architect does his designing before construction activities get underway, so should the researcher do his designing, before he gets his project underway.”\(^2\)

The present world and its affairs have become extremely complex. If any work is to be carried out and completed meaningful it needs to be well planned, and more so when its
execution time spans over a longer period. Without careful planning much damage has been
done to and loss incurred by nations.

A good research work cannot just happen. It includes a number of operations carried out with patience and accuracy. For such a serious work, planning requires almost care and insight.

The title of the present study is “A study of the effect of the computer assisted teaching programme on the achievement of the student of standard IX in mathematics.

The study consists of two parts:

(1) The construction of computer assisted teaching programme in mathematics for std. IX.
(2) To study the effect of programmes on achievement of students.

3.1 Objectives of construction of CATP:

The computer assisted teaching programme is developed to improve the achievement of student towards mathematics. This general aim leads to the following specific objectives.

1) To construct the CATP that give importance to the learner.
2) To construct the CATP that could be used without disturbing the regular classroom structure or teaching.
3) To construct the CATP that is less expensive simple to use.
4) To construct the CATP this could be used by an ordinary teacher in an ordinary room.
5) To construct the CATP that could be used without disturbing the regular classroom structure or teaching.

3.2 Importance of Laboratory teaching programme:

The use of ICT has enriched the teaching learning process with main device computer; it has great potential for teaching at all levels. It has brought a sea change and innovativeness in teacher to use it for teaching. Mathematics and computer both are vital in modern time, as both open the gate for opportunities of the world Mathematics can be more effectively taught with the help of CATP. The Computer Assisted Teaching Programme was
systematically designed by the investigator. If the teaching is done through CATP then student can remember it for a longer time. CATP is useful in developing clear concepts.

Importances of CATP are as follows.

1. The CATP was systematically designed programme on the bases of power point presentation including in ‘Microsoft Office’ package is a powerful presentation tool.

2. Provide large screen video display (projector).

3. Teaching through CATP does not missing Teacher-taught contact.

4. Teacher can more effectively taught Mathematics with the help of computer assisted teaching programme.

5. Computer Assisted Teaching Programme could be applied most effectively to whole class or part of a class.

6. CATP could be used by an ordinary teacher in an ordinary room without disturbing the regular classroom structure or teaching.

7. CATP make provision for the teacher to teach a whole class or part of a class.

8. CATP is an integration of both visual and Verbal thinking instead of the primacy of verbal thinking. Enhancing student understanding by the addition of visual forms of presentation.

9. The programme which has been recorded, can be stored, retrieved and used repeatedly.

10. Education will become highly interactive, engaging the student much in contrast with present day passive lecture methods.
11. Students become more cooperative and reduce certain disruptive behaviors during lecturers.

12. CATP is developed on the principals of programmed learning it also utilizes the concepts of audio visual education, communication theory & system analysis.

13. CATP has better flexibility and more versatility than any of the teaching machines. CATP produces teaching learning experience effectively & efficiently.

14. CATP programme decrease the dropout rate because of in created students interest.

15. Some topics of mathematics are best understood through this CATP.

16. CATP helps the teacher to provide wide range of experiences. He\She can illustrate the concept through graphics, pictures and animations. Besides that graphics, pictures and animations also attract the student’s attention more on the desired point.

17. CATP help students to understand the concepts clearly & which can have the longer effect.

3.3 Topic of CATP:

The investigator prepared ten computer assisted teaching programme from ten topics relating to IX standard mathematics. These programmes consists 71 different power point presentation slides. The topics and sub topics of CATP are given below.

1. Set Operations
   - Distributive Law.
   - Union, Intersection of sets.
   - Venn diagram.
   - Demorgan’s Law
2. **Graphs for information**
   - Histogram.
   - Frequency distribution of boundary.
   - Frequency distribution for boundary points.

3. **Measures of Central Tendency**
   - Median
   - Mode

4. **Factorization**
   - \((a^3 + b^3)\) types factorization.
   - \((a^3 - b^3)\) types factorization.

5. **Variation**
   - Concept of Variation.
   - Concept of Direct Variation.

6. **Triangle**
   - Exterior angle of triangle.
   - Interior opposite angle.

7. **Properties of Parallelogram**
   - Concept of coplanar quadrilateral.
   - Parts of quadrilateral.
   - Consecutive sides of quadrilateral.
   - Opposite sides of quadrilateral.
   - Consecutive angle of quadrilateral.
   - Opposite angle of quadrilateral.

8. **Area**
   - Postulates for Area of rectangle.
   - Perimeter of rectangle.
   - Area of triangle.
9. **Use of Area in daily life.**
   - Area of triangle.
   - Formula of Hero for find out the area of triangle.

10. **Trigonometry**
   - Parts of right angle triangle.
   - Trigonometry ratio.
   - Sine ratio.
   - Cosine ratio.
   - Tangent ratio.
   - Cotangent ratio.
   - Secant ratio.
   - Cosecant ratio.
   - Derivation of an important results: \( \sin^2 \theta + \cos^2 \theta = 1 \).

### 3.4 Time period of LTP:

Next question to be answered is how much time the students needed for the programme. So that the effect of the programme could be measured.

There was no general agreement among the authorities regarding the minimum period. Guilford\(^3\) thinks that a period of one month is enough for pupils of all levels. Torrance\(^4\) claims that period of two months are needed.

After taking consideration various factors like students, class size, and content included in CATP, facility of schools and convenience of schools a period of nine months was selected for implementation of CATP.

### 3.5 Pre pilot tryout of CATP:

In the beginning the investigator had prepared ten CATP on the mathematics of standard IX. The Content containing these programmes was prepared in C.D. This C.D. Containing CATP was tried out on a very small group of students, the mathematics teacher, teacher educators and expert of mathematics subject to make CATP more reliable.
The objectives of pre pilot tryout were as under:

1. To see whether the students understand the Illustration given in CATP.

2. To see whether the students will be able to understand the question which will be asked during the programme.

3. To see whether the students can understand the concept of topics through added picture & figures.

4. To trace out if any ambiguity in the programme.

5. To confirm whether the Programme are of proper size or not.

6. To know whether the teacher, expert and teacher educators have to suggest anything before the programme is to be mimeographed.

7. To determine appropriate time period required to complete the whole programme.

At the time of pre pilot tryout of CATP following points were observed.

1. Time requirement is differ for different programme.

2. Teacher educator and subject experts have suggested to remove some illustration, add some figure & pictures and also to change some problems in CATP.

3. Few difficult words were replaced.

4. Due to time constrains some long programmes were shorten.

From the above observations and suggestions made by experts, the investigator had made necessary corrections, added some illustration, figures & pictures, Changing color of slide, and changed some words in respective programme.
3.6 Pilot tryout of CATP:

In this investigation the pilot tryout of the programme was undertaken to remove ambiguities, to enhance clarity and to study student’s reaction. The pilot tryout of CATP was administered with the following objectives.

1. To get an idea of the administration of CATP.

2. To see whether the provided illustrations given in CAT programme fulfill the purpose of clarifying the new concepts.

3. To check whether the programme is easy to understand or not.

4. To observe the reactions of students regarding the CATP as this would be their first experience.

5. To get an idea of appropriate time duration to be required to complete the whole experiment.

For this, a representative sample was selected from the population viz., the students of standard IX of Nutan Vidhyalaya, Vadodara. The sample for pilot try out consists of Forty students, who have attended the programme from beginning to end. The sample was kept small to maintain a healthy teacher-student interaction in the classroom. In the beginning the general instructions regarding this programme were given. During the pilot tryout, the investigator made following observations.

1. The computer assisted teaching Programme was found easy to understand.

2. The illustrations based on the new knowledge were clearly understood.

3. The CATP could be taught to any type of students, i.e. low, average or brilliant without any difficulty.

4. The students showed interest in learning this computer assisted teaching programme.
5. The students have been participated actively during execution of pilot testing programme.

Now taking into consideration the observations during the pilot tryout, the necessary modifications were made in the CATP and again it was revised. The final form of CATP is included in Appendix 1. The number of experiments and content remained same. The content is given in 3.7.

3.7 Content of the computer assisted teaching programme:

The content of the CATP is described in the form of power point presentation.

CATP 1: Set Operations

Slide 1: Distributive Law.

Slide 2: Distributive of union on intersection.

Slide 3: Venn Diagram for Distributive of union on intersection.

Slide 4: Distributive of intersection on union.

Slide 5: Venn Diagram for Distributive of intersection on union.

Slide 6: Demorgan’s Law.

Slide 7: Demorgan’s Law continue.

Slide 8: Venn Diagram for Demorgan’s Laws.

CATP 2: Graphs for information

Slide 1: graph for continuous frequency distribution- Histogram

Slide 2: Illustration of frequency distribution of boundary and frequency distribution of boundary point.
CATP 3: Measures of Central Tendency

Slide 1: Median.

Slide 2: Example 1. To calculate Median for given data (using formula).

Slide 3: Example 1. To calculate Median for given data (Without using formula).

Slide 4: Example 2. To calculate Median for given data (using formula).

Slide 5: Example 2. To calculate Median for given data (Without using formula).

Slide 6: Example 3. To calculate Median for given data (using formula).

Slide 7: Example 3. To calculate Median for given data (Without using formula).

Slide 8: Mode and Example 1. To find value of Mode for given data.

Slide 9: Example 2. To find value of Mode for given data.

Slide 10: Example 3. To find value of Mode for given data.

CATP 4: Factorization

Slide 1: factorization of $a^3 + b^3$ types.

Slide 2: Examples of factorization of type $a^3 + b^3$.

Slide 3: Application of factorization $a^3 + b^3$ types.

Slide 4: factorization of $a^3 - b^3$ types.
Slide 5: Examples of factorization of type $a^3 - b^3$.

Slide 6: Application of factorization $a^3 - b^3$ types.

**CATP 5: Variation**

Slide 1: Concept of variation.

Slide 2: Illustration of variation.

Slide 3: Definition of variation and concept of direct variation.

Slide 4: Definition of Direct variation and Example 1.

Slide 5, 6: Examples related to variation.

**CATP 6: Triangle**

Slide 1: Exterior angle of triangle.

Slide 2: Total number of exterior angle of triangle.

Slide 3: Interior opposite angle.

Slide 4: Example of Interior Opposite angle.

Slide 5: Animation of result: Measurement of any exterior angle of triangle is greater than the measurement of Interior Opposite angle.

Slide 6: Animation of result: Measurement of any exterior angle of triangle is equal to the sum of measurement of its two Interior Opposite angles.

Slide 7: Animation of the sum of measure angle of triangle is 180°.

Slide 8: Logical proof of theorem: In any triangle the sum of measurement of three angles is 180°.

Slide 9: Application.
**CATP 7: Properties of parallelogram**

Slide 1: Definition of coplanar quadrilateral.

Slide 2: Necessary & Sufficient condition for quadrilateral.

Slide 3: Necessary & Sufficient conditions for quadrilateral continue.

Slide 4: Parts of quadrilateral and Consecutive sides of quadrilateral.

Slide 5: Opposite sides of quadrilateral and Consecutive angles of quadrilateral.

Slide 6: Opposite angles of quadrilateral.

**CATP 8: Area**

Slide 1: Postulates for Area of rectangle and Perimeter of rectangle.

Slide 2: Example 1. To find out the Area of rectangle.

Slide 3: Example 2. To find out the Area and Perimeter of rectangle.

Slide 4: Animation of Area of triangle.

Slide 5: Derivation of the Equation of Area of Triangle.

Slide 6: Application of Area of Triangle.

**CATP 9: Use of Area in daily life**

Slide 1: Area of triangle and Formula of Hero for find out the area of triangle.

Slide 2: Example 1. To find out the Area of Triangle using Hero’s Formula.

Slide 3: Example 2. To find out the Area of Triangle using Hero’s Formula.

Slide 4: Example 3. To find out the Area of Rhombus using Hero’s Formula.
CATP 10: Trigonometry

Slide 1: Parts of the right angle triangle.

Slide 2: Trigonometric ratio.

Slide 3: Sine ratio.

Slide 4: Cosine ratio and Tangent ratio.

Slide 5: Cotangent ratio.

Slide 6: Secant ratio.

Slide 7: Cosecant ratio.

Slide 8: Example: To find out different Trigonometric ratio.

Slide 9: Derivation of an important identity: \( \sin^2 \theta + \cos^2 \theta = 1 \).

Slide 10: Example 1. Application of result \( \sin^2 \theta + \cos^2 \theta = 1 \).

Slide 11: Example 2. Application of result \( \sin^2 \theta + \cos^2 \theta = 1 \).

3.8 Development of the Achievement Test

The Achievement Test was prepared by the researcher according to the syllabus based on the content of software package in mathematics on the 10 units. All the points taught with the help of CATP were included in the achievement test. The suggestions of subject teacher were taken into consideration in developing the final form of the test. It was of 50 marks, 90 minutes was given to complete it. The students had written down the answers in the question paper. Different types of exercise were asked in this achievement test.
### 3.9 Blue Print For Achievement Test

#### (1) Weight age to Objectives

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Mark</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Knowledge</td>
<td>13</td>
<td>26 %</td>
</tr>
<tr>
<td>(2) Understanding</td>
<td>14</td>
<td>28 %</td>
</tr>
<tr>
<td>(3) Application</td>
<td>13</td>
<td>26 %</td>
</tr>
<tr>
<td>(4) Skill</td>
<td>10</td>
<td>20 %</td>
</tr>
</tbody>
</table>

#### (2) Weight age of Points of content

<table>
<thead>
<tr>
<th>Unit</th>
<th>Mark</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set operations</td>
<td>5</td>
<td>10 %</td>
</tr>
<tr>
<td>(2) Graphs For Information</td>
<td>6</td>
<td>12 %</td>
</tr>
<tr>
<td>(3) Measures of Central Tendency</td>
<td>4</td>
<td>08 %</td>
</tr>
<tr>
<td>(4) Factorization</td>
<td>6</td>
<td>12 %</td>
</tr>
<tr>
<td>(5) Variation</td>
<td>4</td>
<td>08 %</td>
</tr>
<tr>
<td>(6) Triangle</td>
<td>6</td>
<td>12 %</td>
</tr>
<tr>
<td>(7) Properties of Parallelogram</td>
<td>4</td>
<td>08 %</td>
</tr>
<tr>
<td>(8) Area</td>
<td>5</td>
<td>10 %</td>
</tr>
<tr>
<td>(9) Use of Area In Daily Life</td>
<td>4</td>
<td>08 %</td>
</tr>
<tr>
<td>(10) Trigonometry</td>
<td>6</td>
<td>12 %</td>
</tr>
</tbody>
</table>

#### (3) Weight age of Questions forms

<table>
<thead>
<tr>
<th>Question forms</th>
<th>Mark</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essay Type Question</td>
<td>16</td>
<td>32 %</td>
</tr>
<tr>
<td>Short Answer Type Question</td>
<td>18</td>
<td>36 %</td>
</tr>
<tr>
<td>Objective Type Question</td>
<td>16</td>
<td>32 %</td>
</tr>
</tbody>
</table>

Blue Print for Achievement Test is given as follows in table no.3.1
### Table 3.1

**BLUE PRINT FOR ACHIEVEMENT TEST**

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Knowledge</th>
<th>Understanding</th>
<th>Application</th>
<th>Skill</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit</td>
<td>E</td>
<td>S</td>
<td>O</td>
<td>E</td>
<td>S</td>
</tr>
<tr>
<td>(1) Set operations</td>
<td>1(1)</td>
<td>2(1)</td>
<td>2(1)</td>
<td>4(2)</td>
<td>1(1)</td>
</tr>
<tr>
<td>(2) Graphs For Information</td>
<td>2(1)</td>
<td>4(1)</td>
<td>4(1)</td>
<td>2(1)</td>
<td>6</td>
</tr>
<tr>
<td>(3) Measures of Central Tendency</td>
<td>2(1)</td>
<td>2(1)</td>
<td>2(1)</td>
<td>4(2)</td>
<td>2(1)</td>
</tr>
<tr>
<td>(4) Factorization</td>
<td>2(1)</td>
<td>2(1)</td>
<td>2(1)</td>
<td>4(2)</td>
<td>2(1)</td>
</tr>
<tr>
<td>(5) Variation</td>
<td>4(1)</td>
<td>4(1)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(6) Triangle</td>
<td>2(1)</td>
<td>4(1)</td>
<td>4(1)</td>
<td>2(1)</td>
<td>6</td>
</tr>
<tr>
<td>(7) Properties of Equilateral Quadrilateral</td>
<td>2(1)</td>
<td>2(1)</td>
<td>4(2)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>(8) Area</td>
<td>1(1)</td>
<td>2(1)</td>
<td>2(1)</td>
<td>2(1)</td>
<td>3(3)</td>
</tr>
<tr>
<td>(9) Use of Area In Daily Life</td>
<td>4(1)</td>
<td>4(1)</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(10) Trigonometry</td>
<td>3(1)</td>
<td>1(1)</td>
<td>2(1)</td>
<td>2(1)</td>
<td>4(2)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13</strong></td>
<td><strong>14</strong></td>
<td><strong>13</strong></td>
<td><strong>10</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>

Note – Figures Within brackets indicates the marks allotted for questions and figures outside the brackets indicates the number of questions or items.
3.10 Summary:

This chapter contains the description of the computer assisted teaching programme, the stage of its development, pre pilot tryout, the pilot tryout and the reactions of teachers, teacher’s educators and expert of the subject and students participated in the tryout. Out of these efforts the final form of CATP had developed.

The execution of CATP is taken in the next chapter.
Footnote


