CHAPTER : III
METHODS AND PROCEDURE

RESEARCH, AN ATTEMPT TO SEARCH NOVEL WAYS

The purpose of any research work is to find novel ways –methods, techniques, strategies, and tactics to perform any task in class with more perfection and convenience. As such, research in education is an attempt in the direction of devising new ways and means to withstand the challenge of teaching-learning field for all round development of students. Using these novel ways, the requisite knowledge and information are transferred to learners to enable them to get an exposure in a variety of healthy skills and habits to interact with the environment surrounding them. Here the term environment connotes a variety of things –tangible and intangible which learners are expected to know. Thus all the three domains –Cognitive, Affective and Psychomotor get due representation in methods, techniques, strategies and tactics of teaching through the ways of peace.

Elaborating on the point ‘Types of Educational Research’, John W Best and Kahn write that any attempt to classify types of educational research poses a difficult problem. ‘The fact that practically every text book suggests is a different system of classification which provides convincing evidence that there is no generally accepted scheme’.²⁴

²⁴ Best & Kahn, Research in Education, PHI Learning, New Delhi, 10th Edn., P 23.
TYPES OF EXPERIMENTAL RESEARCH

Knowledge of the ‘types of experimental research’ helps in understanding the process of research under each classification. A brief discussion to this effect is as follows:

Research can either be applied (or action) research or fundamental (basic or pure) research. Applied research aims at finding a solution for an immediate problem facing a society or an industrial/business organization, whereas fundamental research is mainly concerned with generalization and with formulation of a theory. “Gathering knowledge for knowledge’s sake is termed ‘pure’ or ‘basic research.’”, says Pauline V Young in ‘Scientific Social Surveys and Research’.

APPLIED-RESEARCH

Best and Kahn write, “Applied Research has most of the characteristics of fundamental research”\(^\text{25}\) as detailed below:

- Sampling technique
- Testing of theoretical concepts
- Inferences about:
  i) improvement in the process like teaching-learning process
  ii) improvement in behaviour/ways of doing something.

Prof. R.P.Bhatnagar mentions following five types of Experimental Researches in ‘Shiksha Anusandhan’:

- True Experiment (Laboratory Experiment)

\(^{25}\) Ibid P21
Field Experiment
○ Field Studies
● Expost-facto Studies
○ Experimental Simulation

**THIS STUDY: A QUASI-EXPERIMENTAL STUDY**

The present study, in view of its link with the teaching-learning endeavours falls under ‘**Field Study**’. Due to the characteristic features of hypothesis setting, sampling from a population, statistical calculations to compute a number of values, followed by inferences on the effectiveness of measures adopted to control the violent, aggressive, repulsive or retaliatory ways of students, it would be better to call it a ‘Quasi-Experimental’ study. However, it is different from the basic laboratory research wherein cent per cent control can be exercised on variables for accurate inferences.

Although the experimental method finds its greatest utility in the laboratory, it has been effectively applied in non-laboratory settings such as the classroom, where significant factors or variables can be controlled to some degree. The immediate purpose of experimentation is to predict events in the experimental setting. The ultimate purpose is to generalize the variable relationship so that they may be applied to a wider population for further verification. **(Best)**. Whether to consider disciplines like philosophy, social science and humanities etc. on par with the researches in the stream of Science or not, the system needs to be taken into account. As soon as any field becomes a
matter for research and the investigator initiates action in a scientific manner, it enters the domain of some science.

Judith Bell writes, different styles, traditions, approaches use different methods of collecting data, but no approach prescribes nor automatically rejects any particular method. Quantitative researchers collect facts and study the relationship of one set of facts to another. They use techniques that are likely to produce quantified and, if possible, generalize conclusions.” –Doing Your Research Projects.

Experimentation provides a method of testing of the hypothesis. The hypothesis is tested for either accepting or rejecting it.

TOOLS AND TECHNIQUES OF RESEARCH

A Handbook on Educational Research brought out by National Council for Teacher Education quotes Torsen Heusen and T N Postethwaite (1994, Vol.9, p5021): p53. In educational research, obviously, there are different methods of inquiry, ranking from controlled laboratory experiments through participant observation to action research, from historical studies to logical analysis…In practice, the categories of method, tradition, and theoretical position cut across each other. The tools and techniques to be used in a study will depend upon the objectives of the study, the nature of respondents and also persons responsible for data collection.

In spite of classification of the type (1) Qualitative research and (2) Quantitative research, there are no two watertight compartments.
Some of the tools mentioned under one type of research can also be used in another type of research. For any research study, the research worker collects the data, draws conclusions on the basis of the data and arrives at generalizations. These conclusions and generalizations would be correct, valid and reliable if tools and techniques of date collection are correct. Alternatively, standardized ready-made tools or those developed by the researcher can also be used.

**RESEARCH DESIGN**

“A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure.” –Claire Shelltiz and Othes, *Research Methods in Social Sciences*, 1962, p.50.

It is the conceptual structure within which research is conducted; ‘it is the blue print of the procedures that enable the researcher to test the hypotheses by reaching valid conclusions about relationship between independent and dependent variables’. –*John W Best, Research in Education*, PHI Learning, 10th Edn., p177.

A research design economizes on time and cost. It takes into account the following propositions:

- What is the study about?
- Why is the study being made?
- Where will the study be carried out?
- What type of data is required in study?
Where can the required data be found?

- What periods of time will the study include?
  What will be the sample design?

- What techniques of data collection will be used?
  How will the data be analyzed?

- In what style will the report be prepared?


**RESEARCH DESIGN OF THIS STUDY**

The present study is based on the direct observations of the general tendency of off the norm ways of students known by different names such as violence, aggression, abusive language, indiscipline, rebellious, retaliatory or repulsive ways which detract them from scholarly pursuits. The researcher, by being with the students during two sessions 2009-10 and 2010-11 attempted to groom them to the culture of peace. Peace Education is composed of a variety of finer values like truth, love, beauty, non-violence, dutifulness, honesty, charity, awareness towards environment and constitutional values, sense of respect towards life etc. Promotion of Culture of peace is a concerted effort involving all tangible and intangible resources of the institution coupled with aspirations of the society. The broad classification of the input to shape students into lovers and icons of peace is as follows:
**Physical Resources** – from land and building to a variety of articles required for carrying on teaching-learning process smoothly.

- **Human Resources** – All authorities, teachers, students and the whole staff working in different capacities. Every individual has to play a key role in promoting the culture of peace.

- **Social Aspirations** – This is an important constituent element of peace education because no institution can ignore the aspect of social aspirations. It is the society which favours educational institutions by sending their wards for education.

**OUTLINE OF THE RESEARCH DESIGN:**

The outline of the research design of this study is as follows:

1. Population for Study – Students of Class VIII of Different schools
2. Randomized Study Group
3. Pre-test (First Test) in ‘Civic Sense’ and ‘Mathematics’
4. Evaluation of answer scripts and Recording of Marks
5. ‘Teaching of ‘Civic Sense’ & ‘Mathematics’ through Peace Education Norms and Contents for 30-45 days
6. Post-test (Second Test) in ‘Civic Sense’ and ‘Mathematics’
7. Evaluation of answer scripts and Recording of Marks
8. Tabulation and Analysis of Marks
9. Inferences
10. Generalization and specific comments on the study.

The further elaboration of each points of the research design of this study is as follows:

1. **POPULATION FOR STUDY**

The following schools which had entertained the request of the researcher to take up teaching of ‘Civic Sense’ and ‘Mathematics’ to class VIII students in tune with the ‘Peace Education’ norms formed the ‘Population or Universe of this Study’

[Table No. 1]

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the School/Location</th>
<th>Session</th>
<th>Period Of Study</th>
<th>No. of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Scholar’s Academy, Saidpur, Ghaziabad.</td>
<td>2009-10</td>
<td>February &amp; March 2010.</td>
<td>25</td>
</tr>
<tr>
<td>02</td>
<td>Scholar’s Academy, Saidpur, Ghaziabad.</td>
<td>2010-11</td>
<td>July &amp; August, 2010</td>
<td>15</td>
</tr>
<tr>
<td>03</td>
<td>Dr. Ambedakar Jr.High School, Sudamapuri, Govindpuri, Modinagar, Ghaziabad.</td>
<td>2010-11</td>
<td>July &amp; August, 2010</td>
<td>25</td>
</tr>
<tr>
<td>04</td>
<td>Kamal Inter College, Sudamapuri, Govindpuri, Modinagar, Ghaziabad.</td>
<td>2010-11</td>
<td>July &amp; August, 2010</td>
<td>25</td>
</tr>
<tr>
<td>05</td>
<td>Navin Bal Vidyalaya, Niwari Road, Modinagar.</td>
<td>2010-11</td>
<td>Aug. &amp; Sept’10</td>
<td>25</td>
</tr>
<tr>
<td>06</td>
<td>Sun Indian Public Jr.High School, Tibra Road, Modinagar.</td>
<td>2010-11</td>
<td>Aug. &amp; Sept’10</td>
<td>25</td>
</tr>
<tr>
<td>07</td>
<td>D N Public School, Baldevnagar, Govindpuri, Modinagar.</td>
<td>2010-11</td>
<td>Aug. &amp; Sept’10</td>
<td>10</td>
</tr>
</tbody>
</table>
2) **Randomized Study Group:**

This study is based on ‘Pretest-Posttest Design’ on the group of students selected randomly using the folded chits numbering ‘0’ to ‘9’ written on them or with students names written on them. The bucket/small jar containing these chits has been shaked side-ways and up and down to mix up the chits. Then chits have been picked up for selecting the study group.

**Justification for Randomization:**

Being based on probability theory, randomization is considered the best technique of attaining experimental equivalency. It eliminates the element biases by minimizing the effect of extraneous variables. – Best/Kahn, *Research in Education*, PHI Learning, 10th Edn. p170.

3) **Pretest (First Test) in ‘Civic Sense’ and ‘Mathematics’:**

The very intent of pre-test was to maintain rapport with students by opening a dialogue on the necessity of culture of peace and harmony. It was more of an appeal to students to be true and fair in taking the test than testing them as per the existing practices and methods to check their grip on the contents/topics already taught. The researcher
convinced the student of a lively and congenial atmosphere in the class without any scope for corporal punishment.

4) Evaluation of Answer scripts and Recording of Marks:

Due to smaller number of students and not more than one section in all the schools studied, it was stipulated that the two tests would be taken up by the whole class, while the data would be recorded and analyzed of the randomized students group only for statistical analysis, testing of hypotheses and significance of difference in marks in the two tests.

Best and Kahn write in ‘Research in Education’:

“In behavioural research the random selection and assignment of subjects to experimental and control groups may be impracticable. Because of administrative difficulties in arranging school experiments, it may be necessary to use the same group as both the experimental and control group.”

5) ‘Teaching of ‘Civic Sense’ & ‘Mathematics’ course contents through Peace Education Norms for 30-45 days

In keeping with the present provisions in law which expect teachers to shun violence of any type in the class (totally different from the role of hard task-masters of the past, pulling up students by speaking harsh words or using force/stick etc. for strict compliance with instructions), the researcher tried to create an environment of peace and harmony in the class by way of meaningful dialogues and interactions with
students, giving appropriate motivation, reinforcement and appreciation.

**CIVIC SENSE**

Students are groomed to healthy life styles by exposing them to the following course contents:

**Course Contents:**

1. To follow a system in life.

2. To get tuned to the call of the first Guru (mother) who makes sincere efforts to teach basics to her children:

   - उठो लाल अब ओँखे खोलो, पानी लाई हूँ मुँह घो लो।
     
     "अंखों से देखना अंधेरा, अंखों से देखना अंधेरा।"

     ऐसा सुन्दर समय ना खोजो, मेरे प्यारे अब ना सोइ।

   - To take lessons from cuckoo:
     
     काली कोयल कू कू करती, जो है डाली डाली फिरती।

     "काली कोयल कू कू करती, जो है डाली डाली फिरती।"

     Message of the poem is that we should speak politely. We should appreciate Nature, learn and do things which help us win the hearts of our fellow beings.

**कविता का संदेश**

बच्चों जब अपना मुँह खोलो, तुम भी बीटी बोली बोलो,

इससे कितना सुख पाओगे, सबके प्यारे बन जाओगे।

- संत कबीर का संदेश

**ऐसी बानी बोलिए मन का आपा खोए,**

औरन को शीतल करे, आपनें शीतल दोए।
Consciousness towards various duties as students, as citizens, as elders etc.

- Lively interaction on the following topics –Our Festivals, How to use Public Places and Public Properties?, Things worth-learning, Things worth abandoning and Our Environment etc.
  
  i. Do unto others as you wish others do unto you.
  
  ii. Each one, Teach one.
  
  iii. Down with Dowry
  
  iv. A word to the wise etc.

Some proverbs, sayings and songs worth-remembering:

- Stories of ‘Young Brave Hearts’ who rose above narrow concerns for the welfare of others.
  
  Moral teaching and telling true stories of eminent national and international personalities who loved humanity.

- And a variety of curricular and co-curricular activities during the session being in harmony with fellow students

MATHEMATICS

The teaching work in Mathematics has to be performed without taking recourse to any type of violence so that the phobia of punishment created by using harsh words or stick etc. for not attempting the sum rightly may be eliminated from the minds of students.

Course Contents:
Arithmetic
- Fractions, Comparison and Equality
- Addition, Subtraction and Multiplication of Rational Numbers
- Simple and Compound Interest
- Ratio and Proportion
- Area of Rectangle, Square and Triangle
- Percentage and Some Applications

Algebra
Factorization
Addition, Subtraction, Multiplication & Division of Algebraic terms

Geometry
Angles, their kinds, property of angles.
Pythagorean triplets
Bisect an angle/a line

6) Posttest (Second Test) in Civic Sense and Mathematics:
The posttest covered the course contents taught to students in an environment of peace and harmony, eliminating violence of any type. The outline of course contents of ‘Peace Education’ on which this study is based is attached as appendix.

Sample Questions for Test in Civic Sense
नमूना प्रश्न – नागरिक साधनाः
Questions/प्रश्न

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1. Describe anyone of the following:

Indian Independence Day OR Indian Republic Day OR Any Religious Festival. Also throw light on the significance of the festival you are writing about.

2. What steps should we take to protect environment?

Or How would you face natural calamity?

3. Atomic energy can be put to a variety of good uses. Describe? OR Man is God’s unique creation. Describe the things which man has found for the good of humanity?


5. Write the song which throws light on the nature of Children.

6. What is the message of the poem ‘mithi boli’?

7. Children are sure of their success? They express this idea by singing a song. Write that song or its theme/message in your own language.
Sample Questions for Test in Mathematics

Questions:

1) What sum lent out at 10% per annum simple interest would produce Rs. 150 as interest in 5 years?

2) Calculate compound interest on Rs. 2500 at 9% p.a. for two years.

3) A garden has 2000 trees. 12% of these are mango trees, 18% lemon and the rest are orange trees. Find the number of orange trees.
4) After 16 years Neetu will be five times as old as she is now. What is her present age?

5) Divide Rs. 1000 in the ratio of 2 : 3 : 5 with calculation work.

6) Which of the following pairs of rational numbers are equal?
   a) -9/12 and 8/-12  b) -16/20 and -20/-25  c) -7/21 and -4/-9  d) -8/-14 and 13/21

7) Which of the two rational numbers is greater?
   a) -4/11, 3/11  b) -5/8, -3/4

8) Which of the two rational numbers is smaller?
   a) -4/7, 5/7  b) 6/13, -7/-13

9) Find the area of rectangle whose length and breadth measure 5.5m and 3.5m respectively.

10) Find the area of the square whose sides measure 5 m each.

11) Find the root of 64 by factorization method.

12) Multiply -6a²bc, 2a²b and -1/4

13) Simplify (-2x²) X (7a²x7) X (6a⁵x⁵)

14) Simplify [(2/3)²]³ X (1/3)⁻⁴ X 3⁻¹ X 1/6

15) Factorize: a) x² + 9x + 20;  b) x² -6x + 8

16) a² - b² = ?  (Verify the answer).

17) (a + b)² = ?  (Verify the answer).

18) Define the term triangle.
3 Cm. ...?

B 4 Cm C

How much will AC measure in the above right-angled triangle?

20) A_________________B

Bisect the line segment AB using compass and pencil.

7) Evaluation of Answer scripts and Recording of Marks:
   After organizing the test, the test scripts would be returned to the students as a prompt feedback on their performance. The marks obtained by them would be recorded for analytical study. Evaluation of answer scripts would prepare the ground for posttest guidance and counseling sessions to advise the students suitably for a better performance in future.

8) Tabulation and Analysis of Marks:
   Marks in the two tests would be tabulated and analyzed to compute various statistical measures/values – Means, Standard Deviations and Correlation Coefficient. Mean Difference and Standard Deviation of mean differences were computed. Finally ‘t’ values would be computed to test the significance of following hypotheses at 0.05 level of significance.
**H₀:** There will not be any significant difference between the marks obtained by students in the two tests in Civic Sense i.e. $H₀: \mu₁ = \mu₂$ or I Test Scores = II Test Scores.

**H₁:** There will be significant difference between marks obtained by students in the two tests in Civic Sense i.e. $H₁: \mu₁ ≠ \mu₂$ or I Test Scores ≠ II Test Scores.

**H₀:** There will not be any significant difference between the Marks obtained by students in the two tests in Mathematics i.e. $H₀: \mu₁ = \mu₂$ or I Test Scores = II Test Scores.

**H₁:** There be significant difference between the marks obtained by students in the two tests in Mathematics i.e. $H₁: \mu₁ ≠ \mu₂$ or I Test Scores ≠ II Test Scores.

**Formulae for Computing Various Values:**

Values Required for Computing ‘Correlation Coefficient’

**Mean X (For Civic Sense)** = $Ax + \frac{dx}{N}$

**Mean Y (For Mathematics)** = $Ay + \frac{\sum dy}{N}$

**Standard Deviation $\sigma_X$** = $\frac{\sum d^2x}{N} - (\frac{\sum dx}{N})^2$

**Standard Deviation $\sigma_Y$** = $\sqrt{\frac{\sum d^2y}{N} - (\frac{\sum dy}{N})^2}$

**Correlation ‘r’** = $\sqrt{\frac{\sum dxdy - N(X - Ax)(Y - Ay)}{N \cdot \sigma_x \cdot \sigma_y}}$
Values Required for Computing ‘t’:

Mean Difference $D = \frac{\sum D}{n}$

Standard Deviation $\sqrt{\frac{\sum D^2 - (\bar{D})^2}{n-1}}$

Now ‘t’ $= \frac{D}{\frac{\sum D^2 - (\bar{D})^2}{n-1}}$

9) Inferences:

Inferences would be made in the light of various values computed using the data related to each of the schools studied.

This forms the ground to proceed further to test the efficacy of teaching ‘Civic Sense’ and ‘Mathematics’ through the ways of peace. The effectiveness of teaching as per peace education norms has to be assessed on the basis of difference in marks in two tests each in ‘Civic Sense’ and ‘Mathematics’. The two tests in each subject would give the requisite data for further analysis and computation of various values as discussed in the next chapter.