CHAPTER 3

RESEARCH METHODOLOGY

In this section I will explain the methodology I used to answer my research questions. I will begin by explaining the setting and participants. Then I will explain the process of data collection. I will conclude with an result of an analyzed data.

3.1 Introduction

Mathematics has an important role for developing computational skills precise, logical and abstract thinking. The secondary board of school examination (C.B.S.E.) introduced mathematics syllabus for the tribal students also for following objectives:

- To develop computational skills and foster and desire and ability to be accurate in a degree relevant to the problem at hand
- To develop precise, logical and abstract thinking
- To develop ability to recognize problem and to solve them with related to mathematics knowledge
- To provide necessary mathematical background for further education
- To stimulate and encourage creativity originality and curiosity of the learner.

At a psychological level, exposure to mathematics helps in developing an analytic mind and assists in better organization of ideas and accurate expression of thoughts. A common man is being increasingly dependent upon the application of science and technology in the day to day activities of life and therefore Mathematics is considered as the most important subjects at school levels all over the world.
Causes of poor performance in mathematics of tribal students studying at CBSE schools of Bastar District of Chhattisgarh state

This is the pictorial representation of the school education system running in India both in State level and central level.

**Figure 3.1:** School education system in India
All the major commissions and committee reports on education since independence rightly emphasized the importance of mathematical knowledge and its utilitarian values. In spite of all these reports and recommendations still in India, tribal students struggle with mathematics and become disaffected as they constantly bump into obstacles to engagement. It is an agreeable fact that, amongst the subjects taught in schools, mathematics is considered as one of the toughest subjects by majority of tribal students. But reason for this might be different in different situations. A number of studies were conducted in this area and researchers come up with their recommendations as well. But no one discussed about the poor performance in mathematics of tribal students studying in CBSE schools situated in Bastar district. Still the problem of poor performance of tribal’s in mathematics appears to be pertinent in all levels of school education especially in Bastar district of Chhattisgarh state. This, of course is a serious issue of the 21st century. As I am working in the department of education of Chhattisgarh state and having a keen interest in Mathematics as well as Education I thought of finding out various causes for poor performance of tribal in mathematics who studied in CBSE schools of Bastar district.

3.2 Research design

3.2.1 Sources and methods of gathering information: Here, I use mainly two bodies of literature: As sources, I use analytical materials, official documents and state text, sociological surveys, personal communications with experts, media publications.

3.2.2 Textual sources: include the policy documents, normative and legal acts; publications by individual researchers, international organisations and think tanks; current news, interviews and speeches of relevant. One of the challenges here was that the local sources are strongly biased, and several times instead of analysis, they offer ideology.
3.2.3 In depth semi-structured interviews were probably the most exciting part of my field work. The list of the interviewees includes teachers and student of CBSE schools of the state. Important sources are secondary sources, which include data collected by other researchers or by various institutions in the course of their business, or by some sociological agencies. The challenge here was that not all the surveys concerning security are available to the academia. The same can be said about the statistical data.

3.2.4 Data collection method A self design questionnaire was used in the collection of data for this study. The questionnaire is prepared for both teachers and students. “One word” answer method was used as the response format for the questionnaire.

3.2.5 Sampling process: Two sampling process were used to get the opinion of the stated question below

- Judgment sampling
- Simple random sampling

Judgment sampling is a common non probability method. The researcher selects the sample based on judgment. This is usually an extension of convenience sampling. For example, a researcher may decide to draw the entire sample from one "representative" city, even though the population includes all cities. When using this method, the researcher must be confident that the chosen sample is truly representative of the entire population.

Judgmental sampling design is usually used when a limited number of individuals possess the trait of interest. It is the only viable sampling technique in obtaining information from a very specific group of people. It is also possible to use judgmental sampling if the researcher knows a reliable professional or authority that he thinks is capable of assembling a representative sample.
3.3 Methodology

The study sample was 360 in which 300 were students and 60 teachers which were selected from the different schools. The descriptive survey design was used and questionnaire was used in the collection of data. Frequency and simple percentage were used in the analysis of the data.

Descriptive survey was used in this research work as this type of design allowed the researcher to study small sample and later generalized the findings to the whole population. The population sample for this research study was comprises of higher and senior secondary CBSE school students and teachers of Bastar district, Chhattisgarh state, India.

3.4 Sample selection

The sample for this study was three hundred and sixty students and teachers respectively which were selected using disproportionate stratified random sampling technique. This kind of sampling entails that the random drawing of subjects from the population is not only stratified, but that the stratification reflects an appropriate proportion to the power of each strata of the society. Disproportionate stratified random sampling technique permitted the researchers to have representation from all the higher and secondary CBSE schools in the Bastar district. Gender of the participants in the study where males were the majority in all categories described below in Table 3.1.

Table 3. 1: Gender of Participants

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Male %</th>
<th>Female %</th>
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<tbody>
<tr>
<td>Students</td>
<td>55 %</td>
<td>45%</td>
</tr>
<tr>
<td>Mathematics Teachers</td>
<td>62 %</td>
<td>38 %</td>
</tr>
</tbody>
</table>
3.5 **Age of students**

The most of students studying in higher and senior secondary classes were between 17 and 19 years of age 28%, between 14 and 16 years were 66%, over 20 years 5% and only 1% were below 13 years.

3.6 **Research instruments**

Researcher used the following instruments to gather information during the study;

a) Questionnaires

b) Interviews

c) Observation

3.6.1 **Questionnaire** – To collect the information from the teachers and students, questionnaires were personally administered to the respondents. The respondent is assured of anonymity. Kerlinger (1973) states that the questionnaire elicits information on appropriate area to which respondents respond objectively. The questionnaires consisted of teachers, students, socio-economic and socio-cultural factors such as parents occupation and level of education, parental economic condition etc. The teacher’s questionnaires are on a variety of information including school based factors such as teacher qualifications, experience, physical facilities and method of teaching etc. The student’s questionnaires are on a variety of information including their habit, ability, family backgrounds and study based questions etc. Importance is also given to the questions based on socio-economic and socio-cultural factors such as parents occupation and level of education, parental economic condition etc. In total there were 15 items in teacher’s questionnaires and 25 items in the student’s questionnaires.

3.6.2 **Interview schedule** : Interviews were conducted for collection of information and data in the office of District Education officer. They were
required to give information on CBSE schools in Bastar district including the problems they encounter and to suggest the socio-economic, socio-cultural and the school-based factors affecting mathematical performance of tribal students.

3.6.3 Observation: The researcher made an observation of the availability, nature and adequacy of infrastructure and physical facilities such as classrooms, libraries, laboratories, and learning materials etc.

3.7 Validity

Mugenda and Mugenda (1999) define validity as the accuracy and meaningfulness of the inferences which are based on research results. In other words validity is the degree to which results obtained from the data actually represents the phenomena under study. The instruments for this study were validated through application of content validity, which is determined by expert judgment. Gay (1992) noted that content validity is a matter of judgment by the researcher and professionals, and has no specific formula for determination. This study therefore established validity of the instruments by seeking the views of colleagues, other educationists who are not the researchers, supervisors as well as the expert advice by discussions with the researchers supervisors.

3.8 Reliability

According to Orodho (1998), reliability concerns the degree to which the particular measuring procedure gives similar results over a number of repeated trials. To establish the reliability of the instrument, the researcher will use the test-retest technique. The test-retest technique involves administering the same instrument twice to the same group of subjects to establish whether the same results can be obtained with a repeated measure of the same concept. In this study, it will be done by administering the instrument to the total respondents in the pilot study.
3.9 Pilot testing

This involved checking for the suitability of the questionnaires. The questionnaires were piloted by administering them to individuals who are not part of the sample but have identical characteristics to the sample. The selected individuals for piloting were expected to respond to the items in the questionnaire. Piloting served the following purpose:
- Established whether the instruments were able to measure that is intended;
- Established whether the respondents found the items easy to respond to;
- Established whether the instruments were comprehensive enough to elicit the intended information and the level of the respondent;
- Established whether the time allocated for the data collection was adequate;

The researcher carried out piloting of the 3 sets of the questionnaire using neighboring schools with fairly similar socio-economic background as mentioned in Table 1.6 i.e. DAV Model Senior secondary schools, Sanskar The Gurukul H.S. School, Bastar etc.

3.10 Data analysis

The data collected through the use of questionnaires, interview guide and observation schedule was coded. The data was then analyzed using descriptive statistics and presented in percentages, frequencies and measures of central tendency. The simplest way to present data according to Brinker (1988) is in frequencies or percentage tables, which summarizes data about a single variable. Frequencies were converted to percentages so that they could be easier to interpret. In view of the above, the researcher analyzed the data and represented the findings of the research in percentage, frequency tables, pie charts, and bar graphs. The analyzed data was then interpreted in the light of the objectives of the study.
3.11 Pre survey of Mathematics teacher’s demographic characteristics

The mathematics teachers who participated in this study were 32% female and 68% males. Thus there are more male teachers in secondary and senior secondary schools than female teachers. It was found that percentage of female teacher in senior secondary classes were very less. More girls need to be encouraged to take mathematics so as to have more female mathematics teachers. Information obtained shows almost all teachers (94%) are professionally trained with Bachelor of Education degrees. Therefore, their output is expected to be good. Ages of mathematics teachers between 21 to 30 years of were (16.7%), between 31 and 40 years (66.7%) and over 40 years were (16.7%). These shows mathematics teachers are fairly young and are expected to be energetic in teaching the subject

3.12 Pre survey of student’s socio-economic situation

In beginning the socio-economic situation of students was studied to understand the factors related to education of parents, resources for education and awareness and perception of parents regarding education. Data related to these aspects is presented in Table 3.2. The socio-economic profile indicated in Table 3.2 shows that average family size of students is large i.e. there are average 6 persons in majority of families. A large number of parents are either illiterate or less educated. It may affect the performance of the children as less educated parents do not realize the supportive needs of the child during the period of education. All families are economically weak and belong to BPL families. There is hardly any variation in economic status which is reflected in the basic facilities available at domestic level. Only 30% families have the basic facilities like electricity, T.V., radio, internet etc. leading to lack of exposure to a world beyond the tribal environment. However, it was found that majority of parents now understand the importance of education for progress of
their own children that might be due to the various awareness program run by the state government.

Table 3.2: Socio-economic Situation of Students

<table>
<thead>
<tr>
<th>Size</th>
<th>Variable in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Size</td>
<td>80 %</td>
</tr>
<tr>
<td>Father’s Education</td>
<td>30 %</td>
</tr>
<tr>
<td>Mothers Education</td>
<td>10 %</td>
</tr>
<tr>
<td>BPL Status</td>
<td>70 %</td>
</tr>
<tr>
<td>Basic Facilities</td>
<td>30 %</td>
</tr>
<tr>
<td>Parents Interest</td>
<td>70 %</td>
</tr>
<tr>
<td>Parents perception about education</td>
<td>90 %</td>
</tr>
</tbody>
</table>

3.13 Interview questions for teachers:

1. How many teachers are trained and how many are untrained?
2. How many teachers have at least one year teaching experience?
3. Which method of teaching is used by the teachers in the class?
4. Are the teachers capable to control the class?
5. Do the teachers take feedback of teaching in his class?
6. Do the teachers give homework to the students regularly?
7. Do the teachers evaluate homework copy regularly?
8. Do the teachers think that they have a positive relationship with student?
9. Do the teacher organize workshop, seminars etc. in mathematics?
10. Do the teachers conduct extra classes for the special students?
11. Do the teachers get support of parents by encouraging parent teachers meeting?
12. Are the teachers satisfied by the present infrastructure provided by the management?

13. Do the teachers think that background of the students are responsible for poor result?

14. Do the teachers think that the students have an ability to understand mathematics?

15. Do the teachers think that the student have a habit of
   a) Concentration
   b) Remembering
   c) Time management
   d) Preparation of notes
   e) develop study techniques

3.14 Interview questions for students

1. From which family backgrounds the students come to the school?

2. What is the literacy rate of the locality where majority of students live?

3. Do you feel that your parents have satisfactory economic conditions?

4. Do the student get support from their friends, parents and family members?

5. Do the students feel inferiority complex with other general category students?

6. Do the students and their parents give more weightage to custom and socio-economic factors?

7. What are position of electricity supply in the locality of the students?

8. Do the students go to the school every day?

9. Are the teachers supporting and encouraging the students?
10. Do the students understand the class room teaching?
11. Do the students like the method of teaching?
12. Does the teacher gives home work to the student regularly?
13. Do the students submit home work copy regularly?
14. Do the students have an ability of understanding?
15. Do the students have an ability of remembering?
16. Do the students follow a time table for study?
17. Do the students prepare note book by themselves?
18. Do the students learn or develop special technique for study?
19. Are the students satisfied from the facilities provided by the school authority?
20. Do the teachers provide doubt class, coaching class or tutorial class for special students?
21. Do the students participate in the mathematical conference, workshop and other programs?
22. Do you think that due to language of instruction English your performance in mathematics is not satisfactory?
23. Do you feel that your class room is overcrowded and number of students should be decreased?
24. Do you get sufficient teaching/learning materials like text books, mathematics apparatus etc?
25. Do you want to make your career with Mathematics subject?

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