

CHAPTER – I

THEORETICAL AND CONCEPTUAL ORIENTATION

1.1 Environmental Approaches to Primary Education – The Policy Initiatives

The environmental approaches to primary education arose out of a curricular concern to defend and improve the environment for present and future generations. The need to improve environment arose out of threats to human life faced by the rapid industrialization, depletion of natural resources, increase in pollution of water, air and land, global warming etc. This threat to human beings necessitated into conserve the natural resources for optimum growth and development for present and future generations. It is in this regard education was thought as a means to inculcate and nurture the attitudes, values, knowledge, skills and participation in about environment to the children. The Education Commission (1964-66) stressed the need of environmental education and attempted on a policy to integrate in the school curriculum. The Commission conceptualised environmental education in terms of child environment.

“In the lower primary classes, the focus should be on the child’s environment – social, physical and biological. In classes II and I the accent should be on cleanliness, formation of healthy habits and development of the power of observation. These should be emphasized again in classes III and IV, but the study should include personal hygiene and sanitation”. The recommendation of the Commission was incorporated in the National Policy on Education 1968. Which emphasised on the need of textbooks in regional languages. Accordingly, necessary changes in the curriculum at elementary stage were brought about.

At International level the emergence of environmental education as a distinct entity took place during the seventies. Various educationists and curricular planners all over the world were concerned at viewing environment in isolation, without having any link with other disciplines. It was realised that

- environment does not comprise physical or natural resources only. Environment in its holistic nature is composed of natural as well as human resources,

- the problems and issues of the world community are related to interactions with nature and human beings. This requires Global approach, and international cooperation in the area of environmental education,
- child's environment constitutes the study of immediate local environment in which child is residing and it leads him/her in understanding the relationship of local environment with global environment.

This realisation led many Governments to revoke their national policies. However to support the various national policies the need of international effort and cooperation resulted in which a conference on Human Environment United Nations organizing (Stockholm, June 1972). The Conference recommended the creation of United Nations Environment Programme (UNEP) and a framework for cooperative effort in International Environmental Education and the concept of Environmental Education had its inception.

With the background of Indian Education Commission (1964-66) and United Nations Conference on Human Environment, a curriculum for the ten-year schooling framework 1975 was prepared by NCERT. The framework envisages that *"In the primary classes, the sciences should be taught as environmental studies in classes I and II as a composite course, including both natural and social environments and later on as two subjects Environmental Studies. The purpose should --- sharpen their senses and to observe their environment and to enrich experiences"*.

In 1975, an International survey on needs and priorities of environmental education was taken up. The finding of the survey (cited in Manuel, 1999) indicated that the programmes on environmental education lacked inter-disciplinary approach, were not based on real life problems and were isolated from the surrounding community. The survey indicated a lack of substantive structure of environmental education.

In order to promote and develop environmental education at regional, national and international level UNESCO and UNEP organized an international conference called Tbilisi Inter-Governmental Conference on Environmental Education was held in Russia. A document the '*Tbilisi declaration*' resulted from this conference. The conference recommended the adoption of certain strategies and criteria, which would help to guide efforts to develop environmental education at all levels. The guiding principle of '*Tbilisi declaration*' has been given under:

The environmental education should

- consider the environment in its totality – natural and built, technological and social (economic, political, technological, cultural, historical, moral and aesthetic),
- be a continuous, lifelong process, beginning at the pre-school level and continuing through all formal and non-formal stages,
- be interdisciplinary in its approach, drawing on the specific content of each discipline in making possible a holistic and balanced perspective,
- examine major environmental issues from the local, national and international points of view,
- enable learners to have a role in planning their learning experiences and provide an opportunity for making decisions and accepting their consequences,
- help learners discover the symptoms and real causes of environmental problems,
- focus on current and potential environmental situations while taking into account the historical perspectives,
- promote the value and necessity of local, national and international cooperation in the prevention and solution of environmental problems,
- explicitly consider environmental aspects in plans for development and growth,
- relate environmental sensitivity, knowledge, problem solving skills and values to the learner's own community in early years,
- emphasise the complexity of environmental problems and thus the need to develop critical thinking and problem solving skills,
- utilise diverse learning environments and a broad array of educational approaches to teaching/learning about and from the environment with due stress on practical activities and first hand experience.

Against this background and subsequent developments, the national policy on education 1986 further reinforced the concerns of 'Tbilisi declaration'. *"There is a paramount need to create a consciousness of the environment It must permeate all ages and all sections of the society, beginning with the child environment consciousness should inform teaching in schools....."* The policy gave directions in formulating the National Curriculum for Elementary and Secondary Education: A Framework (NCERT, 1989). The policy stressed that *"learning should take place in relation to physical and natural environment implying there by systematic observation and exploration of environment using scientific procedures"* The emphasis on scientific and behavioural aspects in learning resulted in the emergence of MLL

(Minimum Levels of Learning) in 1991. This resulted in preparation of competency based textbooks in all subject areas including environmental studies.

The ten major competencies aimed at the cognitive, affective and psychomotor domains of development together with the content elements associated with environmental studies are enumerated below:

The pupil

- acquires awareness about one's well being in the context of social and natural environment.
- explores important aspect of one's socio-civic environment and comprehends their working.
- knows about various people at work and appreciates the importance about the 'world of work'.
- understands and interprets the spatial and interactive relationship between man and his environment.
- being to see the relationship between man's past and present, and to hold the past in its proper perspective.
- sense common but simple and easily observable socio-economics situations and problems analyses them and seeks possible solutions at his level of experiences.
- understands the factors contributing to the preservation of good health.
- developing skill in gathering and classifying information about living things from one's environment, and drawing simple inferences.
- observes and examines some common characteristics of non-living things.
- observes simple phenomena on the earth and in the sky and draws inferences.

In 1992, United Nations Conference on Environmental Development (UNCED) was held on the background of 'Tbilisi declaration' (cited in NCERT, 1995) The 'Tbilisi declaration', which emphasised on objectives of environmental education in terms of awareness, knowledge, skills, attitudes and participation. The conference attempted to modify Tbilisi declaration and added the term sustainable development to the objectives of environmental education. Thus the conference suggested that *"Education, including formal education, public awareness and training should be recognized as a process by which human beings and societies can reach their fullest potential. Education is critical for sustainable development and improving the capacity of the people to address environment and developmental issues While basic education provides the underpinning for any environment and*

development of education, the later needs to be incorporated as an essential part of learning. Both formal and non-formal education is indispensable to changing people's attitudes, so that they have the capacity to assess and address their sustainable development concerns." Thus, the suggestions of UNDEP on sustainable development were reflected in the National Curricular Framework for School Education (NCERT, 2000). The framework considered the explosion of knowledge in various fields and changes in ways and quality of life due to advancement in science and technology. It recommended modifications in the concept and treatment of environmental studies. The framework has perceived environmental studies as an integrated area. *"In classes I and II, the environmental concerns would be taken care through the curricular areas of language, mathematics and art of healthy and productive living, environmental studies will be taught as an independent curricular area in classes III to V"*.

In summary, the various policy initiatives [Educational Commission 1964-66, Tbilisi 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.

1.1.1 Defining Environmental Education

The term environmental education has been used extensively in the literature. The term is broader in its scope and covers all the aspects of human life. A single universally acceptable definition of environmental education has not yet emerged. However few definitions have been listed here.

According to Ridel (cited in NCERT,1980) *"Environmental education is a viable practical theory, which is truly interdisciplinary, blending scholarship and experience in a new education process which recognises value clarifications through self-awareness, knowledge through environmental awareness and synthesis through real life experiences"*

According to Saveland (cited in Manuel, 1986) *“Environmental education is a process of recognising the values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture and his bio-physical surroundings”*

According to National Policy on Education (N.P.E.) 1986, the environmental education consists of learners relating and understanding the interactions between man, natural environment and social environment. Thus considering the definition of Saveland, Ridel N.P.E.1986, the core essence of environmental education can be defined as *a continuous process required for recognising values and clarifying concepts in order to develop skills and attitudes among the learner*. In order to integrate this core-essence in to school curriculum NCERT has conceptualised Environmental Education as Environmental Studies.

1.2 Environmental Studies – Context and Concerns

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”* (Harlen, 1985). 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 in environmental studies the environment is the stimulus to learning and learning is directed to the study of environment using process skills. This has been represented in the figure 1.1

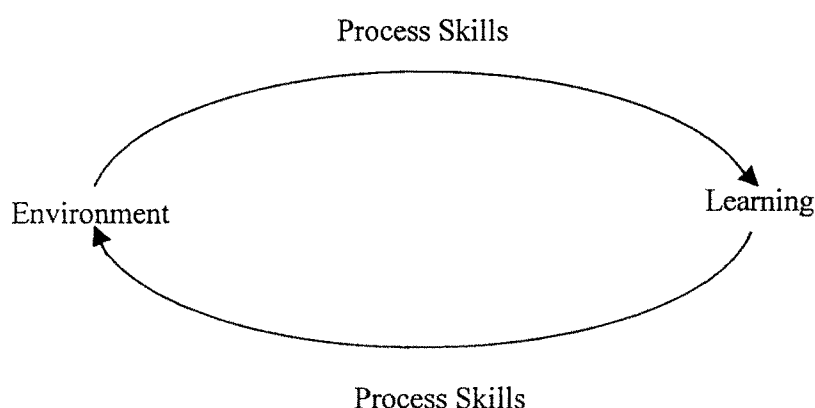


Fig. 1.1 Environment and Learning

Thus immediate environment of the learner, both natural and human is used to make the learning concrete and meaningful (NCERT, 2000).

In this regard an environmental study is not thought of a subject with its own body of factual information but way of learning through organized inquiry. *“It is an approach through activities based on child’s physical and social environments, which leads to progressive development of attitude and skills”* (NCERT, 1981).

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 realise these concerns in practice, it is desirable to view school curriculum based on process approach to environmental studies.

1.3 Process Approach to School Curriculum

The process approach to school curriculum arose out of concerns to make the pupils experience the means through which knowledge is generated. The knowledge generation process emphasise on *“development of children’ to develop the mental skills and attitudes constituting scientific approach in order to be able to investigate their surroundings and solve problems. These abilities, it is argued, enable children to respond to the changing world in which they live, to reason logically and know how to seek and use evidence in all areas of their activity, not just in science (Harlen, 1986)”*.

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 The attitudes concerned usually include curiosity, openness to new ideas, respect for evidence, independence in thinking, and satisfaction in understanding the world around. Learning activities, which aim to develop these processes naturally, have to use some content but this is chosen to serve the practice of the skills rather than to build up a coherent body of knowledge (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 generalisation emerge to add to the children's conceptual knowledge (Harlen, 1993)”. Thus learning in which the learner collects the evidence and learn by making the ideas of his or her own using the process skills constitutes a process approach to school curriculum.

1.4 The Process Skills

The term process skills have been used in the literature on science education with three different meanings by Miller and Driver (cited in Jenkins, 1985). Thus process skills means

- Cognitive process involved in learning of science
- The process scientists' use in investigating the natural world.
- The pedagogical processes taking place in classroom.

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

- | | |
|--------------------------------------|---|
| 1. Observing | 6. Communicating Effectively |
| 2. Question-raising | 7. Designing and Making |
| 3. Hypothesising | 8. Devising and Planning Investigations |
| 4. Predicting | 9. Manipulating Materials and Equipment |
| 5. Finding patterns and Relationship | 10. Measuring and calculating |

❖ Observing

Observation is more than just seeing. It involves various senses (like seeing, hearing, feeling, tasting and smelling) to gather relevant information. It includes identifying differences between similar/different objects or events and recognising the order in which sequenced events take place. Given below, some examples of an event and usage of the skill of observation.

Examples

- 1) Lump of sugar dissolving in warm and cold waters

Observation: Asking children to find difference between similar things

2) Change of shadows during a day

Observation: how things change with sequence.

However, observations should be made for a purpose, just looking for similarities and difference, may not yield any specific result.

❖ Question Raising

It is concerned with asking questions, which can lead to inquiry, or it can be based on hypothesis. It involves children to identify questions, which they can answer by their own investigation and their ability to recognize, that some question cannot be answered through scientific inquiry.

Examples: Does wood float in water? Does earthworm live below the soil?

(Questions that can be answered by scientific inquiry)

Do earth worm smile?

Do earth worm cry?

(Question that cannot be answered by scientific inquiry)

❖ Hypothesis

It is a reasonable 'guess' to explain a particular event or observation. It involves use of concepts or knowledge from previous experience. The hypothesis needs to be consistent with evidence and hypothesis needs to be testable by collecting relevant evidence. Hypothesis can include more than one possible explanation of an event.

Example: Floating. *"A block of wood floats because it is light in weight but a coin sinks because it is heavy"*. This hypothesis can be inconsistent if the block is heavier than coin.

❖ Predicting

It involves use of available evidence or experience to make a prediction than a guess. Since a guess has no rational foundation. It involves using pattern or relationship to make predictions and justifying how a prediction was made in terms of present evidence or past experience.

Example: Predicting the number of bounces from a Tennis ball / Plastic ball / Leather ball.

❖ Finding Patterns and Relationships

It involves putting various pieces of information together (from direct observations or secondary sources). When children relate one piece of evidence with another, it helps in making sense of a great deal of data which otherwise would have been an isolated

pieces of information. It involves finding trends in information, measurements or observations.

Example: The association between the time and position of the shadow is so regular that it can be used to predict the position of the shadow at any particular time. On the other hand, the length of the shadow will first decrease and then increase during the day and so there is not such a relationship of length to time.

❖ **Communicating effectively**

It involves using writing or speech as a medium for sorting out ideas or linking one idea with another, listening to other ideas and responding to them, keeping notes on actions or observations during an activity, ability to report events systematically and clearly, using specific scientific words is necessary to communicate in writing.

Example: The word '*dissolve*' has to be used with reference to salt in water, and not '*disappear*' to cover the range of effects, which may occur.

❖ **Designing and Making**

It involves, the choosing appropriate materials for constructing things, which have to work or serve a purpose for constructing models producing a plan or design, which is a realistic attempt at solving a problem.

Example: Testing properties of certain materials, constructing simple things from paper, glue, cardboard boxes and other scrap materials.

❖ **Devising and Planning Investigation**

Planning an investigation involves turning a question or hypothesis into action designed to provide answer. It involves taking decisions on equipment, materials etc., which are needed, for an investigation and identifying variables to be kept the same for a fair test. The fairness includes consideration of three variables the independent variable, dependent variable and control variable for deciding the order in which steps should be taken for investigation.

Example: Comparison of fabric for waterproof ness, testing the food preference of ants.

❖ **Manipulating Materials and Equipments Effectively**

It involves pupils to handle and manipulate materials with care for safety and efficiency, using tools effectively and safely, showing appropriate respect and care for living things and assembling parts successfully to a plan.

Example: Activities involving wooden boxes, or wooden blocks, egg boxes, plastic cups, glue etc. will come into use in assembling models.

❖ **Measuring and Calculating**

It involves using an appropriate standard or non-standard measure in making comparison or taking readings. Pupils need to take adequate measures while measuring instruments correctly and with reasonable precision. The emphasis is on showing concern for accuracy in checking measurements or calculations, using the numbers as labels, or ways of placing an object in a sequence according to some feature or property such as being longer, shorter, or faster etc. -

Example (Non-standard Measure):

Using bricks in wall for comparing heights nonstandard

Using hand spans to measure a distance measures

The way these process skills operate within a context of scientific investigation and the way they develop among children have been conceptualized in terms of models of process skills.

1.5 Models of Process Skills

In order to understand the process skill development among children two models have been proposed. They are Linear model and Holistic model. The linear Model assumes that process skills tend to develop in a linear sequence. It was the first model, which attempted to explain the process skill development. The various criticisms on this model gave raise to Holistic model. In the Holistic model, the Process skills were assumed to be related to each other and they tend to develop as a 'Whole'. These models have been described in detail in sub sections 1.5.1 and 1.5.2. The sub section 1.5.1 describes the linear model where as the sub section 1.5.2 describes the holistic model.

1.5.1 Linear Model on Process Skills

The Linear model on process skills was advocated through a project '*Science As a Process Approach*' (SAPA) in 1960 by American Association of Advancement in Science. The SAPA (cited in Meyer 1971) advocates Inductive Discovery method and use of scientific method in carrying out investigations, which is similar to that of a scientist. "*The uniqueness of SAPA is that, it is focused and organised around process of science and concepts of science*" (Burules & Linn, 1991). Thus, SAPA advocates.

- Emphasis on process implies a corresponding de-emphasis on specific science 'content'. Which means, process skills are general, transferable and are not related to any specific content.
- What is taught to children should resemble what scientists do.
- The consideration for human intellectual development through the knowledge gained from sensory experiences.

The following is the linear sequence of development of process in science as advocated by SAPA.

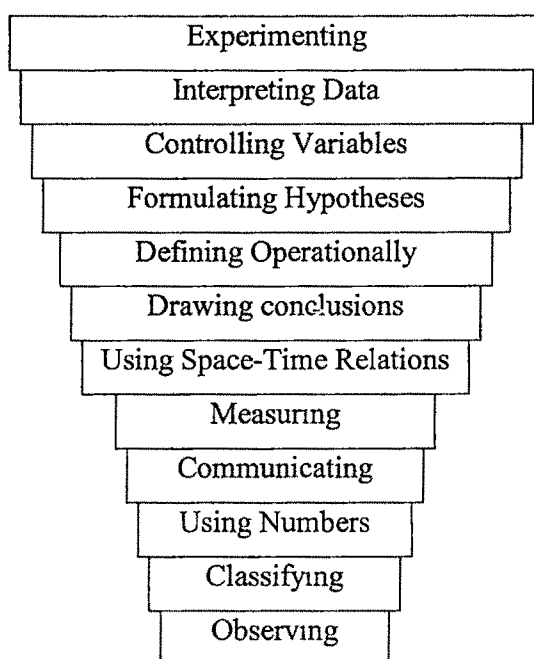


Fig. 1.2 Linear Model on Process Skills (Modified, Bhatt 1983)

The process skills are arranged in a linear fashion. The skill of observation is at bottom of the hierarchy and skill of experimentation is at the top of the hierarchy. So pupils need to muster each skill before proceeding to the next skill. For example – in order to use the skill of using numbers mastering the skill of classifying and skill of observing is essential. *“The ability to use each upper level process depends on the ability to use simpler under laying process. Observation is considered to be as a fundamental or basic skill by virtue of its foundation of the hierarchy of skills and experimenting is considered as the higher order skill by virtue of its position at the top of the hierarchy.”* (Gagne cited in Finely 1983). Thus, this linear model advocated

by SAPA was guided by conception of science by Gagne who stressed on *“scientific process as the foundation for scientific inquiry.”* (Finley, 1983).

The linear model on process skills has guided many curricular projects like SAPA, Nullified curriculum, Warwick process science, science in process, science improvement project of UNESCO (India). However, there are many criticisms on the assumptions of this model. These criticisms have been described below.

Criticism on SAPA: The inductive discover approaches advocated by SAPA have come for several criticisms.

Miller (1989) has criticized the scientific method advocated by SAPA. Miller reviewed the Philosophies of science and arrived on a conclusion that *“among Philosopher there is no general agreement about scientific method”*. Further miller argues, *“SAPAs emphasis on scientist as authority or a reliable knower distorts the spirit of science, which does not emphasis on the authority as a source of knowledge”*. The emphasis on Scientific method in SAPA is based on Inductive view of Science. Which stress on gaining knowledge thorough sensory experiences. It is in this regard, Finley (1983) reviewed the various philosophies in science. According to him the *“Recent Philosophers of science has been critical of the view that scientific inquiry is inductive and knowledge is obtained only through sensory experiences”*. Finely stress, on gaining knowledge through ones own perception may not necessarily depends on our sensory experiences, instead *“our perceptions are in large part determined and selected according to prior knowledge we possess about the nature of objects and events”*.

Criticism on the Hierarchy of Skills

The assumptions on the hierarchy of skills like Basic process skills (observation, communicating etc) can be chained to form higher order process skills (Experimenting etc) have been questioned from the empirical evidences. Some of these evidences are presented below.

Cunningham (cited in Roth and Roychoudury, 1993) came to a conclusion that most of the skills (basic and higher order skills) are unconnected. The science process skills have been shown to be related to one underlying construct (Roth, 1993). The process skills are context bound and are related to content. (Harlen ,1990). Thus, the various criticisms against to process skill development through linear model

question the utility of using Linear model to understand the process skill development among children. It is in this regard an alternative model based on holistic approach to process skill development seems to be relevant.

1.5.2 Holistic Model on Process Skills (Harlen, 1990)

The holistic model on process skills came as a reaction to the linear model of process skills. The holistic model is derived from the development of cognitive science and constructivism. According to it, learning is a result of an interaction between new situations and present knowledge. *“The process of bringing present knowledge to bear on new situations and possibly extending or adapting that knowledge in the light of new experiences involves the learner in an active way in the development of his or her own understandings”*. From this perspective, the dichotomy between content and process in science does not exist. Learning what is considered as ‘content’ in any meaningful way involves the learner in an active process of knowledge construction.

The learning in science is characterised neither by learning ‘content’ nor by learning ‘process’ but by a dynamic interaction where by pupils continually and progressively construct and reconstruct their understanding of the world. (There by differing with the linear model advocated by SAPA which emphasised on understanding the world through sensory experiences gained through the use of ‘processes of science’) Children’s ideas and hypothesis are shaped by existing analogies and models, which are available to them through the culture, both inside and outside school (Brook et al, 1989). From this perspective, learning is contextual, in a meaningful context process skills develop as a ‘whole’ and reach a high level of sophistication (Roth and Roy choudhary, 1993). The notion of viewing process skills as a whole avoids any hierarchy or sequence in the use of process skills Harlen (1990), Woolnough (1989), Roth et.al. (1993).

If we do not view process skills as a whole we end up focussing only few specific skills. They’re by measure only parts and omit the all-important whole (Woolnough, 1989). Thus the need to view process skills as a whole arises. It is in this emerging scenario a holistic model on process skills proposed by Harlen (1990) seems to be relevant.

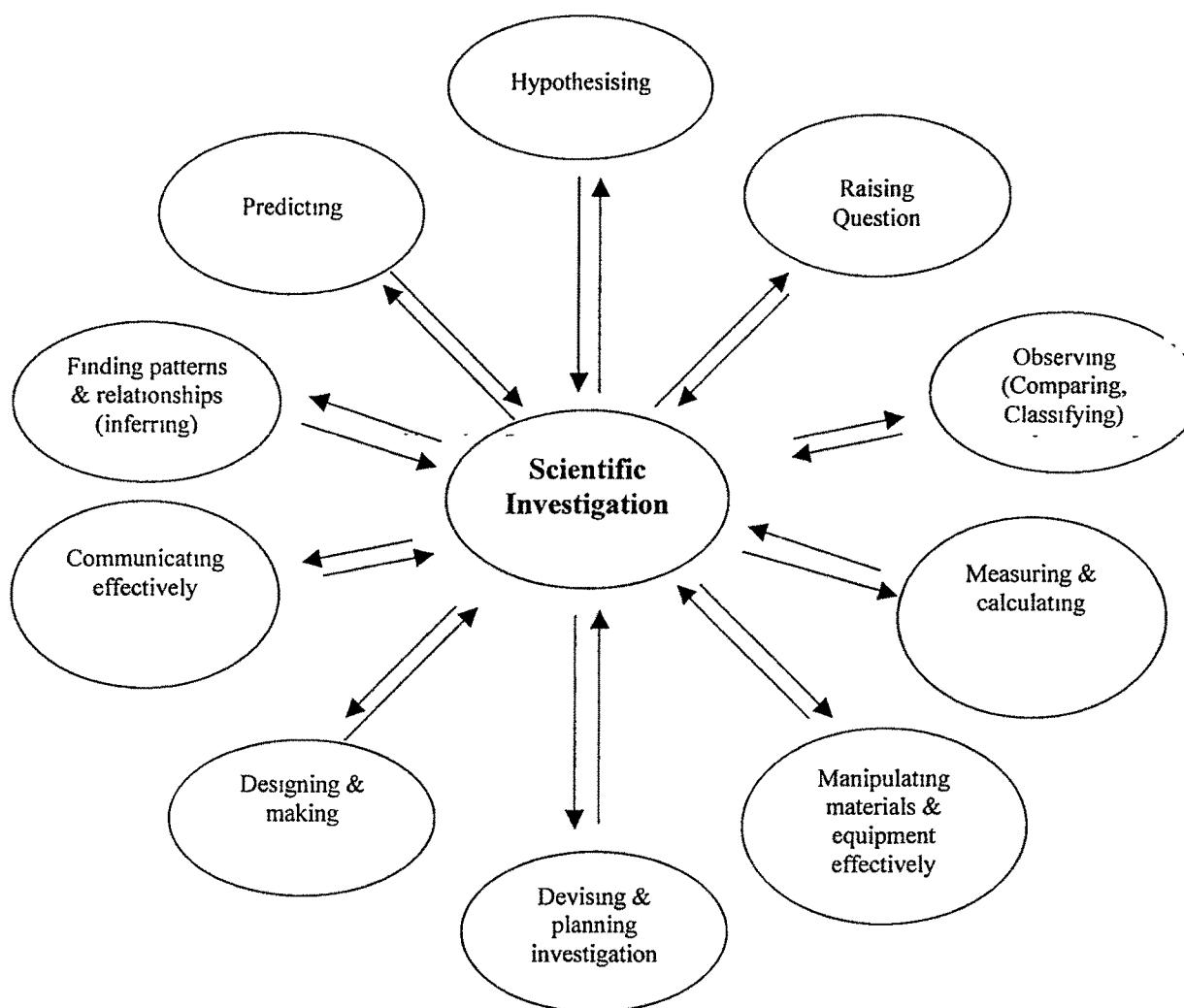


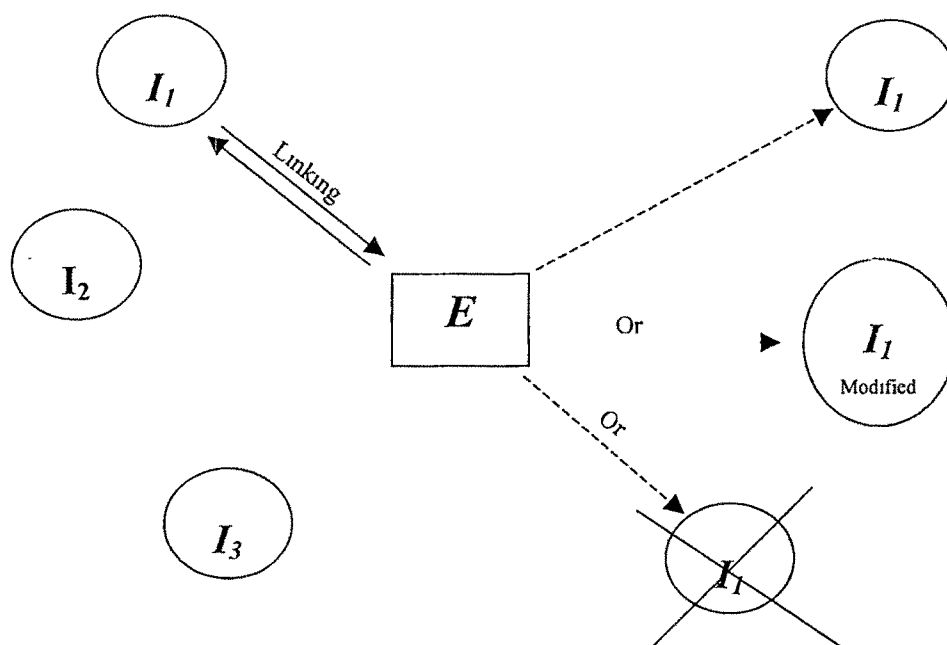
Fig 1.3 Holistic Model on Process Skills

The model avoids any indication of a hierarchy or sequence in the use of process skills. The process skills do not have their identity with respect to their separate or individual use. Instead they act as a whole in scientific investigation for the purpose of concept development.

1.6 The Process Skills and Concept Development

An environmental study is 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 experience. The development of ideas or concepts depends upon the way ideas or concepts are imparted through rigorous scientific manner with regard

to available evidences. Therefore, *conceptual learning is viewed as modification or expansion of existing ideas rather than the creation of new ideas* (Harlen, 1993). This conceptual learning is described below with the help of a diagram.



I_1, I_2, I_3 are the various existing ideas. E is the experience.

Fig.1.4 A Model on Conceptual Learning (Harlen, 1993)

One of the ideas is linked to other possibilities because of some perceived similarities. The idea, which has been tested in seen against evidence to check whether or not it helps in making sense of new experiences. If it does, it will emerge reinforced as a more useful idea having wide range of application. Whether ideas are retained, refined (modified) or rejected depends on result of testing using process skills. This may include raising questions, prediction, planning and carrying out investigations, interpreting and making inferences, etc. The nature of experience and extent of testing ideas using process skills influences the concept development.

The concepts and process skills are interdependent, as concepts gradually become more sophisticated so process skills need to be refined and extended. The development of both must go hand in hand.

The emphasis on modification of pre-conceived ideas or existing ideas among children shares a constructivist view of learning, thus places the learner at the center

of learning process. Wittrock (cited in Driver, 1988) summarizes the constructivist perspectives to learning as follows:

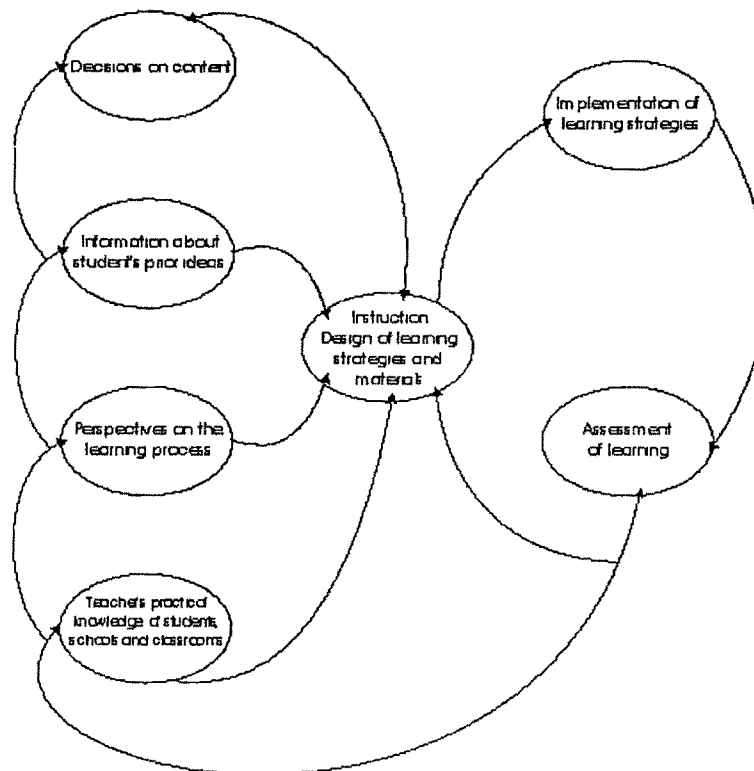
“The key feature in this view of learning is the idea of mental constructions or schemes. Such schemes are used by learners, whether babies or adults to interpret new situations. Furthermore, it is assumed that the learners actively construct these schemes. Learners do not simply absorb what they are told or what they read. From this perspective, learning involves the learner in bringing existing schemes or ways of thinking to bear on a situation in an attempt to understand it. What is learnt thus depends not only on the characteristics of the situations presented (Whether it be text in a book or physical phenomenon), but on the ‘schemes the learner has available. In other words, learning process is an interaction between the mental ‘schemes’ of the learner and features in the learning environment. Moreover, since making sense of any new situations requires the learner to bring his/her schemes to bear on the new situations and assess their applicability, ultimately the learner is responsible for his or her own learning”.

The constructive perspective does not limit itself to knowing the children’s ideas but it involves the process of changing the prior ideas (Finley 1983). It is in this context, instruction acts as facilitator in changing pupils’ ideas. As ideas change so process skills as a whole also change.

1.7 Process Skill Development – An Instructional Framework

When process skill development is viewed from the perspective of conceptual learning model (Harlen, 1993), learning is seen as modification or expansion of pupil’s ideas. These ideas result, when pupils interact with learning experiences. *These processes are initiated by the teachers to enhance the tools of thinking and are a cooperative process of engaging in mutual activities* (Vygotsky cited in Howe, 1996). The co-operative learning perspective views that *“one would not treat children as essentially solitary individuals trying to make meaning ---- instead one would treat them as participants in a joint enterprise in which meaning is derived through interactions with other pupils”* (Howe, 1996). Thus in cooperative learning pupils interact with each other collectively with teachers to accomplish academic goals (Howe, 1996).where pupils exert efforts to achieve, learn more and build complex structures and retain information learn more accurately (Johnson & Johnson, 1999), thereby constructing knowledge in groups (Joyce & Weil, 1992) The other advantage

with the cooperative learning is that it can help in learning of skills as Barbules & Linn (1991) say “*Cooperative learning can create a better learning environment since skills lacked by some students can be compensated by the skills of others*”. There by, children work in groups to modify or expand their process skills. Then the role of a teacher is to provide learning experiences such that pupils get opportunities to interact and develop process skills. 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 with an intention of developing process skill. 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).



**Fig.1.5 Constructivist Model for Curriculum Development
(modified from Driver,1988)**

In 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, (Refer Table 1.1) implementation and assessment procedures shape the instruction by facilitating the design of learning strategies and materials.

Table 1.1 Planning the Instruction

Sl. No.	Planning Components
1.	Decision on Content <ul style="list-style-type: none"> • Policy initiatives of Environmental Studies • Text books/ Resource books on Environmental Studies
2.	Information in student ideas <ul style="list-style-type: none"> • Students prior ideas in a given topic area • Review of literature, & interactions with students
3.	Perspectives on Learning Process <ul style="list-style-type: none"> • Conceptual learning model • Constructivist views
4.	Teacher's practical knowledge <ul style="list-style-type: none"> • About students, classrooms & school • Availability of resources
5.	Implementation of Learning Strategies
6.	Assessment of Pupils Ideas

Thus, the instructional framework for the study was derived from constructivist approaches to curriculum development and principles of group learning. This framework provides the theoretical base on which an Instructional programme was conceptualized in environmental studies. The instructional programme has been presented in the Appendix I. The justification for preparing the instructional programme has been described in the rationale.

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

The Linear model on process skills have been criticised 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 criticized 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 emphasises 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 & Melvielle (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

- process skills development through Instructional programme based on holist model of process skills and constructivist approaches to learning.
- lack of empirical evidence on process skill development in environmental studies, with respect to rural primary children.
- understanding children in grade four during the process skill development the present study was conducted.

1.9 Statement of the Problem

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

1.10 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.

1.11 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.

1.12 Scope of the Present Study

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

1.13 Organisation of the Thesis

The thesis is divided into seven chapters. The chapter one deals with the theoretical & conceptual orientations of the study. It deals with the policy initiatives on environmental studies, process skills and its role in the conceptual development, on rationale and objectives of the present study. The chapter two provides overview of the review of related research work done in the area of process skills and environmental studies. The chapter three explains the methodological choice of the present study. It deals with the reasons for conducting the study through case study methods. The choice of case study school, sample data collection methods and data analysis procedures have been described. The chapter four has focus on the description of the prescribed curriculum followed in the case study school. The analysis and interpretation of the data are presented in chapter five. The data analysis is done in two stages the first stage deals with the Preparation of the Instructional programme and the second stage deals with the Implementation of the instructional programme. The second stage is further sub divided into Identification of process skills employed by the pupils and to identify the changes in pupil's ideas. The chapter six discusses the findings of the study in the form of assertions. The chapter seven presents the summary and conclusion of the study.

1.14 A Note on Style of Writing

Qualitative researchers rely on writing as a means for providing thick description of the data. This description of data creates problems in communicating the meaning derived from the study. Since the researcher reports the events as it happens during the study and also gives the interpretations of the events. Accordingly the style of presenting and describing these events tends to vary in the qualitative study. In the present study such variations in the style of writing can be seen in third, fourth and fifth chapters. The present continuous tense is used to describe the research design (section 3.3 in chapter three) and routine interactions (section 4.4 in chapter four). The present and past tense have been used to describe the preparation and implementation of the instructional programme (section 5.2 & section 5.3 in chapter five).

In section 5.3.1, the data regarding the 'context' of scientific investigation is presented in terms of summary of pupils' activities. Pupils reported these activities in Kannada language. Pupils' usage of certain words, in complete sentences to describe an activity in Kannada has been translated into English language (refer Appendix VII). As a result one may likely to encounter incomplete sentences and words in the translated version.