CHAPTER II
Review of related literature

2.1 Introduction:

A literature review is a crucial part of a dissertation or research paper that explores, summarizes, and critically assesses prior academic work related to a particular topic or research question. Its main goal is to present a comprehensive understanding of what has already been researched, identify recurring themes, gaps, or contradictions in the existing literature, and set the groundwork for the researcher's own investigation. By reviewing previous studies, the literature review supports the rationale for the current research and shows how it adds value to the ongoing scholarly discussion. It goes beyond simply summarizing sources by offering a critical evaluation that underscores their relevance, strengths, and weaknesses.

For any specific research to occupy the place in the development of a discipline, the researcher must thoroughly be familiar with both previous theory and research. To assure this familiarity a review of the related literature is done. It allows the researcher to know the amount of work done in the concerned area. It avoids the replication. The review of the related literature provides some insight regarding strong points and limitations of the previous studies. It enables them to improve their own investigation and to arrive at the proper perspective of the study.

The review of related literature is divided into two categories:
1. Studies conducted in India.
2. Studies conducted abroad.

2.2 Studies conducted in India:

Pioneering researches have been conducted in science education to give a synoptic view of the trends. Veerappa (1958), for the very first time, conducted a study to examine the position of science education in India and assessed the developing trends on the basis of observations in the USA, UK, etc. The feasibility of introducing these trends in Indian institutions was also investigated. He found that teaching science through Herbatian plans, the lecture demonstration method, and essay type questions in the examinations were the then trends.

According to Hussain (1968) Science teachers having less than 5 (five) of teaching experience reported difficulty in preparing visual aids. Inadequate finances, lack of laboratory, guide books for planning experiments were the other constraints in science teaching and also mentioned the difficulties in planning lessons as syllabus was not in proper sequence.

Hminga (1985) investigated the difficulties faced by High school students in learning science in the schools of Aizawl town in Mizoram. The difficulties may be related to science content, science textbook, classroom teaching in science subject, science teachers, science laboratory and library, medium of instruction, time allocation and evaluation. The study compared the difficulties of male and female students of government and private schools. The study revealed that the pupils from government schools had more problems as compared to students of private schools regarding the science content, science textbook, classroom

teaching in science subject, science teacher‟s medium of instruction, time allocation, materials, aids and evaluation of their learning science subject. The Government schools as compared to private schools offered better facilities in teaching of science with respect to laboratory, library and equipments.

Javlekar, V.D. (1988) evaluated the effectiveness of exhibits of the Nehru Science Centre, Bombay within the context of scientific concepts to be developed among Class-VIII students. He found that participatory museum displays convey scientific concepts more effectively than other methods, regardless of socio-economic status.

Grewal, Avinash (1988) studied about "Developing validating and testing the efficacy of self-learning process-based material for the development of some integrated processes in science." After observing the different processes used in teaching of science, it was found that the processes of prediction and interpretation were hardly found in teaching. More commonly used processes were inferring and classifying. The relationships between the sub-groups were found to be significant and the correlations between sub-scores and the rest of the processes confirmed the validity of the test constructed.

Malhotra, V.K. (1988) made a study on "A critical study of the existing facilities of science teaching and construction of evaluation instruments for its supervision in different types of secondary schools in Delhi." It was observed that the three types of schools differed significantly in the existing facilities for science-based co-curricular activities, existing human facilities, the supervision of the theory classes, the supervision of the practical classes, the supervision of the science-based co-curricular activities, supervisory practices of the faculty meetings, the related facilities for the supervisory practices, welfare of the students and the public schools scored high uniformly.

Awasthi, V. (1989) made a study on "Developing training strategy for science teaching by using concept Attainment Model." The study indicated that the said training techniques were equally effective in regard to the understanding of the concept attainment model. It was observed that the Intermittent Demonstration, with Quards practice (IDQP) practice group was superior to the Continuous Demonstration with pair Practice (CDP) group as judged by the teaching competency score. The teaching competence scores of the two groups at the school stage were significantly higher than the ones obtained by them at the end of the laboratory phase.

Darchingpui (1989) studied about "A study of science achievement, science attitude and problem-solving ability among secondary school students in Aizwal." The study indicated significant relationships between scores on scientific attitude and achievement in science. It was found that significant sex differences in achievement in science and problem-solving ability existed. High socio-economic status, family facility and type of school attended favoured achievement in sciences, scientific attitudes and problem-solving ability.

Ghosh, Shibani (1989) studied about "A critical study of scientific attitude and aptitude of the students and determination of some determinants of scientific attitude." It was found that scientific aptitude was significantly related to scientific attitude and academic motivation. No significant difference was observed with respect to sex, socio-economic conditions or place of habitation.

Aziz, Talat (1990) made a study on "A study of the comparative effectiveness of the information processing models of teaching in developing certain concepts in chemistry at the secondary stage." It was observed that the pupils exposed to the teaching programme based on information processing model of teaching performed significantly better than the pupils taught through the traditional lecture method. It was also observed that chemistry could be effectively taught through the model approach. Models approach of teaching was better than the traditional approach of teaching. It was found that the Concept Attainment Model and inductive thinking model were effective for teaching science concepts. Taba have also suggested that Thinking could be taught if appropriate teaching strategies were used whereas Bruner‟s Concept Attainment Model was effective for attainment of concepts. It was also found that mental abilities of the students had no bars on the concept attainment so far as the students of higher average mental ability were concerned and both information processing models were found superior to the traditional approach for teaching concept-based chemistry.

Begum, Khatija. H (1990) investigated on "Problems of teaching new science syllabus for standard VII in Andhra Pradesh and their impact on pupils‟ achievement." It was found that more than 60% of the teachers found the content in the recent syllabus, new as well as overloaded. The dictation of notes by teachers was the dominant method of getting exercises done by the students. The lack of facilities for science teaching continued to bother teachers a lot. It was observed that achievement in science favoured significantly those students, whose teachers had attended an in-service education programme. It is proposed that school conditions need to be improved through, say supply kits and handbook for teachers so that pupils may participate in the teaching-learning process by practicing processes of science such as classifying, inquiring and experimenting, etc.

Alexander, Benny. (1990) made a study on "A study of the relationship of critical thinking, science aptitude and socio-economic status to the science achievement of second year PUC students" The major findings of the study was that high scores on critical thinking, scientific achievement and socio-economic status favoured achievement in science. The three predictors, namely, scientific aptitude, critical thinking and socio-economic status contributed a variance of 15.4%, 8% and 5.36% to the total variance in achievement respectively. It was observed that sex differences in achievement in science favouring males existed. There was no significant interaction effect between each of the independent predictors taken separately favoured achievement in science.

Kar, D.K. (1990) made a study on "A study of relationship between attitude towards and achievement in general science of class IX students of Cuttack City." It was found that the distribution of the attitude score was negatively skewed. Boys were found to be more favourably disposed towards science than girls. There was positive relationship between attitude and achievement.

Mohan, Radha (1990) investigated on "Effective concept learning in science education: A theoretical Instructional mode." It was observed that the planning instructional strategies, the socio-cultural factors, the educational environment and the learner‟s style of learning have to be given due consideration. Blending a number of instructional media might be useful in generating a learning climate that fosters interaction of various components of learning process. In the selection of learning strategy, the active role of the learner, the place of teacher, learning materials and process of concretization for concept development had to be cautiously designed keeping in view the learning theory. While determining focus of

control in the teaching-learning process, the impact of external factors outside the learner as well as internal factors within him/her had to be carefully considered.

Anwar, G (1991) made a study on "A study of the effect of short term content enrichment programme to overcome the deficiencies of trainees in science subjects in TCH courses." It was observed that there was no significant difference among the experimental and control groups in the content competence in general science before the enrichment programme. There was a significant difference between the experimental and control groups in the content competencies in general science after the enrichment programme. It was also observed that there was no significant difference between the variables-sex, institution, location and SES of students-teachers in the learning of science subjects. There was no significant difference between experimental and control groups in the learning of science subjects in practice teaching before the enrichment programme.There was a significant difference between the experimental and control groups in the learning of science subjects and in practice teaching after the enrichment programme.

Deshmukh, A.L. (1991) investigated on "Science education as a means of social change with special respect to health and hygienic habits." The finding of the study was that using pre-test post-test control group experimental design, the programme so developed was found to be effective to judge by gains in scores favouring the experimental groups. However, it was noticed that there were some serious difficulties
such as loaded curriculum, lack of physical amenities and time, ignorance of parents and failure in practice by the students in their homes what they had otherwise understood in the classroom.

Vaidya, N. (1991) made a study on "Developing teaching-learning strategies for enhancing student achievement in science." The study revealed that it was possible to discern a pattern of common thought with co-efficient of fluctuations of thoughts remaining under the permissible limit of 10%. It was also possible to accelerate thought under certain conditions such as arranging thought-provoking problems in their hierarchical order but abstracts Piagetian schemes of thought were difficult to crack. It was very much possible for children to help themselves in their day to day teaching-learning provided the teacher did not always insist on the right answer. The wrong answers in fact revealed the evolving structures of their logical thought.

Ganguli, D. and Vashistha, V.C. (1991), in their trend report on Research in Science Education for the Fourth Survey pointed out the various weaknesses of science education. The competence of science teachers e.g. is manifested when they are in a position to reach out to different children by creating a rich multi-dimensional environment for them to learn. They have no choice but to think hard while working on their jobs. Otherwise, it may happen that curriculum framers, examination boards, publishers, science teachers and science students may be stealing each other"s clothes for the benefit of none.

Muddu (1978) conducted a survey of 120 high schools and then Desai (1986) surveyed 460 higher primary (middle) schools of Karnataka and found that, though the textbook were attractive and suitable, and experiments were conducted by teachers, the climate for motivation for teaching and learning of science was not there. The problems faced by teachers and students while teaching or conducting science practicals seem to be a matter of interest for the NCERT or UGC but not Ph,D.-level researchers since all the three studies conducted in this area, Rajput (1978), Muddu (1978) and Singhal (1983) were financed

projects. Needless to say, the findings were highly disappointing. Teaching science without practicals or laboratories, teachers teaching subjects other than the one they are qualified and appointed for, weak expression and strictly confining themselves to the syllabus were some of the problems exposed through these studies.

2.3 Studies conducted abroad:

Brandwein (1958) says, "Science learning and teaching requires equipments in biology, living things in chemistry, solution and apparatus of all sorts in physics celibrated equipments." Hence, science teaching and learning needs laboratories and equipments for effective learning. It is an integral part of science education.

In **Czechoslovakia (H.M.S.O., Report 1963)** science students are encouraged by the science teachers to perform advanced and preferably research type of laboratory exercises on voluntary basis after school hours. In the final year of the secondary school, they are further encouraged to write „maturity papers" three in required subjects and one in elective. The scope of the paper, of course, varies but it has been found that the potential scientists do incorporate their research findings in their final report.

In Hungary, **Dr.Pais (1963)** has attempted to link methods of science teaching and learning with research. Four research associates under his guidance carry out investigations into improving laboratory experiments in chemistry, into the use of new aids in chemistry subjects and into the history of chemistry as an ingredient of the content of an introductory chemistry course. The Hungarian pupils are challenged maximally to put in their best through three extra moral activities namely, a student journal in which they report their original ideas in the fields of science and mathematics, yearly Olympiads in mathematics in which students try hard to solve ten different problems in ten days at home.

Norton and Butts (1973) studied "Assessing children ability to solve problems in science." They have suggested that the way students function in problem situation is related to their knowledge of that context.

Larkin (1980) studied the "Understanding and problem solving in physics." The finding of this study was that once a problem is perceived, the mind must be engaged to construct a response. The uninterested student with limited knowledge of the problem context will probably be engaged in ideas of similar experiences, stimulate inferences and resort to non-empirical reasoning about causality. In contrast, more skilled students will tend to focus on known concepts, construct inferences and resort to reasoning closely tied to their knowledge base.

Makkar, S.L. (1991) studied the "Education and scientific research in Japan."The study revealed that whereas formal education begins at 6+, it is compulsory for nine years, the pattern of education begins 6+3+3. It was also observed that most of the high schools are co-educational and grouped as general schools (providing all-round education including science for all) and special schools (providing instruction in practical subjects such as agriculture, commerce and technology) and that there are excellent separate science laboratories for the various sciences. Surprisingly enough, Junior high school students are introduced to the methods of science while exploring natural phenomena (earth science too is included). It was also found that the admission to the Universities is highly competitive and

the specialization begins at the graduate level. It was also found that the Research facilities are excellent in this country.