CHAPTER – VII

SUMMARY AND CONCLUSION

7.1   Introduction

The environmental approaches to primary education arose out of a curricular concern to defend and improve the environment for present and future generations. The various policy initiatives [Educational Commission 1964-66, Tiblisi Declaration, N.P.E. 1986, UNCED, National Curricular Framework (2000)] have shown that:

- Environmental education as a distinct curricular area emerges in seventies due to international efforts.

- Environment in its holistic nature is composed of natural and human resources

- Environmental education is inter-disciplinary in its approach

- Environmental education's concern on examining major issues from the local, national and international point of view.

- Environmental education helps learners to discover the symptoms and real causes of environmental problems, through application of scientific procedures.

The emphasis is on learners to relate and understand the environment requires a systematic study of the surrounding environment. The study of their own environment emphasis on an approach to learning how to learn, a training in the methods of self-learning. While a certain quantum of scientific facts and concepts must be learnt at primary level, it is more important for the learners to assimilate the methods of scientific inquiry using process skills. In environmental studies these skills are taught to the children through the help of the objects and features of child's own surrounding environment.

Thus the environmental studies concerns on

➢ process of learning or way of learning through organized inquiry, using process skills.

➢ approach through activities by using child's physical and social environment

➢ progressive development of skills and attitudes

In order to reflect these concerns, it is desirable to view school curriculum based on process approach to environmental studies.

The process view is one that holds the development of (process) mental skills and attitudes to be pre-eminent. The skills concerned usually include observing, problem solving, inferring, predicting, hypothesizing, classifying, communicating, interpreting data, controlling variables and the combinations of skills required for planning and carrying out investigations and experiments. (Harlen, 1985). It is assumed that when process skills are used to gather and test information, interpreting what is found, from the environment, the patterns and generalization emerge to add to the children's conceptual knowledge (Harlen, 1993).

Thus learning in which the learner collects the evidence and does learning, making the ideas his or her own using the process skills constitutes a process approach to school curriculum.

7.2   Process Skills

However, in the present study process skills have been viewed as cognitive process involved in learning of content since emphasis on environmental studies is on helping the pupils on 'how' to learn from the environment. Thus process skills consist of following skills (Harlen, 1993).

Observing, Question-raising Designing and Making, Predicting, Hypothesising, Communicating Effectively, Devising and Planning investigations measuring and Calculating Finding patterns and Relationships, Manipulating Materials and Equipment effectively.

7.3   Process Skills and Concept Development

Environmental studies is a human enterprise through which we come to some understanding of the biological, social and physical aspects of the world around. Their understanding involves the development of ideas or concepts, which enable related situations, objects or events to be linked together, so that past experience enables us to make sense of new experiences. The development of ideas or concepts depends upon the way ideas or concepts, which can be imparted through rigorous scientific manner with regards to available evidences Therefore, conceptual learning is viewed as modification or expansion of existing ideas rather than the creation of new ideas (Harlen, 1993).

7.4   Process Skill Development – An Instructional Frame Work

When process skill development is viewed from the perspective of conceptual learning model (Harlen, 1993). Then learning is seen as modification or expansion of pupil's ideas. These ideas result, when pupils, teachers interact with learning experiences. This learning involves the process such as planning, implementation and evaluation of learning experiences. These processes are initiated by the teachers to enhance the tools of thinking and is a cooperative process of engaging in mutual activities (Vygotsky, 1986).

It is in this context, instruction as a process emerges, since the primary purpose of instruction is to cause learning. Thus instruction is an intentional, interpersonal process (Anderson & Burns, 1989) meant for planning, implementing and evaluating the learning experiences. In other words instruction is a plan of action, implemented to modify or expand the pupils initial ideas.

It is in this regard, the emergence of constructivist approaches and holistic model of process skills development provides an instructional framework for process skill development. In this regard the instruction framework for the present study is derived from the constructivist model of curricular development (Driver, 1988).

This model instruction is seen as a continuous process involving the aspects such as planning, implementation and evaluation. These aspects are interrelated and interact with each other and constitute a 'whole'. Instruction guides the planning, implementation and assessment of learning strategies and materials. In turn planning, implementation and assessment procedures shapes the instruction by facilitating the design of learning strategies and materials.

7.5   Rationale of the Study

The various policy initiatives on Environmental studies emphasis on learners to relate and understand their surrounding environment. *"The immediate environment of the learner, both natural and human is used to make learning concrete and meaningful"* (NCERT, 2000) which lends to progressive development of attitude and skills. (NCERT, 1981). The progressive development takes place through an organised inquiry using process skills, (Sharma, 1994). The research efforts to translate these policies into practice have resulted in development of Instructional programme for teachers and pupils (Lobo, 1990 and Sharma, 1994). The instructional programme

developed to understand the process skills were based on Linear model of process skills.

The Linear model on process skills have been criticized with respect to adherence to scientific method of investigation, which do not find agreement with the philosophies of science (Miller, 1989). The process skills were assumed to be arranged in a linear fashion, which develops in isolation, independent of content and context. Once developed, these skills tends to be transferred to other context area have been criticised by (Harlen, 1986), Roth and Roychoudhury, 1993). The emphasis on single or set of skills during scientific investigations presents a distorted view of science by giving emphasis on few aspects on part and 'whole' aspect of scientific investigation is being marginalized "The whole of being good at science is greater than the sum of being good at parts" (Woolnough, 1989).

In light of the criticism on linear model, an alternative 'holistic' model based on constructivist approaches has been proposed by (Harlen, 1993). This model emphasis's on the process skills as a whole during scientific investigation. The process skills are related to content and context of an activity (Harlen, 1986, Roth and Roychudhury, 1993), where pupils refine their existing ideas to develop new ideas during learning encounters in co-operative groups (Harlan, 1993, Howe, 1996).

The emergence of holistic model makes it imperative to refine and question the utility of Instructional Programmes based on linear model of process skills. Therefore, there is a need to develop Instructional programmes based on holistic model of process skill development.

However many research attempts were made in India and Abroad to understand and develop process skills of secondary and higher secondary students [German (1994), Ahmed (1981), Bhatt (1983), Roth and Roychoudhury (1993)] but due attention has not been given to develop process skills among students at primary education.

The empirical evidence available on process skill development is very limited, for comprehensive understanding of the various policies, which stress on development of process skills and attitude among primary children.

However, the work done by Sharma (1994) has indicated the usage of Instructional Programmes in environmental studies for development of process skills among students of grade there. The Instructional Programme was limited to urban English medium schools. Therefore, there is a need of empirical studies to understand

the process skill development through Instructional programme meant for rural students who use 'local language' or 'mother tongue' to understand and relate environment. Thus the need of relating the Instructional programme for relating content, curriculum methods and materials associated with it, are directly related to learner's experience and environment (Taylor, 1997) was felt.

An empirical study by Mcnay & Melville (1993), focusing on process skill development across various grades has indicated a spurt in the development and usage of skill of predicting happening at grade four. Which needs further empirical verification. So considering the need of

o process skills development through Instructional programme based on holist model of process skills and constructivist approaches to learning.

o lack of empirical evidence on process skill development in environmental studies, with respect to rural primary children.

o understanding children in grade four during the process skill development

the present study was conducted.

7.6   Statement of the Problem

"Acquisition of process skills by IV standard pupils through an Instructional Programme in Environmental Studies".

7.7   Objectives

1) To prepare an Instructional Programme in Environmental Studies for IV Standard pupils.

2) To implement the prepared instructional programme in environmental studies for IV Standard pupils.

3) To identify the process skills employed by pupils during the Instructional Programme.

4) To study the acquisition of process skills employed by the pupils during the Instructional Programme..

7.8   Explanation of the Terms

Acquisition: The term refers to development of Process Skills viewed in terms of change in pupils' ideas during the 'context' of scientific investigation.(Harlen,1993)

Pupils' ideas· The term refers to opinions, beliefs and knowledge of pupils (with respect to content aspect of environmental studies) represented in written or oral communication during the 'context' of scientific investigation.

'Context' of scientific investigation : The term refers to the teaching-learning environment created through an instructional programme

Instructional Programme: The term refers to a plan of action, executed by the teacher within an instructional situation for a definite purpose.

7.9 Scope of the Present study

The scope of the present study is limited to IV standard pupils studying in Government Higher Primary School, Srirampura, Mysore Taluk of Karnataka State.

7.10 Methodological orientation

The focus of the present study is on acquisition of process skills by IV standard pupils. The acquisition of process skills is realized through pupils' ideas within the 'context' of scientific investigation. Thus the change in pupils' ideas through their actions and interactions over a period of time is the concern of the researcher. This concern was expressed in terms 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?

These research questions were addressed in the form qualitative case study, and in specific overlaps with the educational case study (Stenhouse, 1990). The researcher took the position a teacher, to participate actively in the interactions of pupils.

7.10.1 Selecting a 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 for 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.

7.10.2 Data collection methods

The main data collecting strategies employed in this study were Participant observation, In-depth interviews and Documentary analysis.

7.10.2.1 Participant Observation

The participant observation became an essential strategy to collect the data. 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 as (Jorgensen, 1989) says "access to the world of everyday life from the stand point of a member or insider"

➤ *Recording observations*

In order to record the observation Tape recorder, still photography and field notes were used. Tape recorder 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. Tape recorder 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 it's 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.

7.10.2.2 Interviews

The interviews focused 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 conservation 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 Tape recorder were used to record the interview. Later on interviews were translated on the field notes.

7.10.2.3 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' notebook a translation procedure was adopted. (refer appendix VII) This gave me an insight into the way pupils view an activity or set of activities.

7.11 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

7.11.1 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.

7.11.2 Implementation of 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.

7.12 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.

7.12.1 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, Grifin & 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.

7.12.2 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.

➤ *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.

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 progamme.

<u>Establishing validity of Qualitative Data</u>

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.

7.13 Findings and Discussion

In the present study the findings of the study has been expressed into four assertions. They are as follows,

❖ *Assertion One*

Instructional programme in environmental studies facilitated the teacher in evolving teaching strategies for enhancing teacher-pupils interactions during the acquisition of process skills.

❖ *Assertion Two*

During the context of scientific investigation pupils expressed autonomy in learning through interactions with teachers and with fellow peers.

❖ *Assertion three*

Pupils proposed hypothesis based on certain concepts to explain the occurrence of events during the context of scientific investigation.

❖ *Assertion four*

Pupils showed willingness to change ideas in the light of evidence.

The assertions have been discussed below

Discussion on findings

The intent of this thesis is to understand the Acquisition of process skills by IV standard pupils in the context of scientific investigation created through an instructional programme in environmental studies. The Acquisition of process skills is viewed in-terms of change in pupil's ideas through modification or expansion of existing ideas. (Harlen, 1993).The finding of the study suggests that, change in pupils'

ideas does not happen in isolation but in relation to instruction. Where a teacher deliberately makes an intentional attempt, to change pupils' ideas. In this regard teaching is not a static but *"'an inquiry in action'– reflection into on going process of current practice"* (Macniff,1993).

It .is in this regard, instructional programme facilitated the teacher to modify teaching strategies. The very attitude of teacher to change the existing teaching strategies created a change in pupil's ideas during the 'context' of scientific investigation. This can be seen in terms of pupil's tendency to be autonomous, attempting to propose hypothesis and willingness. to .change their ideas during the 'context' of scientific investigation. In the present study these change in ideas constitutes the progressive development of process skills Hurlock (1997) views *"Development as qualitative and quantitative change. ---- A progressive series of orderly –coherent changes. Progressive signifies that changes are directional that they lead forward, rather than backward. Orderly- Coherent suggests that there is a definite relationship between changes taking place and those that preceded or will follow them. "* It is from this perspective changes in pupils ideas have been discussed.

Pupils tendency of becoming autonomous (independent) in their group work needs to be viewed in relation to interactions between pupils and teacher In the initial stages pupils were seeking teacher approval for their choice of observation. As the teacher changed the teaching strategy pupils in various groups started showing a tendency of being independent in their learning situations. Pupils were seemed to argue with teacher. In one particular case a pupil showed courage to conduct an activity all alone, as he did not agree with the way the other peers had done the work. This can be seen in terms of teacher's very attitude of changing or modifying teaching strategies. In the initial stages teacher was guiding the pupils' observation but later on teacher allowed the pupils to interact freely with materials and with fellow peers. They're by accepting pupils ideas and encouraging them to work on ideas in a co-operative learning situations. As Johnson and Johnson (1999) says " *The purpose of co-operative learning groups is to make each member a stronger individual. So that, they can subsequently perform higher as individuals* " This autonomy is essential for pupils to work in groups along with teacher to bring conceptual change. This conceptual change was visualized when pupils showed a tendency of proposing hypothesis based on their day-to-day experiences and gradually shifted to hypothesis based on concepts taught in school.

This progressive change in pupils' ideas is an indicative of pupils attempt to relate experience gained from everyday experiences to experiences gained in the school. As Vygotsky (cited in Howe, 1996) refers as conceptual change. *"which is a an on going process in which the child in collaboration with a teacher or other student integrates every day concepts* (learnt in day to day experiences) *in to a system of related concepts which are taught in the school."* The very tendency of conceptual change was evident when pupils showed a progressive change and willingness to modify or change their ideas in the light of experiences (Harlen,1993) provided through instructional programme. This Instructional provided opportunities for pupils to interact with activities related to soil, sound and water.

The pupil's ideas in the activity soil, sound and water have undergone change. The change of pupil's ideas can be seen in terms of ideas getting modified or rejected in the process of conceptual learning. The teacher initiatives in providing the learning experiences *focus on social interactions between teacher and pupils, where intervention by more expert adult (Teacher) positively helpful in moving child to think ---- through ideas a starting point with a view of helping them to expand their knowledge and learn to use ---- (Howe, 1993)* in variety of situations

The change in ideas strengthens the case of conceptual learning. (Harlen,1993). Where process skills employed by the pupils changes over a period of time. This change can be seen in terms of pupils ability to express autonomy, proposes hypothesis and willingness to change their ideas in the light of evidence. These findings of the study seem to strengthen the relationship between *school instruction and conceptual development* (Vygotsky cited in Howe, 1993). *When concepts tend to develop, process skills also tends to develop. Since concept development and process skills development are interrelated* (Harelen,1993). From this perspective the instructional programme prepared and implemented during the study was helpful in teacher to *make pupils ideas explicit and provided opportunities for clarifications and exchange of ideas* (Driver, 1989).

7.14 Conclusion

The finding of the study has indicated that process skill develop as a whole but not in isolation thereby reinforcing Vygotskian perspective on relationship between instruction and change in pupils' ideas. During the Instructional Programme the teacher made a conscious attempt to reflect on teaching strategies and thereby

modifying teaching strategies to bring a change in pupils ideas. In this regard instructional programmes based on constructivist approaches seems to be relevant in helping the teacher to change there by creating change in pupils ideas. Thereby, both teacher and pupils undergo a change in the process of instruction. The finding of the study may be seen in terms of need of Preparing Instructional programmes for teachers based on constructivist approaches to curriculum development. Such programmes are essential for teachers to create a change in classroom instruction by assessing pupils ideas and reflecting on their teaching experience. Thus, teacher evolves better teaching strategies and in the process brings a change in pupils' concepts or process skills.

7.15 Suggestion for further Research

When process skills act as a whole pupils tend to change their prior ideas in the context of scientific investigation created by the instructional programme in Environmental studies.

However the scope for further research can be seen in terms of understanding

- Pupil's ideas that could be changed are resistant to change during instructional situations needs to be verified.

- Patterns or trends in the acquisition of process skills need to be looked through longitudinal research across various grades and different content areas.