CHAPTER – 2

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2.0 INTRODUCTION:

In the words of Good (1972), "The Key to the vast store house of published literature may open doors to sources of significant problems and explanatory hypothesis, and provide helpful orientation for definition of the problem, background for selection of procedure and comparative data for interpretation of results. In order to be truly creative and original, one must read extensively and critically as a stimulus to thinking".

Review of literature is an important component of any research work. This helps in building a solid foundation on which any research is based. Whenever, an individual wants to do research, keeping in mind their interest, one starts scanning journals, periodicals, year books, handbooks, and other published literature. This is useful in pin-pointing a research problem. This scanning of literature develops clarity about components, procedures and different steps followed in research. It can be said "Scanning is Reviewing". It avoids the risk of duplication of already undertaken studies. It is helpful in locating the data useful in the interpretation of results. Review helps in refining and developing insight into research problem.

A few studies have been undertaken in the area of concept attainment. Initial work has been conducted in the developed countries and very few studies related to the field have been conducted in India. For the purpose of review and drawing inferences these studies may be grouped into the following –

- Studies conducted abroad.
- Studies conducted in India.

2.1 STUDIES CONDUCTED ABROAD:

These students have been categorized into two broad categories:

2.1.1 Studies in which intervention in the form of instruction was not given.

Osborne and Cosgrove (1983) examined the children's conceptions of the changes of state of water. In this student children's conceptions about familiar phenomena associated with water. e.g. evaporating, condensing, boiling and the melting of ice, were investigated using clinical interview technique. The result of investigation indicate that children do have ideas which are quite different from the views of scientists.

Dolgin and Behaend (1984) studied the children's knowledge about animates and inanimate. 12 children (3,4,5,7 and 9 years old) and 12 adults were asked 20 questions about 2 example of each of 16 categories of animate and inanimate objects. Questions were selected to

prove a wide variety of animate properties. Although the 3- and 4- years old made the greatest number of errors, these errors were not distributed differently than the adult's errors and were not skewed towards animism. Instead, animism was strongest in the 5 years olds. Analysis of the errors indicated that apparent self-movement and physical similarity to animates contributes to animistic bias. Seven and 9 years old subjects answered in a manner demonstrating no animism, indicating an earlier end to the phenomenon than has been previously suggested.

William and Marck (1988) studied understanding and misconceptions of Biology concepts held by the students of small and large high school. Fifty students attending small high schools and fifty students attending large high schools were randomly selected and then evaluated on their understandings and mis-understanding of four biology concepts: diffusion, homeostasis, food production in plants, and classification of animals and plants. Students attending small high schools showed less instances of understanding and more instance of mis-understanding the concepts of diffusion and homeostasis. These differences could be related to a higher percentage of students in large schools capable of formal operations; sound understanding of diffusion and homeostasis required students to use formal operations. No difference was observed between the large and small school samples for the concepts

of food production in plants and classification of plants and animals. Students in the small school sample lived in agricultural communities and their daily experiences allowed them to develop some understanding of food production in plants and prevented instances of mis-understanding from being developed, classification of animals and plants required concrete operations to understand; therefore, students in small schools were capable of developing sound understanding as well as students from large schools.

Broady, Marion and Chipman (1988-89) assessed the level of scientific and natural resources knowledge that the fourth, eight and eleventh grade students related to the main process concerning acidic deposition. A representative sample of public school students (N=75) was interviewed on twelve concepts, principles considered critical for full understanding of the acidic deposition problem pertaining to : (i) geological, (ii) meteorological, (iii) ecological, (iv) political, and (v) economic concepts. Students knowledge was rated for each concept principle on a scale of complete, high partial, low partial and no understanding. Common misconceptions were also noted. Generalized correct concept statements of student's current knowledge were, as well as generalized missing concept was reported.

Westbroak and Marck (1991) examined VI grade, X grade biology students and college zoology students for their understanding about the concept of diffusion. Sample consisted of 300 students (100 from each grade) randomly selected from the three grades. Each students responded to a test packet consisting of a biographical questionnaire, two Piagetian like developmental tasks and a Concept Evaluation Statement (CES). The CES were used to measure the students' understanding of the concept of diffusion. None of 300 students across the three grade level exhibited complete understanding of the concept of diffusion. There was no appreciable difference among the grade levels in sound or partial understanding, misconception or "no understanding". An analysis of the misconceptions exhibited by the college sample showed that many of the misconceptions could be traced to a mis-application of scientific terminology at the earlier grades.

Jaoude (1991) studied the nature of students' understanding about the concept of "Burning". Sample consisted of 20 students of eight grade level. Students were interviewed using the "interview about events" techniques. Findings of this student is that students' understandings about the concept of burning differs from the understanding accepted by the scientific community. This student showed that students understanding about burning did not constitute an explicit theory of burning. There was

no evidence that all the students used their observations to formulate a coherent theory of burning. This study also showed that the students used phrases such as "Chemical Change" and "Physical Change" without any consideration to their scientific significance.

Brody (1991) assessed IV, VII and XI grade students' understanding of natural and social science concepts related to pollution. A representative sample of public school students (N=105) from 11 schools was selected, and students were interviewed on four concept principles considered critical for full understanding of the pollution problem. The concept of pollution included the much publicized issues of solid and toxic waste as well as air, soil and water pollution. Common misconceptions were also studied. This study considered student understanding from a human ecological perspective, which reflects a complex, integrated and multi-disciplinary conception of natural phenomena.

Abraham and Willianson (1994) conducted a cross-age study of understanding of five chemistry concepts. A sample of 100 students from Junior High School Science, High School Chemistry and Introductory College Chemistry were examined for understanding of five chemistry concepts. The concepts studied were : (i) chemical change, (ii) dissolution

of a solid in water, (iii) conservation of atoms, (iv) periodicity and (v) phase change. The amount of experience with the concepts (grade level) and reasoning ability (developmental level) were examined as possible sources of variation in student understanding. Difference in understanding with respect to grade level were found to be significant for the concepts of chemical change, dissolution of a solid, conservation of atoms, and periodicity. However, few of the students in the college chemistry sample exhibited sound understanding of chemical change, periodicity or phase change.

Atwood and Atwood (1996) studied pre-service elementary teacher's conception of what causes the seasons. Forty nine students were sampled in which 48 were females. A total of 39 students provided alternative conception responses on the written procedure; 42 students provided responses to reflect alternative conceptions on the models with verbal explanation procedure. The distance of the earth from the Sun was the most commonly expressed alternative conception on both procedures. Many students were not consistent in providing a particular alternative conception for the two procedures, which indicate that the alternative conceptions expressed many not be firmly held.

Kikas (1998) studied "Pupils' Explanations of Seasonal Changes....", study was conducted on 112 school children, i.e. 32 pupils each from grade 3 (age 9-11), grade 5 (age 11-12) and grade 7 (age 13-14) and 16 pupils from grade 9 (age 15-16). Half of the pupils were boys. The participants were divided into groups of four same sex and same grade pupils i.e., into 28 groups. Guided peer discussions in foursomes were used. The sources of references on which pupils based their explanations were divided into five categories, these were: (i) everyday, (ii) distance theory, (iii) incomplete, (iv) exact rules, and (v) authoritative. The results indicated that younger pupils referred more frequently to everyday perceptible data and older ones more to the material taught in school but using distance theory did not change with age.

1.2.2 Studies in which intervention in the form of instruction was given:

Hynd et. al.(1994) studied the role of instructional variables in conceptual change. The effect of three instructional variables i.e., demonstration, student-to-student discussion, and/or read a refulational text about Newton's Law of Motion, was studied. Three hundred ten students of 9^{th} and 10^{th} grade were randomly assigned within class for the three activities, and pre-testing, instruction and post-test design was followed. Results revealed that reading the refutational text helped students change their intuitive ideas to scientific ones. While seeing a demonstration affected how students interacted with group and text on

same measures. Discussing ideas in a group did not lead to significant learning of scientific concepts, but, rather, students were less influenced by either the demonstration or the text.

Stahly, Krockour and Shepardson (1999) examined the third grade students' ideas about the lunar phases prior to and following an instructional period designed to promote students conceptual change. Four, third-grade students enrolled in an elementary school were selected for the purpose of the study. Qualitative method of interviewing and observation were used to identify students' conception of the lunar phases. The results of this study indicated that students held individual views that were scientifically accurate, however, they also held conception that were scientifically inaccurate. In addition, the results demonstrated that students were capable of making conceptual change. It was also pointed out that students may continue to hold views that are inconsistent with the scientific view even after the interventions.

2.2 STUDIES CONDUCTED IN INDIA:

Pachaury (1986) conducted a study on Teachers' Concept of Density on a sample of 223 pre-service and in-service teachers. Data were collected by means of paper-and-pencil test developed by shymansky. The study revealed that 48% of the M.Sc. and 59% of the B.Sc. pre-service science teachers gave incorrect answer to density task. The situation in the

case of in-service teachers of science, language, non-language and commerce was still worse. Except for in-service science teacher were 47% gave the correct responses, in all the other in-service teachers, less than 40% gave the correct response. The reason for this state of affair, as advanced by the investigator of the paper, is that most of our teaching strategies involve one short telling-recitation transactions heavily backed by the abstractions.

Pachaury (1986) studied about developing concept of speed in school children. Altogether 180 subjects of third to eight grades participated in this study. Each child was individually interviewed and responses were recorded verbatim by experimenter in a data sheet, most of the subjects, advanced a semi-logical reasoning i.e. they failed to isolate and coordinate distance, speed and time relationship. The sample of the study subjects showed a delay of at least three to four years in the development of the concept of speed.

Grewal (1992) studied the children's conception of life. Subjects were asked to classify objects and also into living and non-living in support of their response. The result indicate that children are forced to memorize information through telling, rather than providing them with the opportunities for active learning.

Saxena(1998-99) studied understanding of pollution among VI and VII grade students. The sample consisted of 30 students, 15 students from each grade. The data were collected by using interview technique. Students' responses were analyzed and scored at five different level of understanding i.e. sound understanding, partial understanding, partial understanding with miSunderstanding, complete miSunderstanding and no response. Thirty-seven questions were asked for the purpose. Misconcepts were also noted. It was found that level of understanding of students was low. Knowledge was at general level and not at scientific level.

The present chapter has dealt with the selected studies conducted both abroad and in India. It helped the investigator to conceptualized the present study.