Chapter 4: Design of Research and Methodology

A theory can be proved by experiment; but no path leads from experiment to the birth of a theory.

Albert Einstein (1879 - 1955)

While chapter 1 gave the context and background, the two sections of review of related literature and theoretical framework in chapter 2 and 3 gave some directions to move on. Chapter 4, after building up the idea of descriptive and exploratory research from educational research in general, describes the design, research questions etc. The first subsection has been devoted to develop an understanding of descriptive and exploratory research from educational research in general, showing directions for the nature of questions, strategy and scope of the study undertaken. A total of six subsections of this chapter have been developed. These inform and lend direction to the nature of the study, the research questions and objectives of the study being undertaken. A pictorial representation of the sample is also included in the chapter.

4.1 Introduction

“In particular questions related with education (educational research) are not limited to the approaches used in physical and natural sciences. […] Education is generally considered as an interdisciplinary field of study. This consideration is based upon the understanding that it has borrowed concepts, methodologies and theories from psychology, anthropology, political science, economics, sociology, sciences and other disciplines” (McMillan, J. H. & Schumacher, 2001).

Further in simplistic terms educational research is categorised into qualitative and quantitative. Both quantitative and qualitative research studies are conducted in education. The most obvious distinction to a reader between quantitative and qualitative research is the form of data presentation. Quantitative research presents statistical results represented with numbers; qualitative research presents data as a narration with words. The distinctions, however, go beyond the form of data presentation
(Denzin, N.K. & Linkon, 2000). Qualitative Research strategies are flexible, using various combinations of techniques to obtain valid data. Most researchers adjust decisions about data collection strategies during the study. The multiple realities are viewed as so complex that one cannot decide a priori on a single methodology. (McMillan, J. H. & Schumacher, 2001) has claimed that Nature and Scope of Exploratory & Descriptive Research Criteria matches more with qualitative research criteria.

4.2 The Design of Study

This part of the report tries to answer the key questions like why such a study has been undertaken. It explores questions like, how the research problem has been defined/ designed. Why has a hypothesis not been formulated? What methodology has been adopted, what particular technique of analysis of data has been used and why etc.

In the Indian context, the large classroom size, and busy timetable schedule, a lot of non-teaching assignments and similar problems leave a very limited scope for a science teacher to give individualized attention to every learner in the class. The researcher had experienced this problem as described in the introduction part of this report in chapter 1. The researcher came to the understanding that there might be many more possibilities of formation of Alternative Frameworks in the life experiences of science learners that might need deep probing. For this, the science learning experiences were explored to locate potential sites of formation of Alternative Frameworks. The focus of addressing of Alternative Frameworks among learners of science was a live challenge in front of the researcher. The constraints of time, limited resources and energy available to teacher forced the researcher to think about some alternatives that may assist a science teacher in this endeavour. With interest in computers and its applications combined with an opportunity to have come across computer assisted instructional material developed by Delhi government, the researcher had a question about the efficacy of using computer to address these alternative frameworks.

A preliminary review of related research unfolded the absence of computer-assisted learning material/ program specifically designed for addressing these Alternative Frameworks. It also revealed that we don't have any idea about the
framework in which we can design such type of program. In individual capacity, it is not possible for the researcher to design his own computer-assisted learning material and test its efficiency. It has to be a complete team effort, requiring high level of expertise in computer programming and design based skill-set, content expertise and an in-depth understanding of the formation of Alternative Frameworks amongst learners in science, in specific content areas. Review of related literature revealed that the need and feasibility of this type of intervention in the context of teaching-learning of science has not been explored. An understanding about how does a science teacher transact a science concept vis-a-vis formation of Alternative Frameworks has also not been undertaken. Thus, an exploratory and descriptive study has been designed to understand this efficacy of computer-assisted learning in addressing Alternative Frameworks amongst learners in science in terms of its need and feasibility.

The study is titled

**Exploring the Efficacy of Computer Assisted Learning in Addressing Alternative Frameworks Among Learners in Science**

In the title of the study undertaken, the term exploring has been used to depict the exploratory and descriptive nature of the study. It has earlier been mentioned that the exploratory and descriptive studies match more with qualitative research criteria and that qualitative research assumes reality as multilayer, interactive, and a shared social experience interpreted by individuals. These are the basic assumptions about the reality that has been explored in the present study. Not to repeat but to emphasise, the strategy used in this study matches with qualitative research thereby these strategies being flexible, using various combinations of techniques to obtain valid data and the multiple realities are being explored by not deciding on a single methodology. This study distances itself from experimental setup of controlling the variables “at will” or seeing the “cause and effect” relationships.

The researcher’s curiosity and desire for a better understanding of Alternative Frameworks among learners in science, portraying the contextual characteristics for taking more comprehensive study related to addressing these Alternative Frameworks using Computer Assisted Learning, motivated the researcher to take up possible site of formation of alternative frameworks in this study. The nature of the study was such that it was not possible for the researcher to control the variables in the process of
formation and addressing Alternative Frameworks among learners in science. Thus, in
the absence of controlled variables no hypothesis has been formulated. This also
helped the researcher in keeping a distance from his own preconceived notions about
different dimensions of the study.

4.3 Research Questions and Objectives

4.3.1 Research Questions:
The following questions emerged while undertaking this study.

I. In what context are Alternative Frameworks being formed and addressed in
   Indian classrooms among learners in science?

II. How do science teachers perceive alternative frameworks as a part of the
teaching-learning process?

III. How do science teachers perceive Computer Assisted Learning as a part of the
teaching-learning process?

IV. What should be the characteristics of Computer Assisted Learning program as
    per the perceptions and expectations of science teachers?

V. What are the characteristics of the required Computer Assisted Learning
    program based on the above understanding developed?

VI. Based upon the understanding developed about the teaching learning context
    and the perceptions of science teachers, how do we evaluate some of the
    available Computer Assisted Learning programs in science?

4.3.2 Objectives:
The study has focused on the following objectives:

1. To explore teaching learning contexts in science classrooms with respect to
   a. Teachers' natural dispositions towards formation and addressing of the
      Alternative Frameworks
   b. Possible sites of formation of alternative frameworks among learners in
      science

2. To understand science teachers’ perception about Alternative Frameworks

3. To understand science teachers’ perception about the use of Computer
   Assisted Learning program in addressing Alternative Frameworks among
   learners in science.
4. To identify the characteristics of desirable computer-assisted learning program as per the perceptions of science teachers.

5. To evaluate features of some of the computer-assisted learning programs in science on the basis of
   a. Understanding that has been developed about the teaching learning context in science classrooms.
   b. Perceptions of science teachers

6. To suggest implications for Science Education.

4.4 Methodology, Sample and Tools:

4.4.1 Methodology:
Different researches show that Alternative Frameworks are formed in both formal and informal settings that are difficult to understand in discontinuity from each other. This generates the need to understand science learning contexts in an integrated form from multiple dimensions. 38 prospective science teachers of the two colleges (MV College of Education and GRD College of Education in Delhi) were chosen as samples for the study. In the study these 38 prospective science teachers have henceforth been addressed as science teachers. Most of the observations, interpretations, analysis and reflections done by the participants were discussed with them also to develop their insight about their own science classrooms. These science teachers were also a connection to reach to the science learners in the schools. Thus an input from the science classrooms was available to the teachers during their school life experience program.

Three forms of inputs were received from the science teachers.

1. The first input was regarding the way in which issues related to Alternative Frameworks are dealt by the science teachers.
2. The second input was related to analysis and reflection regarding the questionnaire filled by their science learners.
3. The third input was related with the formation and addressing Alternative Frameworks, understanding of Computer Assisted Learning and feasibility of using Computer Assisted Learning in addressing Alternative Frameworks among learners in science.

All types of schools were allotted to these science teachers during their school life
experience program. Training of teachers was done for both data collection (one day) and analysis (three days). Also, two days were devoted for reflection and discussion on resolution of the problems faced during the process.

4.4.2 Sample

I. Total 38 Prospective/Pre-Service Science teachers from two B.Ed. colleges of University of Delhi and GGSIP University, Delhi.

II. Total 18 schools in which above had School Life Experience Program.

III. Total 1207 science Learners of the above mentioned (Prospective/ Pre-Service) Science Teachers during their School Life Experience Program

Learners of class sixth to ninth studying integrated sciences were the sample of learners. Their teachers irrespective of graduation and post-graduation subjects became the sample of teachers for looking at relevant issues related to integrated sciences at secondary level.

Figure 1- Classification of Different Schools Constituting School Sample
Details of the Sample Schools

The following table shows the Details of Sample Schools from which data was collected.

Table 2 - Details of Sample Schools

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Details of Participant Teachers

The following table shows the details of participant teachers.

G- Government; P- Private; G.A.-Government Aided; K.V.-KendriyaVidyalaya

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<td>2.07</td>
<td>9th</td>
<td>GBSSS, Model Town III</td>
<td>M, G</td>
<td>Boys B.Sc. (Physical Sciences)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>2.08</td>
<td>9th</td>
<td>Kendriya Vidyalaya, Naraina, Delhi Cantt.</td>
<td>M, K</td>
<td>Co-Ed B.Sc. (Physical Sciences)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Details of participating teachers in terms of their college, classes allotted and Gender

Total number of Prospective teachers = 38

![Diagram: Classification of teachers’ sample]

Figure 2 - Classification of teachers’ sample

Following are the details that are evident in the above figure.
Total number of participating prospective teachers = 38
Total 30 prospective teachers from Guru Ram Dass College of Education – code numbers 1.01 to code number 1.30
Total 8 prospective teachers from Maharishi Valmiki College of Education – code numbers 2.01 to code number 2.08
Details of science learners from the participating schools

Total number of learners in schools = 1207

Figure 3 - Classification of science learners

It is evident from the nature of the sample that it is not a random sample. It has to be mentioned that although no deliberate attempt was made for the sample to be homogeneous or representative, it got addressed in the process to some extent. The science teachers belonged to different socio-economic backgrounds and the science learners belonged to different sorts of school settings. These types of schools included all boys’ school, all girls’ schools, government, government aided and public schools. Therefore we can say that different socio-economic backgrounds and diversity in teaching-learning settings has been represented to a large extent in the sample.
School Profile
The sample taken consisted of 18 schools. Three schools randomly selected have been described under to give glimpse of the contexts of the schools. The school profiles as built based on teachers’ descriptions is as follows:

Teacher code 2.05
This was a private school and learners found a very strict environment there. The learners came not from very rich family, mostly learners came from middle-class families and some of them studied in that school because of the distance factor. Daily 20-30 learners would stand outside the rows of assembly due to lack in their uniforms. The school teachers always checked them. The books of the school were not of a very famous publication. Only a few parents of learners have government jobs. The socio-economic background of learners didn’t seem to be very strong. It was middle or we can say it was lower middle.

Teacher code 2.02
Assembly
The assembly starts at about 7:25 am and after 7:30 am learners are supposed to make a separate queue for late coming. Then, there are some learners who had been given the badge of the learners and during assembly; their duty was to check the overall uniform of all the learners. The assembly started with, a morning prayer, followed by special information for today, thought for the day, news, a few lines of a particular topic, quiz etc. For a particular day these activities were undertaken by a particular standard of a particular class for example class 6th A. They had a rule that for one week learners of a particular class and section will handle the assembly.

As a result of this assembly rule, learners were getting an environment conducive to address the school assembly and provided them with a platform to boost their confidence.

Discipline
The discipline of this school was enforced strongly. While coming to assembly or for going to library, playground or computer room they were supposed to make a line and the monitor of that class took care of these instructions. The school had two floors. After the assembly learners went to their respective classes. Some learners were given the opportunity to check whether the learners were following the rules or
not, whether they were going in proper rows or not without making any noise, without pushing one another. In the corridors of the school, in every corner there were enthusiastic thoughts written.

**School laboratories**

There were laboratories for learners of class sixth to eighth known as integrated science lab and there were separate laboratories for physics, chemistry and biology. All the laboratories conformed to the requirements of a good laboratory. On Wednesdays, they had physical education and on Saturday first two periods were assigned for co-curricular activities like essay competition. The library and computer laboratories were functional. Learners were given opportunities to access internet. Their personal IDs were created for the same.

The principal of the school was very strict and she always took special care of the rules of the school and she also checked the learners’ uniform, haircut etc herself. In the school all the classes had been provided with green board, and had the capacity to accommodate around 50 learners. The teachers of the school were learner friendly and cooperative.

Teachers were following the traditional methods of teaching. The teaching learning process has been observed to be examination oriented. There were instructors for sports and learners were provided with the necessary sports related materials. Each and every learner was provided with newspapers on daily basis. The school had a working canteen where the food items were served fresh.

**Teacher code 2.03**

Most girls of this school belonged to a weak economic background. Some girls were from middle class also. Still they cannot use the present day technologies as these technologies were not available to them. Parents of these girls were also not well educated. Parents of most girls were educated till senior secondary only. Because of this reason they did not get any assistance in their home tasks or any other tasks. Most girls were observed to be dependent upon tuitions and those girls without tuitions came from poor economic status.

**Teacher code 2.07**

This school belonged to the government school settings. The infrastructure was in very bad condition. In many classes even 90 learners were enrolled and the seating
capacity for a class was only for 40 learners. The writing boards were also in a very bad condition. The science laboratories were there only for namesake. There was not even a tuning fork in the laboratory. The library was generally closed for the learners.
The computer room had been filled with empty boxes instead of computers. The socio-economic background was weak. The teachers lacked motivation to teach. Even some fights between teachers and learners were observed. The fights were so serious that police had to be called twice.

### 4.4.3 Tools for data collection

Following three tools were used for data collection.

1. **Self assessment feedback schedule for Science Teachers (Appendix A)**
2. **Questionnaire for understanding teaching-learning contexts. (Appendix B)**
3. **Questionnaire for understanding Computer Assisted Learning in addressing Alternative Frameworks for Science Teachers (Appendix C)**

#### Preparation of tools

In order to develop an understanding of the teaching learning contexts, two relevant tools were primarily identified as questionnaires and interviews. As described in objective number one, a tool is required with the help of which large amount of data can be collected in the limited time that is available to the researcher.

The use of questionnaires for collection of data ensures that data can be collected from large groups; respondents can complete the questionnaire at their own pace convenience etc. The cost and time involved in using questionnaires is less than the interviews.

Review of available tools was done. Some sample items from the tools that were reviewed are as under.

Page 4 question 5 (Taken from (Sansanwal & Joshi, 2001))

> You are watching movie in a movie hall. Suddenly hall caught fire .what you will do?

*(Mark the correct inference)*

1. You will run outside.
2. You will search a water tank and hide yourself in it.
3. You will start shouting and collect a mob.
4. You will use fire-extinguisher.
There must be a correct reason for this answer. Mark the correct reason.

1. Because you know you will be safe if you run outside.
2. Because you know that water does not catch fire.
3. Because you know people will help in extinguishing fire.
4. Because you know that carbon dioxide of the fire extinguisher will helps to extinguish the fire.

Inference – You will use fire-extinguisher.

Reason - Because you know that carbon dioxide of the fire extinguisher will helps to extinguish the fire.

The following questions were taken from (Jha, 2001)

Choose the correct option from
1) Completely disagree, 2) Disagree, 3) Undecided, 4) Agree, 5) completely agree

Q. 1. Before reaching to any conclusion I will think on the lines of every option available to me.

1) Completely disagree
2) Disagree
3) Undecided
4) Agree
5) Completely agree

When I am finding solution for any problem then in that case usually I believe the facts and figures.

1) Completely disagree
2) Disagree
3) Undecided
4) Agree
5) Completely agree

The following questions were taken from (Arora, 1994)

Part A

Q - Except for one, animal-cells have all the structural element components.

a) Cell-Wall
b) Cell-Membrane

c) Nucleus

d) Nuclear Membrane

e) Chromatin

Q - Give four differences to identify RBC and WBC.

The following questions were taken from (Agarwal, 1987)

Page 9 Question 4 Who discovered Maximum/Minimum Thermometer?

a) Newton

b) Dalton

c) Fahrenheit

d) Archimedes

The following questions were taken from (Sharma & Shukla, 1985)

Page 3 Q 1

Consequences Test

(This test is based upon imagination of some situations that seems to be impossible)

What would happen if nobody dies in this world?

a) There would be space crunch on earth.

b) Everybody would fight among themselves.

c) Humans will start living in water.

d) More production of medicines.

e) There will not be any sort of movement on earth.

f) Lack of fresh air.

Unusual Uses Test

(This test is based upon imagination of some unusual uses of commonly available items)

What are the uses of electricity?

a) For heating

b) For curing diseases

c) To end life

d) It changes weather
To get information about human brain
f) For agriculture

New Relationship Test
(This test is based upon imagination of finding similarities between two different things)

Q- Birds and Animals Relation-

a) Both are living beings
b) Both are pet or wild
c) Both of them are useful after death.
d) Both die
e) Both of them have bones

“Just think, why” Test
(This test is based on enhancing new ways of thinking.)

Q - In what circumstances it does not rain?

a) Less temperature
b) Scarcity of forest
c) No mountains
d) Lack of dust particles in atmosphere
e) When wind does not blow towards land from oceans.

The following questions were taken from (Bhargava, 1984)

<table>
<thead>
<tr>
<th>Copper</th>
<th>Wood</th>
<th>Copper</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>P</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td></td>
<td>R</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y</td>
</tr>
</tbody>
</table>

XY is a Copper, Wood, Copper rod shown in above diagram. Wax is stick on each dot P, Q, R. If we start heating this rod from point Y then on which point does it melt?

a) P
b) P & Q
c) Q
d) Q & R
e) R
The following questions were taken from (Bhargava, 1983)

Page 3 question 7

Which of the following forces are working on a kite when it is in air?

a) Weight of kite
b) Force of kite thread
c) Air pressure
d) All of the above

Discussion

In the review of the available tools it was identified that these tools cannot be used in order to collect data required for the present study or in other words suitable tools for getting the relevant data could not be located. Thus, in order to explore teaching learning contexts in science classrooms with respect to possible sites of formation of Alternative Frameworks among learners in science, a questionnaire for the sample of learners in the 18 schools was prepared. This questionnaire had both open ended and close ended questions, questions that can be analysed in quantitative and qualitative ways. The major themes of the questionnaire include exploration about the resources that the learners tend to tap, their preferred learning styles, possible sites of Alternative Frameworks, their notion about themselves as science learners.

To validate the tools, the First draft of tools was given to experts namely school teachers, and colleagues in teacher education institutions, and ambiguous language and other issues resolved and the items modified subsequently.

4.5 Collection of data

4.5.1 Self Assessment Feedback Schedule for Science Teachers

A self appraisal of 30 pre-service science teachers was collected in the form of self-assessment feedback regarding 592 Science lessons transacted (Appendix A). The teachers were asked to rate themselves on the basis of self-assessment after each lesson. This feedback on 592 lessons from the teachers was received, analyzed and reported. The feedback was quantified, described and analyzed in terms of science teachers approach towards forming and addressing Alternative Frameworks during
the science classes.

Data collected from the science teachers was on the basis of understanding developed from a review of studies related to Alternative Frameworks and researcher’s own experience as science teacher/teacher educator. A comprehensive tool was developed by the researcher to have feedback on different issues related to their daily feedback on different areas of the teaching-learning processes in science. The science teachers were also given the liberty and choice of reflecting on these self-assessment and feedback Schedule. Some of them have reflected on this schedule also. This schedule contained 26 items in total. Out of these 26 items, 14 were related be the Alternative Frameworks. Responses on all these 14 items were coded, quantified, analyzed and described.

4.5.2 Questionnaire for Understanding Teaching-Learning Contexts

A questionnaire prepared by the researcher (Appendix B) and vetted by two eminent scholars was used for the same. This questionnaire was distributed to more than 1207 learners of science studying in classes sixth to tenth across Delhi and received from total 979 learners. These schools catered to the needs of a diverse population. Some particular topics were under focus in various schools (due to the schedule s fixed by the educational structure) at the time when data from school was collected. Thus, some topics got more coverage in the study than the others as the topics under discussion were not in researcher’s control.

The questionnaire for science learners containing total 17 items was given after transaction of 12 to 15 lesson plans and collected on the same day itself by the science teachers. The primary task of analyzing and reflecting on these questionnaires filled up by the science learners was given to the science teachers so that they are able to make linkages with their own classrooms in their particular contexts, which is not possible for the researcher to make. Science teachers were given about 10 days for this task. This analysis and reflection was summarized by the researcher and analyzed to see patterns, exceptions and other aspects. Two of those 17 questions from the questionnaires filled up by the science learners were analyzed by the researcher. These two questions were related to ‘questions that are coming to the mind of the science learner’ and second the ‘figures, diagrams and scientific terms used’ by the science learner. While the former was analyzed to understand the nature of questions
that are coming to the science learners mind, the latter was analyzed to identify the concepts depicted and the possible sites of Alternative Frameworks (if any).

4.5.3 Questionnaire for Understanding Computer Assisted Learning in addressing Alternative Frameworks for Science Teachers

Eight questions on computer-assisted learning (Appendix C), formation and addressing Alternative Framework were given just a few days before their exam, to the prospective science teachers, after they completed the syllabus and had reflected well on the learners, learners’ curriculum and their own curriculum. The questionnaire was given to all the 38 Science teachers and feedback was received from 30 of them Questionnaire containing 8 items related to the problem of using Computer Assisted Learning in addressing Alternative Frameworks among learners in science.

Towards the end of the completion of their pre-service education program, these science teachers were given a questionnaire containing 8 items related to the problem of using Computer Assisted Learning in addressing Alternative Frameworks among learners in science. The science teacher’s views on these eight items were collected question-wise, analyzed and described.

At all stages the science teachers were assured that this work is not part of their curricular assessment and they are completely free to express themselves. Similarly, they were asked to tell this to their learners while filling the questionnaire distributed in their respective schools.

For quality enhancement of the report, editing of English-language has been done but to the minimum extent possible. Some of the science teachers and science learners have given their responses in Hindi and have been translated to English by the researcher.

4.6 Analysis of Data

4.6.1 Self Assessment Feedback Schedule for Science Teachers

Self-assessment feedback Schedule, that contained 26 items originally, had the option of responding in terms of strongly agree, agree and disagree. In order to understand this data, these three categories were given the weight two, one and zero respectively. Thus from one day feedback of a particular science teacher there were responses on the selected 14 questions directly or indirectly related to the study, in the
form of zero, one and two. For one particular science teacher, these responses were collected on Microsoft Excel sheet for the period of entire school life experience program. From this, average score of one particular teacher on each of the 14 items were calculated. Similarly, this process was repeated for the 30 teachers who responded to this task. These average scores of 30 teachers were then entered in another Excel sheet to be analyzed for their responses on the selected 14 items. Various descriptive of these 14 items were calculated and reported. Graphs were plotted to show the average per day score of the 30 science teachers on these 14 items. These were further analyzed and reported in terms of graphs showing histogram and probability curve for giving pictorial idea of the responses of the learners. The descriptive that have been calculated using IBM-SPSS are Range, Min. - Max., Mean, Std. Deviation, Variance, Skewness and Kurtosis.

4.6.2 Questionnaire for Understanding Teaching-Learning Contexts

Questions from the questionnaires filled up by the science learners were analyzed in two ways.

(a) The first and the primary analysis was done by their own science teachers, that are discussed in part

(b). Two questions i.e. question number six and number 13 were analyzed by the researcher only. Question number six was related to the questions that come to the students’ mind while the teacher was transacting a particular lesson on a topic from their curriculum and question numbered 13 was related to the figures and diagrams made and terms used by the science learners.

In order to analyze these questions, the researcher categorized the responses to question no. 6 of the questionnaire in terms of conceptual areas. Originally 449 questions were received from the science learners. After identifying repetitions, 17 broad conceptual areas of questions finally emerged. These questions along with the topic have been reported in the study. On the response to Question number 13 a total of 908 diagrams and figures were received and were grouped according to the concept represented in them. These were analyzed with two major focuses namely the concepts and keywords representing the possible sites of Alternative Frameworks. These two have been reported along with the original diagrams and figures drawn by the science learners in the appendix. In order to meet the ethical standards, the names
and identifiable information of the science learner has not deliberately been put on the figures and diagrams. But the questionnaire responses filled up by every learner was coded so that the linkage with the sheet can be made without having to identify the personal information of the science learner and is imprinted on every diagram and figure.

(b) The analysis and reflection of the science teachers on the 17 questions (on the questionnaire by their science learners) is summarized, analyzed, reflected and presented in the report qualitatively.

4.6.3 Questionnaire for Understanding Computer Assisted Learning in addressing Alternative Frameworks for Science Teachers

Questionnaire containing 8 items related to the problem of using Computer Assisted Learning in addressing Alternative Frameworks among learners in science have been analyzed question wise for all the eight questions. Qualitative inputs, views and opinion about the various aspects of using Computer Assisted Learning in addressing Alternative Frameworks amongst learners in science have been drawn and presented. For making meaningful interpretations, the responses have been arranged and summarized theme wise. The themes were not decided a priori but emerged from teachers’ responses.

4.6.4 Available Programmes for Computer Assisted Learning

Two different sorts of available science learning, computer-assisted learning programs were critically analyzed on the basis of findings for potential of addressing these Alternative Frameworks. The programs are from CIET (NCERT, Delhi) and University of Colorado.

For increasing reliability and validity of the data in context, the primary data collected with the help of response sheets for science teachers, science learners, open ended analysis and reflection of science learners response sheets by the teachers were all coded, organized, analyzed, described and reflected, all based upon the type of data received and the need. Another thing that is important to mention is that not all participants responded in every type of the data collected.
This chapter introduced the methodology, sample and tools in details and their inter-linkages. Why this research was undertaken has been described in terms of research questions and objectives. Sample schools, teachers and learners have been classified in relevant categories to develop an understanding about the sample. Details of participating teachers have been included. Collection and analysis of data has also been described. The data collected has been analysed in the forthcoming chapters namely chapter 5 and 6.