

## CHAPTER – III

### METHODOLOGY

#### 3.1 Introduction

This chapter presents the methodological choice adopted by the researcher to realize the objectives of the study. The review of related literature has indicated the usage of qualitative approaches in understanding the process skill development.

This chapter is presented in two sections. The first section discusses the rationale behind the methodological orientation and the second section focuses on the research design and research process.

#### 3.2 Methodological orientation

The methodological orientation of the study was guided by the nature of research questions

1. What are the process skills operating in the context of scientific investigation?
2. How does 'pupils idea' tend to change during the 'context' of scientific investigation?

The focus of these questions emphasizes on 'context' of scientific investigations during which process skills and pupils ideas tend to operate. The term 'context' has been defined as follows:

*"A context is a culturally and historically situated place and time, a specific here and now" ---- the context is the world as realized through interaction and the most immediate reference for mutually engaged actors"* (Graue & Walsh, 1998). Wensworth (in Graue & Walsh, 1998) defines *"context may be thought of a situation and time bound arena for human activity"*.

In consideration to these definitions the 'context' of scientific investigation may be seen as an intentional learning environment created by teacher for the purpose of developing process skills among pupils.

This learning situation can be realized through continuous interaction with the pupils/children by *"Giving explicit attention to day to day situations in which children live and interact We pay close and systematic attention to children in play ground, class room, school, backyard etc "* (Graue & Walsh, 1998).

The need to study pupils in a context necessitates the researcher to collect data with through

- face to face interaction with pupils
- spending longer duration of time with pupils
- creating 'context' of scientific investigations in learning situations
- giving a narrative description of the context.

The very nature of research questions guided the researcher to arrive at a decision on the choice of methodology. Hence the present study employs 'case study' as a research strategy.

### 3.2.1 Case study as a Research Strategy

Sharma (1995), defines the case study in terms of an *"investigator, who makes a detailed examination of single subject, group or phenomenon and seeks to address, illuminate and understand a complex array of issues embedded in its context, through the eyes of people being studied"*.

Yin (1989), favour to call case study as *"an empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident"*.

Sturman (1997), looks at the very core belief of the case study from the holiest tradition of scientific inquiry. According to this tradition *"the characteristic of parts are seen to be largely determined by the whole to which it belongs. The human system develop a characteristic wholeness or integrity and are not simply loose collection of traits"*.

... *"The case study researchers hold that to understand a case, to explain why things happen as they do and to generalize, predict or arrive at an explanation requires a rich description of the case and understanding of it, in particular the relationship to its parts"*.

The survey of the various definitions seems to suggest that

- 1) case study is a distinct empirical inquiry conducted in real-life context.
- 2) Case study views human system as a whole and not as a part
- 3) Case study involves in-depth investigation of a phenomenon, or a group etc.

The case study has been approached by qualitative (Sharma, 1997) and quantitative techniques (Yin, 1998; Sturman, 1997). The approach to a case study

largely determined by the nature of the research questions. Another aspect of case study is its attention to process of change. The process of change in curricular movement is used as a criteria to classify the case studies (Stenhouse, 1990) as

- Evaluative case study
- Educational case study
- Case study in action research

#### ▪ **Evaluative Case Study**

The focus of this case study is on a single case or a collection of cases is studied in depth with the purpose of providing information to decision-makers (administrator, teacher, parents, pupils) to help them to judge the merit or worth of policies.

#### ▪ **Educational Case Study**

The focus of this study is on educational action to enrich thinking and discourse of educators. This is done either by development of educational theory or by refinement of procedure through the systematic and reflective documentation of experiences. The researchers are concerned neither with social theory nor with evaluative judgement but rather the understanding of educational action.

#### ▪ **Case Study in Action Research**

The focus of this case study is on contributing to the development of the case or cases under study by feedback of information, which can guide revision, and refinement of action.

### **3.2.2 Situating the present study**

The focus of the present study is on acquisition of process skills by IV standard pupils through an instructional programme in Environmental studies. The instructional programme is intended to create 'context' of scientific investigation. Where pupils work in groups to interact with the learning experiences (for details refer Fig. 1 in Appendix I). These interactions help the pupils to modify their existing ideas through the use of process skills to develop ideas to relate and understand the surrounding environment. Thus the focus of the study was converted into research questions, which are stated in section 3.2. These research questions necessitated the need on the researcher to interact with IV standard pupils

The very nature of these interactions requires the researcher

- to guide and participate in pupils action
- to observe and record the pupils action

In order to facilitate this requirement, the researcher took the role of a teacher.

In order to perform a role of a teacher and researcher, a case study methodology was adopted. This methodology provides the scope for the researcher to document pupils' actions and simultaneously guide these actions towards understanding the research questions. So in the present study the research questions are addressed in the form of qualitative case study and in specific overlaps with the educational case study (Stenhouse, 1990).

### 3.3 Research Design

Yin (1989) describes a research design as a *“logical sequence that connects the empirical data to a studies initial research question and ultimately to its conclusions”*. The logical sequence is the essential aspect of a research design. In this study the logical sequence evolves or unfolds over a period of time. In the initial stages of my work I entered the research setting with a tentative research questions and conceptual framework derived from the literature on process skills. In this sense pre-field work, fieldwork and post fieldwork are interrelated and overlap substantially. This has been described in detail in the figure 3.1.

The study was a result of my personal interest to understand the acquisition of process skills among primary school children. I worked as a teacher in a urban primary school for a period of two years. During this period, I had observed pupil's actions, conducting and participating in scientific activities. This interaction with pupils coupled with my personal interest made me to review the relevant literature in the area of children learning of science. The limited research in the area of primary education especially with respect to science learning was a glaring feature which made me to arrive at a decision on to work with pupils learning of science. The interactions with fellow colleagues, curricular specialists, officials of education department suggested the need of research to work with respect to rural children, in the area of environmental studies (refer section 1.8, Rationale of the study).

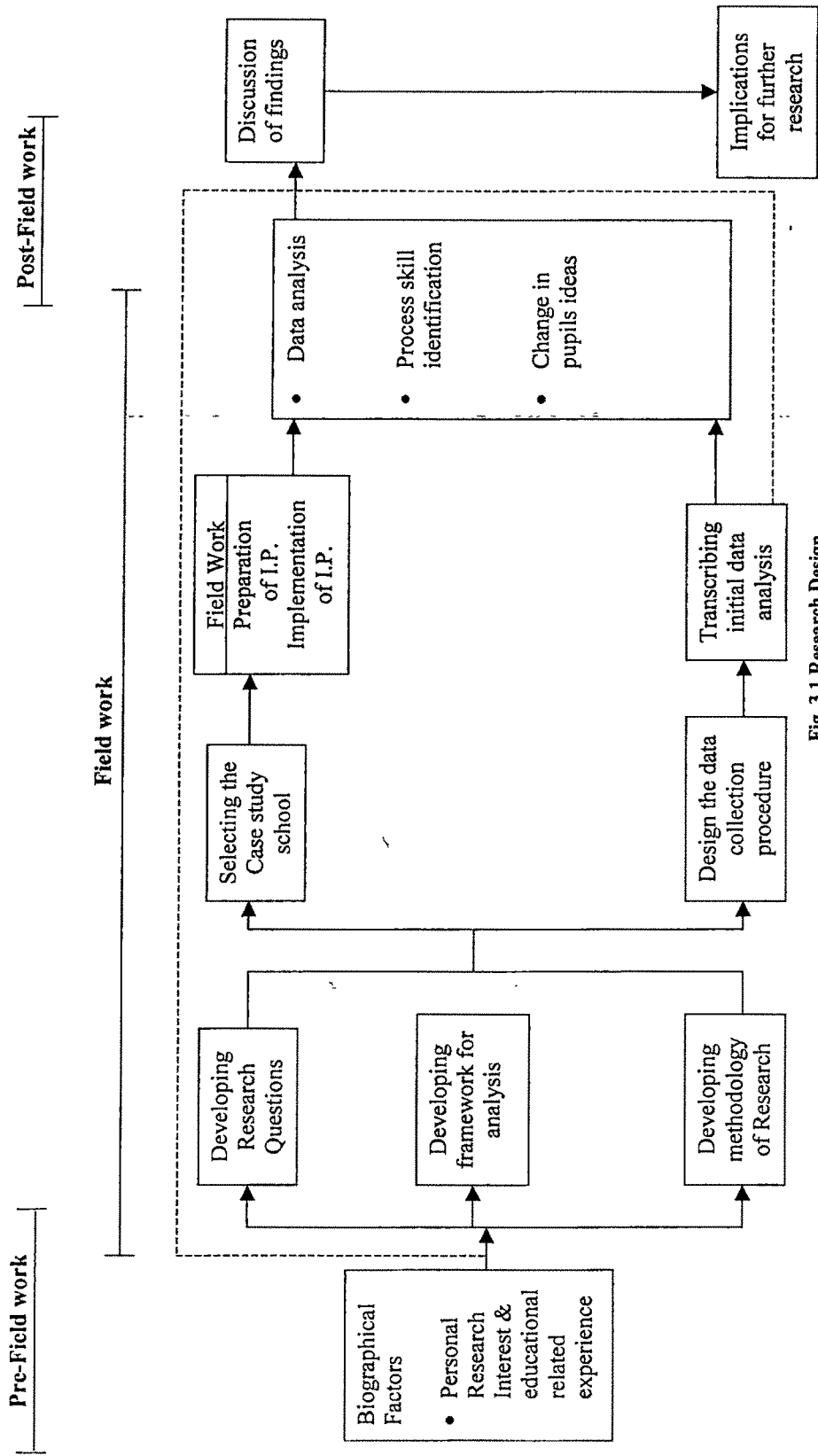


Fig. 3.1 Research Design  
(adopted from Sharma ,1995)

From the earlier stage of the project, it was felt that qualitative data obtained through in-depth interaction of pupils would provide understanding the ways through which the acquisition of process skills takes place. The need to understand the process skills and to prepare the instructional programme with respect to IV standard pupils' made the researcher to decide on selecting the case study school.

### 3.3.1 Selecting the Case Study School

For the purpose of this study Government Higher Primary School, Srirampura, was selected. (The description of case study school is presented in Chapter IV ) hence the sample of the study was purposive. The nature of the study required to interact and engage with group of pupils with a longer duration. Hence only IV std. Pupils were selected (refer section 1.8, Rationale of the study) for the study. Another criteria which helped me to choose the school was accessibility as vulliamy's (cited in Sharma 1995) says a *"typical compromise between what is most desirable from the research point of view, --- what is most practical"*. The school was near (just 2 km.) to the place of my residence it provided me *"an opportunity and convenience in gaining access to the study"* (Jorgensen, 1989).

The initial theoretical and methodological orientation was very general and flexible. It was then I made my first visit to Government Higher Primary School, Srirampura, during mid part of July-August 1998. During this period I started interacting with pupils, teachers and parents. The focus of the interactions was centered on a question "what constitutes the pupils day to day environment in the school? This question guided me to experience teaching-learning process in the classroom, I taught environmental studies to the pupils of III and IV standard. My first visit was helpful in understanding the teaching-learning process, which helped me to prepare the framework for the Instructional Programme. Which helped me to identify the relevant research questions.

It was during my second visit to Srirampura during July 1999 to November 1999. I could able to refine the research questions. The research questions have been stated in the Section 3.2

### 3.3.2 Gaining Access to the Case Study School

In order to enter the school, the official permission was sought through a written request to Block Education Officer (BEO), Mysore Taluk (Rural)

During the formal meeting with B.E.O, I expressed my intention of conducting research study at Government Higher Primary School, Srirampura. B.E.O asked me about the topic of research and also about my academic background. Accordingly, I was granted a written permission to conduct a research study in the area of environmental studies at Government Higher Primary School, Srirampura. The written permission from the B.E.O gave me an official approval to conduct the work. I entered the school with this letter, the in-charge Head madam (Head madam was on leave) of the school welcomed me with a cup of tea. (A Social drink given in respect and recognition of the other person). The next day Head madam introduced me to pupils and other teachers as a person who has come to teach the environmental studies for III and IV std. Pupils. During my visits to the school, I interacted with all the pupils with my interest centered more on IV standard Pupils. I played games and shared stories and songs. This way, I thought, I can reach pupils. Later on I took the position of a teacher and taught a lesson from environmental studies. My role as a teacher in school gave me unobtrusive observation of pupils during teaching-learning situation.

In order to familiarise myself with the village and its surroundings, I made a survey of village with the help of pupils who had volunteered to show the village. I ventured into the places where children move around. It involved 'Kaddi-thota' (mulberry plantations) coconut farms, Lingabhudi tank, house visits and village bus stop. I felt very exhausted after moving around with them. It was a new experience for me to jump the fences of mulberry plantations, walking on the field etc. I played cricket and football with village youths. But I could not match the physical fitness of village youth. The Parents and other community members were approached some time through school and some times through my personal visits.

### 3.3.3 Ethical Procedure

The nature of the present study required me to spend substantial time (6 months) in a school, interacting with a group of pupils on day-to-day basis. This necessity requires me to be honest to one self and others as Grauve and Walsh (1998) call it as ethical behaviour. According to them “ *the attitude that one brings into the field and that one brings to one's interpretation. Entering other people's life is intrusive It requires permission that goes beyond the kind that comes from consent forms It is the permission that permeates any respectful relationship between people*”

Accordingly I sought the permission of Head Madam and staff to conduct research. I expressed my research intentions and provided as much information as possible about the study. I also told them clearly that, what I am going to do with all the information, I collect from the school.

However, with pupils, I had difficulty in communicating my research intentions. The difficulty arose from my belief that pupils may not comprehend all that information on research. When asked, by pupils I just said, “ *I have come from Mysore city to teach them*”.

The school was also benefited from my presence. I helped the teachers in managing their classes (for some time, while they were on leave). I joined teachers in preparing models and trained the pupils for co-curricular activities at the school like creative drama, singing etc. The co-operative relationship on my part developed a trusting relationship with teacher and pupils, encouraged them to participate freely in the research.

#### **3.3.4 Sample of the study**

The sample of the study was derived by considering the objectives of the study and the nature of data for meaningful analysis, it was necessary to select a case study school.

The practical knowledge gained by the researcher through interactions with pupils, parents, teachers and classroom observation provided a framework for the preparation of the instructional programme. Hence the sampling involved all the seven teachers in the school. The sampling of pupils and parents involved was purposively selecting four pupils and their parents from grade III to VII. The sampling of classroom observation consists of observing the classroom interactions involved in spending two periods each on grades I to VII.

However during the implementation of the instructional programme the sampling procedure involved was selecting all the IV standard pupils and dividing them into five groups ( refer Appendix III ). For the purpose of documentary analysis sampling of pupils notebook was undertaken. The pupils note books (ranging two to four books ) were purposively chosen from each of the five groups



### 3.3.5 Data Collection Methods

The main data collecting strategies employed in this study were Participant observation, In-depth interviews and Documentary analysis. This has been summarized in the following table.

**Table 3.1 A summary of fieldwork activities:**

Sl. No.	Area of Inquiry	Data Collection Methods	Sources of Data
1	Preparation of the Instructional Programme (Phase I)	Participant observation In-depth interview Documentary analysis	- School & Classroom - Teachers - Parents - Textbooks - Pupils
2	Implementation of Instructional Programme (phase 2)	Participant observation In-depth interview Documentary Analysis	- Pupils - Teacher (Researcher) - School & Classroom - Pupils note book - Still photographs - Audio Tapes - Field Notes

#### 3.3.5.1 Participant Observation

The data for the present study was collected through participant observation. The participant observation focuses on “--- human interaction and meaning viewed from the insiders view point in every day life situations and settings “(Jorgensen, 1989). In this study the participant observation is done in two phases.

In the first phase, it involved largely observing what was really happening at the school level. As the study progressed, the insights gained from this personal experience contributed towards improving the research design. The observation was quite unstructured and helped to confirm or contradict issues, which arose either in the literature or case study school. The interactions with teachers, pupils and parents helped to arrive at (curricular) decisions on the preparation of instructional programme.

In the second phase it involved implementing the instructional programme with IV standard pupils. As a result the observations were centered on interactions with IV standard pupils. The focus was on observing pupils actions, their way of conducting scientific activities in the classroom and outside the classrooms. In order to conduct the participant observation I took the role of a teacher. This gave me an opportunity and access to reach pupils in terms of “access to the world of everyday life from the stand point of a member or insider” (Jorgensen, 1989)

- *Recording observations*

In order to record the observation Tape recorder, still photography and field notes were used. Taperecorder and still photography were used to record the action/event, when it really occurred. The still photographs were used to capture the event in its totality as it happened. Taperecorder was used occasionally to report on the action of an event as it was happening in front of the observer so that narrative of an event is stored as it happens.

Field notes were used to report on the day-to-day observation after the event has occurred. Although this approach is well suited for the study it had its own problems. At early stages of my fieldwork, I faced some difficulty in writing down all my observation notes. This was because a number of activities took place simultaneously and in a short period of time.

### 3.3.5.2 Interviews

The interviews focussed on what, why, how particular event system or situation is operating. During the first phase of work the semi-structured interviews with pupils, parents and teachers. During the second phase of work the unstructured interviews were involved with IV standard pupils and occasionally teacher interviews were sought. The interviewing procedures with pupils were difficult as Grave & Marsh (1998) state *"The typical sit down research interviews is difficult to conduct with children. The younger children the are, the more difficult it is"*. The interviews with pupils were of more of conversation between teachers and pupils. However the questions were not focused on individual pupils but on the group. So the interviews were done in groups as Grave & Marsh (1998) says *"kids are more relaxed with a friend (in group) than with an adult"*. The casual conversations done after the class with pupils provided an insight into the way in which pupils live and work in rural situations.

- *Recording interviews*

During the first phase interviews were recorded with a note pad. Sometime summary of the interviews was recorded after the event is over. During the second phase Taperecorder were used to record the interview. Later on interviews were translated on the field notes

### 3.3.5.3 Documentary Analysis

In this study documentary analysis consisted of the analysis of IV standard environmental studies textbook and analysis of pupils notebook.

In order to prepare the instructional programmes, it was considered to analyze the environmental studies textbook of IV standard pupils, prescribed by the Govt. of Karnataka. The content analysis was done to identify the topics that would be dealt in detail within the programme (refer Appendix II). The pupil's notebook was analyzed to identify how pupils have reported the particular activity and recorded their observations. In order to analyse the contents of pupils note book a translation procedure was adopted. ( refer appendix VII) This gave me an insight into the way pupils view an activity or set of activities.

### 3.3.6 **Process of Data Collection**

The data for the present study was collected through participant observation, in-depth interviews and documentary analysis from variety of sources (refer Table 3.1). The data was collected during fieldwork in two stages namely,

Stage 1: Preparation of the Instructional Programme

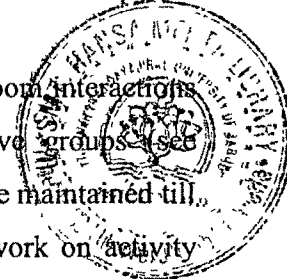
Stage 2: Implementation of the Instructional programme

#### 3.3.6.1 Preparation of the Instructional Programme

The data for this stage was collected during the mid part of the fieldwork during July-August, 1998. The data was collected for a period of 25 days. The purpose of my visit to Srirampura was to get the feel of '*local context*' (Graue & Walsh, 1998). The '*local context*' was experienced, by participating in the day-to-day interactions. The data was collected through participant observations of the school and community, interviews with parent's pupils and teachers. These data were recorded as a field notes. These field notes were read on day-to-day basis. The data generated various possibilities and issues, which needs to be given importance for preparing the instructional programme. Initially I had difficulties in recording the data, as I found too many events taking place simultaneously. But later on I could able to classify data that concerns the present study and the data that may not concern the present study.

#### 3.3.6.2 Implementation of the Instructional Programme

The Instructional programme was implemented with IV standard pupils for a period of five months from July 1999 to Nov 1999. The data was collected from the



interaction of the pupils and teachers. In order to facilitate the classroom interactions of teachers and pupils, the pupils were divided into co-operative groups (see Appendix III). The groups of pupils thus divided in the beginning were maintained till the end of the data collection. The intact groups were allowed to work on activity cycle. The researcher, who has taken the role of teacher observed the groups while performing activity, maintained a field notes to record the events in the class- room. The tape recorder was used to record the interactions between teacher and pupils. The still photographs were used to capture the events as and when it takes place. These observations provided me an insight as to how each group has conducted a particular activity among themselves and in relation to each other.

The observations usually varied about 60 to 90 minutes in a given day.

I had difficulties in giving equal attention to all the five groups. While paying attention to one group the other group might not have got the attention. This was made up partially by talking to kids after the activity and pupil's records gave me an insight into the way pupils had conducted an activity. I had difficulties in recording the intra-personal interactions within the group. However, the teacher-pupils interactions within a group have been recorded as interviews. These interviews with pupils centered on the activity, their difficulties in conducting the activity instructional sheets (see appendix I-B.3). The interviews usually lasted for a period of five minutes on a given activity. Pupils were provided with notebooks to record their observations on the particular activity. Pupils were given freedom to record the way they wanted to write the explanations and diagrammatic representation of the activities.

### **3.3.7 Data Analysis**

The data analysis was done during fieldwork and post field work. The data interpretation involves constructing the meaning on acquisition of process skills by IV standard pupils through an instructional programme in Environmental studies. The data analysis describes the units of analysis, procedure adopted for data analysis and the techniques adopted for establishing validity of qualitative data.

#### **3.3.7.1 Units of Data Analysis**

The data was collected from variety of sources (Table 4.1) on pupils working in groups. In order to assess the learning from these sources, it became apparent that individual is not the most useful unit of analysis. Thus, for this study the analysis of

social events and products that involve the negotiation between two or more participants with different understanding of the situation became the necessary part of analysis (Vygotsky, Newman, Griffin & Cole cited in Roth & Roy Choudhary, 1993). Thus, the new and more powerful skills and concepts can be observed in social interaction long before individuals exhibit them. The evidence presented is much more typical of all the pupils than the individual pupils. However products of individual pupils were used due to special circumstances to strengthen the evidence.

### 3.3.7.2 Procedure of Data Analysis

The data analysis was done in two stages

Stage 1: Preparation of the Instructional Programme

Stage 2: Implementation of the Instructional programme

The procedure of data analysis with respect to these stages have been described in detail.

#### Stage 1: Preparation of the Instructional Programme

The data from the participant observation, Documentary analysis and in depth interviews were used to prepare field notes. The data analysis consists of reading and re-reading the field notes. The emergent patterns were listed in terms of interactions with pupils, teachers, parents and classroom. The patterns were triangulated to construct the meaning on the preparation of Instructional programme.

The procedure of data analysis and interpretation has been presented below

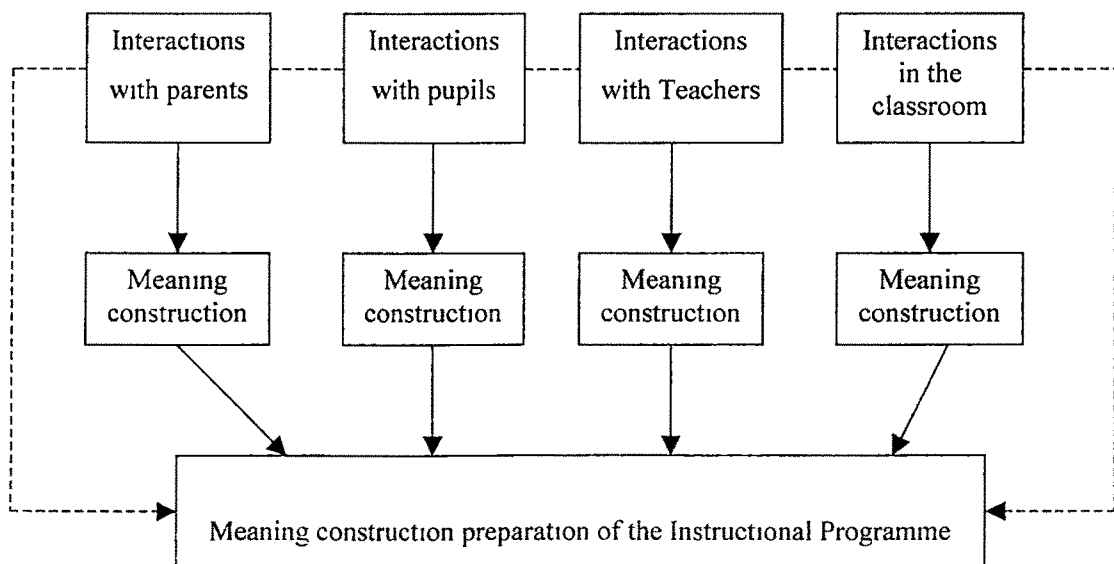


Fig. 3.2 Procedure of Data Analysis and Interpretation (for objective one)

### Stage 2: Implementation of the Instructional programme

The data analysis consists of transcribing the recorded interviews. This was one of the most time consuming and frustrating activities during the post-field work. Each interview was clearly dated and labeled. Then I read the un-edited versions carefully, correcting the minor grammatical errors and deleting the redundant information. The edited version of the tapes was listened again to identify the missing linkage. The transcribed tapes, field notes along with pupils notebooks were triangulated to view the occurrence of recurring patterns. These patterns were identified and analysed with respect to objectives three and four (refer section 1.10) as follows.

#### To identify the process skills employed by the pupils

In order to identify the process skills employed by the pupils during the instructional programme, the Pupil's ideas were grouped according to the pupil's activities. The recurring patterns in these activities were coded and observed for all the groups. The meaning that evolved for particular activity was constructed. The meaning of all the activities within a topic was compared with process skills indicators (see appendix I.B.1.b) to identify the process skills employed by the pupils. The procedure of data analysis and interpretation has been presented in fig 3.3

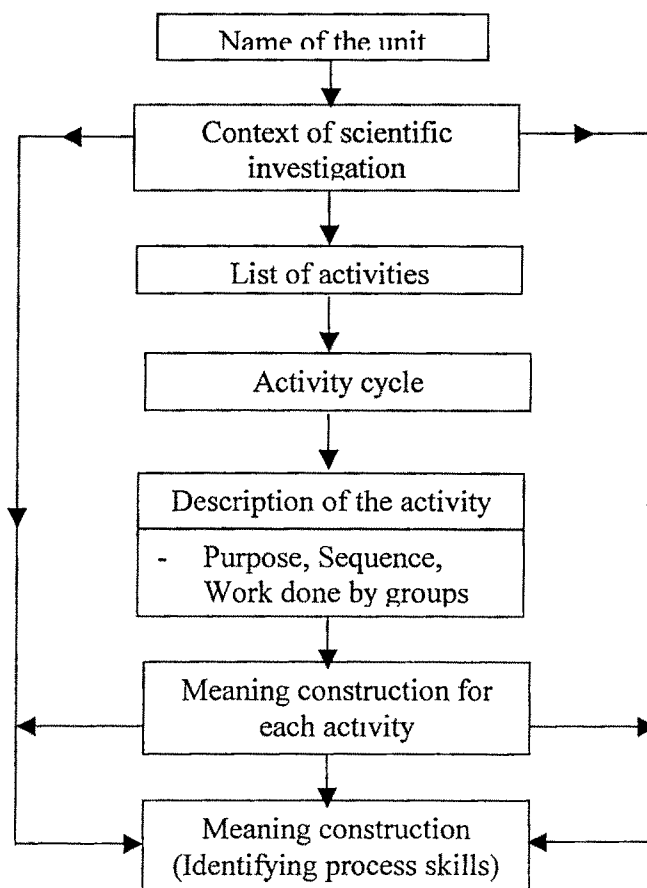


Fig.3.3 The procedure of data analysis and interpretation for objective three

During the analysis the activities done by different groups have been described with certain terminologies and coding categories. They are described below

- **Terminologies**

The term Activity sequence refers to the order in which the groups have conducted the particular activity in the activity cycle

The term Activity cycle refers the format through which all the groups undertake a series of activities that are regularly repeated in a particular order.

- **Coding categories**

The pupils conducted the activities in five different groups. The description of these groups can be seen in appendix III. During analysis, each group has been represented with a particular code. This has been presented in the table

**Table 3.2 Coding Categories**

Sl.No	Groups	Codes
1.	Group One	G1
2	Group Two	G2
3	Group Three	G3
4	Group Four	G4
5	Group Five	G5

Hence forth, each group will be referred with respect to these coding categories only.

Apart from the codes for each group the interactions between teacher and pupils within a group have been represented as follows

**T** is used to denote teacher

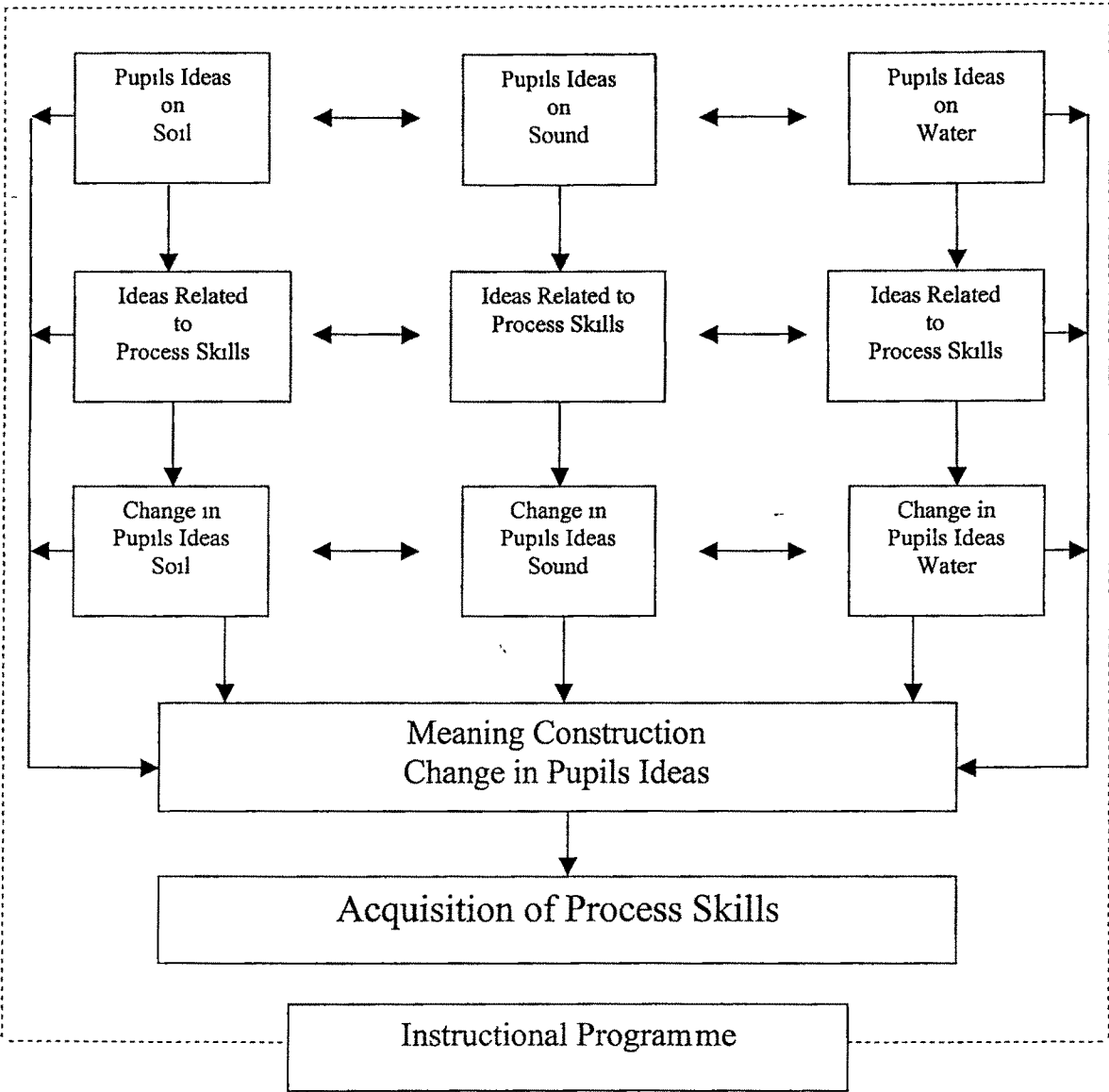
**P** is used to denote pupil

Further P1, P2, P3 are used to differentiate pupils belonging to the same group and involved in the conversation with the teacher

### **To Study the Acquisition of Process Skills**

In order to study the acquisition of process skill through the instructional programme consisted of following this procedure. The process skills employed by the pupils indicated the ideas related to process skills. This was further categorized for each

activity to identify the change in pupils’ ideas. The change in pupils ideas obtained for each activity was triangulated to construct meaning on the acquisition of process skills through instructional programme. The procedure adopted for data analysis and interpretation has been presented in Fig. 3.4



**Fig. 3.4 Procedure of Data Analysis and Interpretation (for Objective Four)**

**3.3.7.3 Establishing validity of Qualitative Data**

In the present study Triangulation was used as a validity procedure, where researchers search for convergence among multiple and different sources of information to form themes or categories in a study (Creswell & Miller, 1990) In the triangulation procedure, researcher provides corroborating evidence collected through multiple



methods such as observation, interviews and documents to locate major or minor themes.

### **3.3.8 Challenges of Case study research**

The case study as a methodology offers numerous challenges to the researcher during the fieldwork. In the initial stages I had difficulties in managing the dual role of a teacher and researcher. The difficulties were in recording data as too many events were taking place. After some time I could able to adjust, observe and record the pupil's activities.

Another difficulty, I faced was while using the tape recorder I found it was distracting pupils attention and work. Pupils were eager to talk and were making demands to listen their voice in the Tape recorder. As the time progressed, holding tape recorder and taking classes became a regular feature. I found that pupils got used to the recorder. The initial euphoria on distraction was not there during the middle and fag end of the fieldwork. During interviews, I could not record as I anticipated, since all the five groups were demanding my attention to their activities. When, I could not give due attention pupils used to draw my attention by disrupting the activities of other groups. This tendency of the pupils used to annoy me. My instinctive reaction was to yell at the pupils to keep quite. During such encounters the interviews process was affected and data was not recorded to my satisfaction.

A 35mm Kodak camera was used to take still photographs .The process of taking photographs used to distract the pupil's work. So I found that pupils were getting distracted whenever it was used in the classroom though I used it very sparingly and for limited purpose only.

Pupils used to have inter-personal problems, fights between pupils on sharing materials, like pencils, note books, eraser, used to result in big fight. I found it was difficult to predict the occurrences of fights among pupils. The process of negotiations and arriving at a compromise between groups used to disrupt my observations and interviews of the pupils. However, I got an opportunity to explore and experience the pupils learning from the position of a teacher.