CHAPTER - II
REVIEW OF CONCEPTUAL LITERATURE AND RESEARCH RETROSPECTS

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2.0.0.0: INTRODUCTION

The survey of the literature is a significant and crucial aspect of the planning of any research study. Exploring the literature, enriches and excites the intellect of the researcher. Hours spent in good browsing what others have already done in his area of interest, helps to analyze the various topics, notice the gap and to identify the needed research. Hence the review of related literature and research work done are essential requirements for any research study. In the following sections some aspects considered relevant to the selected problem under investigation are discussed.

The present chapter covers two broad sections. The first section consists of theoretical materials related to the selected variables named Achievement motivation, Scientific attitude and Mental ability. The second section deals about the research work done in the above topic in India and Abroad.

2.1.0.0: REVIEW OF CONCEPTUAL LITERATURE

In any type of research it is important to have review of conceptual literature in the chapter of “Study on related literature” usually in the second chapter. In that line, the materials gathered by the researcher related to the variables selected namely Achievement motivation, Scientific attitude, Mental ability and Achievement in science were presented one by one.
2.1.1.0: ACHIEVEMENT MOTIVATION - COMPONENTS AND PROCESSES

Mavis (1983) portrays the affective and cognitive process potentially involved in the (1) Instigation, (2) Direction, (3) Maintenance, and (4) Reinforcement of achievement-oriented activity. Indeed, each successive line of the figure may seen as brimming into sharper focus on one of these phases.

Figure 1: Achievement Motivation: Proposed processes

Goal Formation:

- Cognitive Sets
- Situational Cues
- Affective State

Goal/Means Salience, Expectancy, Value

Goal Means Representations

Anticipatory Affect

Goal Adoption:

Performance Goals: Obtaining a favorable judgement of competence
Avoiding a negative judgment of competence

Learning Goal: Increasing Competence

Task Performance:

Goal-oriented Activity
Task-irrelevant Activity

Means Affect

Outcome

Evaluation:

Evaluation of Outcome Relative to Standard

Possible Strategy Analysis of Attribution

Goal Affect

Possible Goal Revision
Essentially, we may conceive of the child as entering an achievement situation with particular cognitive sets and with existing affective status, although these sets and status may be greatly influenced by situational cues. The cognitive sets, situational cues and affective status are seen as influencing the salience of the different goals, and as contributing to the expectancies and values attached to them.

How do the expectancies and values of the salience goals and means then influence the actual selection of goals and means? Or, how are expectancies and values represented and considered? It is possible, as implied by the more cognitive approaches, that they may sometimes simply and directly take the form of cognitions about what one can and wants to accomplish, with different goals being compared to each other in terms of some combination of “can” and “want”. Or, we might combine and elaborate the views of Kagan (1972) and McClelland, Atkinson, Clark and Lowell (1953) to suggest another possible mechanism. According to Kagan, motivation involves activating the cognitive representations of goals, and according to McClelland motivation involves anticipatory affective responses to goals. Thus one might propose that given particular expectancies and values, the child may activate or generate cognitive representations on salient goals and, we would add, means. That is, a small, biased sampling of possible activities and outcomes may take place. The child may then experience or anticipate affective reactions in conjunction with each for example, dread or excitement in task initiation, boredom or enjoyment of task activity, shame or pride in outcomes and in this way may gain a sense of what courses of action will make him or her feel better or worse in the short or long run. In any case, both cognition about, an affective reaction to, likely and valued events may guide choice of achievement goal and goal-oriented activities. These, along with the positive and negative affect that derives from the activity, may then work to facilitate or interfere with task performance. At some point,
evaluation of the progress or product takes place. The evaluation may prompt a strategy analysis or an attribution and depending on the conclusion, children may either maintain or alter their goals and goal-directed activity.

Using the wealth of findings from achievements research in the various traditions, we will now explore in detail specific parts of the process. Because achievements goals must lie at the heart of any analysis of achievement motivation, we will begin with an examination of the goal themselves and of the factors that may predispose children to focus on specific goals.

2.1.2.0: SCIENTIFIC ATTITUDE

Since the beginning of the present century science educators have included the development of scientific attitude among the general aims of science education. Some writers label this attitude as "scientific mindedness" (Burnett, 1944), "that habit of scientific thinking" (Noll, 1933) or "the spirit of Science" (Educational Policies Commission, 1966) and "it is most often characterized by a list of component attitudes such as objectivity, open-mindedness, skepticism, and a willingness to suspend judgment if there is insufficient evidence". Richard W. Moore (1970) has rightly defined Scientific Attitude as the opinion or position taken with respect to a psychological object in the field of science.

The scientific attitude, by its very name, tends to be associated solely with the area of science. There is a general agreement among investigators that a person who has a scientific point of view- 1. looks for the natural causes of events; 2. is open-minded toward the work and opinion of others and toward information related to his problem; 3. bases opinions and conclusions on
Noll (1933) opined that the scientific attitude includes the following habits of thinking.

1. Habit of accuracy in all operations, including accuracy in calculation, observation and report.
2. Habit of intellectual honesty.
3. Habit of open-mindedness.
4. Habit of suspended judgment.
5. Habit of looking for true cause and effect relationship.
6. Habit of criticalness, including that of self-criticism.

The titles as listed, according to Noll, are probably sufficient to describe the habit in detail.

They may, however, be briefly defined for further clarity in terms of their opposites:

1. Accuracy in calculation, observation, and report is the opposite of habits of careless, inaccurate work.
2. Intellectual honesty is the opposite of such habits as exaggeration and rationalization.
3. Open-mindedness is the opposite of bigotry, prejudice and intolerance.
4. Suspended judgment is the opposite of the habit of making snap judgments or jumping conclusions.
5. Looking for true cause and effect relationship is the opposite of habits of superstitious thinking of expecting rewards to come without commensurate effort.

6. The habit of criticalness including that of self-criticism is the opposite of habits of accepting explanations of phenomena without question, or without attempt of evaluation; it is the opposite of the habit of condoning and accepting such things as racketeering, political corruption, and the like, as inevitable.

Noll also listed fourteen specific objectives without any attempt to rank them.

The fourteen specific objectives are,

1. Command of factual information.
2. Familiarity with laws, principles and theories.
3. Ability to distinguish between fact and theory.
5. Ability to make observations.
6. Habit of basing judgment on fact.
7. Ability to make observations.
8. Willingness to change opinion on the basis of new evidence.
10. Appreciation of the contributions of science to our civilization.
11. Appreciation of man's place in the universe.
13. Appreciation of the possible future developments of science.
Davis tried to bring out brief and accurate list of elements of scientific attitude. He prepared a questionnaire with a list of characteristics. He sent them to 250 well trained experienced teachers. He ranked the characteristics as selected by these experienced teachers, and finally accepted those which were chosen by at least 80 percent of them. The following are the characteristics which were finally selected.

1. Willingness to change opinion on the basis of evidence (92%)
2. Search for the whole truth regardless of personal, religious or social prejudice (89%)
3. Concept of cause and effect relationship (86%)
4. Habit of basing judgment on fact (85%)
5. Power or ability to distinguish between fact and theory (82%)
6. Freedom from superstitious beliefs (81%)

Caldwell and Curtis (1943) gave the following list of scientific attitudes,

1. A curiosity to know about one's environment.
2. The belief that nothing can happen without a cause and those occurrences that seem strange and mysterious can always be explained by natural causes.
3. An unwillingness to accept as facts any statements that are not supported by convincing proof.
4. The determination not to believe in superstitions of any sort.
5. The belief that truth itself never changes, but that our ideas of what is true change as we gain more and more knowledge.

6. An intention not to experiment on to work blindly and carelessly, but to begin only after careful observation.

7. The determination to be careful and accurate in all one's observations.

8. A willingness to consider all the evidence and try to decide whether it really relates to the matter which is being considered, whether it is sound and sensible, and whether it is complete enough to allow a conclusion to be made.

9. A determination not to base final conclusions on one or a few observations, but to work as long as may be necessary in order to secure answer to a problem.

10. The desire to do one's own observation and experimentation but a willingness to use results of other scientists' work.

11. The willingness to change an opinion or a conclusion if later evidence shows that it is wrong.

12. The intention to respect another's point of view.

13. The determination to prevent one's own like and dislikes from influencing one's judgment.

and lastly, 8. More faith in the books written by specialists in their irrespective fields on scientific attitude.

2.1.3.0: MEANING AND CONCEPT OF MENTAL ABILITY

Many psychologists have given different types of definitions about Mental ability or Intelligence. Below are the some of the important definitions.

1. **Stern** (1914): "Intelligence is a general capacity of an individual consciously to adjust his thinking to new requirements. It is general mental adaptability to new problems and conditions of life."

2. **Terman** (1921): "An individual is intelligent in proportion as he is able to carry on abstract thinking."

3. **Wagon** (1937): "Intelligence is the capacity to learn and adjust to relatively new and changing conditions."

4. **David Weehsler** (1944): "Intelligence is the aggregate of global capacity of an individual to act purposefully, to think rationally, and to deal effectively with its environment."

5. **Garret** (1946): "The abilities demanded in the solution of problems which require the comprehension and use of symbols. i.e., words, numbers, diagrams, equations, formulae.

6. **Buchingham** (1921): "The ability to learn."

7. **Thurndike** (1914): "The power of good response from the point if view of truth or fact.

Louis Thurstone (1938) objected to Spearman’s emphasis on general intelligence; he felt that intelligence could be broken down into a number of primary abilities. To find these abilities he applied the method of factor analysis to results from a large number of tests employing many different types of items.
One set of items was for verbal comprehension, another for arithmetical computation, and so on.

After intercorrelating the scores of all the tests, Thurstone applied factor analysis to arrive at the basic factors. Those test items that best represented each of the discovered factors were used to form new tests; these tests were then given to another group of subjects and the intercorrelations reanalyzed. After a number of studies of this kind Thurstone identified the seven factors as the primary abilities.

**Thurston’s Primary Abilities**

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<thead>
<tr>
<th>S.No.</th>
<th>Ability</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Verbal Comprehension</td>
<td>The ability to understand the meaning of words: Vocabulary tests represent this factor.</td>
</tr>
<tr>
<td>2.</td>
<td>Word Fluency</td>
<td>The ability to think of words rapidly, as in solving anagrams or thinking of words that rhyme.</td>
</tr>
<tr>
<td>3.</td>
<td>Number</td>
<td>The ability to work with numbers and perform computations</td>
</tr>
<tr>
<td>4.</td>
<td>Space</td>
<td>The ability to Visualize space from relationships, as in recognizing the same figure presented in different orientations</td>
</tr>
<tr>
<td>5.</td>
<td>Memory</td>
<td>The ability to recall verbal stimuli such as word pairs or sentences.</td>
</tr>
<tr>
<td>6.</td>
<td>Perceptual Speed</td>
<td>The ability to grasp visual details quickly and to see similarities and differences between pictured objects</td>
</tr>
<tr>
<td>7.</td>
<td>Reasoning</td>
<td>The ability find a general rule on the basis of presented instances as in determining how a number series is constructed after being presented with only a portion of that series.</td>
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</table>
Thurston devised a battery of tests to measure each of these abilities, called the Test of Primary Mental Abilities, which is still widely used. Its predictive power however is no greater than that provided by tests of general in intelligence such as the Wechsler scales. Thurston’s hope of discovering the basic elements of intelligence through factor analysis was not fully realized for several reasons. His primary abilities are not completely independent; there are significant intercorrelations among them providing some support for Spearman’s idea of a general intelligence factor. In addition, the number of factors identified by factor analysis depends on the nature of the test items chosen. Other investigators used different test items have come up with a larger number of factors.

2.1.3.1: PRIMARY MENTAL ABILITIES

Approximately fifty years ago it was observed that aspects of intelligence tests are correlated and that aptitude tests are also seem to have underlying similarities. On the basis, an English psychologist, Charles Spearman, hypothesized that different items and different tests measure some common factor called ‘general intelligence‘ or ‘g’ and that many different skills involve this common factor. Mechanical ability, musical ability, mathematical ability and many others which show even a slight correlation with each others which show even a slight correlation with each other do so, it was claimed, because they all require certain amount of ‘g’. Many psychologists opposed this claim of a general intelligence factor, but the view received wide attention.

In addition to ‘g’ according to Spearman each skill calls for specific abilities or ‘s’. Thus in addition to requiring a certain amount of ‘g’ facility in mathematics would require specific mathematical ability which might be facility with numbers, ability to factor, ability to multiply and so forth. These would be
the 'S's in mathematical performance. Mechanical skills, in this view, would require mechanical 'S's in addition to certain amount of 'g'.

Following the lines of reasoning suggested in the concept of specific abilities. American psychologists defined seven primary abilities, both verbal and non-verbal, that could be measured readily by group methods. These factors are represented in a test called Primary Mental Abilities. They include word fluency, number ability, verbal comprehension, memory, reasoning, spatial relations and perceptual speed. Today with the aid of high speed digital computers for accomplishing factor analyses, there are conceptions of intelligence as composed of many different factors.

2.1.3.2: DIVERSITY IN MENTAL ABILITIES

Though Psychologists still don't agree on what intelligence is, the study of IQ tests and intelligent behavior has yielded many insights into human mental abilities and has highlighted the diversity of those abilities. It has shown that IQ tests do not measure all aspects of the abilities people have in mind when they talk about intelligence and that some aspects of mental ability seem to be some what independent of intelligence as measured by traditional tests.

In every area of human endeavor, there are people who demonstrate creativity, in other words, they can produce novel but effective solutions to challenge. To measure creativity, some psychologists have generated tests of divergent thinking, the ability to think along many paths to generate many solutions to a problem. Divergent thinking tests are scored by counting the number of different but plausible responses that a person can list for each item or by assessing the extent to which a person's answers are different from those given, by most test takers. Of course, the ability to come up with different answers or different ways of looking at a situation does not guarantee that
anything creative will be produced. Thersia Amabile has identified three components necessary for creativity (Amabili1989).

1. Expertise in the field of endeavor which is directly tied to what a person has learnt.
2. A set of creative skills including the ability persist at problem solving the use of divergent thinking and the ability to break mental sets and take risk.
3. The motivation to pursue creative production for intrinsic rewards such as satisfaction rather than extrinsic rewards like prize money.

2.1.3.3: LINKAGES: MENTAL ABILITIES AND AGING

There are chances to change in mental abilities over the life span. The findings regarding age-related changes depend to some extent on the method of study. One method, the cross-sectional study compares data collected simultaneously from people of different ages. However, cross-sectional studies contain major confounding variable because older subjects were born in a different year than younger ones, they may have had very different educational, cultural, nutritional and medical experiences.

Changes associated with age can also be examined through longitudinal studies. In which a group of people are repeatedly tested as grow older. Longitudinal studies, however, may be marred by another problem. As the people of the same age are tested through the years, fewer members of the group can be tested, because some die or become incapacitated. Those remaining are likely to be the healthiest in the group and may also have retained better mental powers than the dropouts. Hence the longitudinal studies may underestimate the degree to which abilities decline with age.
Crystallized intelligence which depends on retrieving information and facts about the world from long term memory may continue to grow well into old age. Fluid intelligence which involves rapid and flexible manipulations of ideas and symbols, remain stable during adulthood and then declines in later life. Among those over 65 or 70 problems in several areas of information processing may impair problem solving ability (Sullivan and stanko, 1990).

2.2.0.0. RESEARCH RETROSPECTS

2.2.1.0: STUDIES CONDUCTED IN INDIA

Abrol. D.N., (1977) has made Ph.D., research work entitled, “A study of achievement motivation in relationship to intelligence, vocational interests, achievement, sex, socio-economic status.” The study sample comprised 414 students of class X in Delhi. The hypotheses of the study were 1. Achievement motivation and intelligence are positively correlated. 2. Achievement motivation scores do not differ in the case of boys and girls. The major findings of the study were 1. The means n-achievement of students from unaided, aided and government schools differed significantly. 2. In the total sample the mean n-achievement of boys was significantly greater than of girls.

Bharadwaj. R.L., (1978) has made of “A study of vocational interests as functions of creativity components intelligence and socio-economic status among college going students.” The study sample comprised 240 college going students of Agra town. The hypothesis of the study was to determine and study the impact of components of creativity and intelligence upon the vocational interests of Indian adolescents at various strata of socio-economic status. The major findings of the study was Intelligence consistently demoted vocational
interests on the high level of SES. It was more interests - promoting in less interest - promoting in high creative adolescents.

Venkatapathi. P., (1979) conducted a study about "I.E. Locus of control, achievement motivation and anxiety among semester and non semester students." The hypotheses of the study were semester course students will significantly differ from the Non - semester course students on their achievement motivation. The findings of the study were the semester course students will have higher level of achievement motivation than the Non - semester course students.

Alegaokar. P.M., (1981) has made "A study of effect of physical achievement on intelligence." The study sample comprised 414 students in the age rank 13 - 16 years selected stratified random samples. The hypothesis of the study was To find out the effect of physical achievement on intelligence. The major findings of the study was high achievement in physical achievement had higher IQ than low - achievement. This was true for the students of 13, 14, 15 and 16 years of age.

Bedi. H.S., (1982) has undertaken a research work on "A study of Aspiration of adolescents as related to socio - economic status, intelligence and sex." The study sample comprised 750 male and female adolescents of Chandigar on 6 schools. The hypothesis of the study was intelligence had no significant correlation with Aspiration of adolescents. The major finding of the study was correlation between intelligence and occupational aspiration differed significantly in respect of sex and place of residence.
Chatterji. P.S., (1983) made an inquiry into "A study of personality, intelligence and achievement motivation of students in different academic groups." The study sample comprised 9760 male plus two students. The objective of the study was to compare the personality, intelligence and achievement motivation of students studying in different academic groups at the +2 stage. The major findings of the study were 1. Science students were significantly higher in achievement motivation in comparison with those in agriculture at the arts groups. 2. Students of commerce and agriculture attained a significantly higher mean achievement motive score in comparison with those in arts. 3. Out of four academic groups, science students were the most intelligent and arts students the least. 4. Commerce students stand second in intelligence out of the four academic groups and were significantly more intelligent than those in arts on all the factors intelligence.

Puttapuddi., (1983) conducted a comparative study of general intelligence of IX and X grade students of Karnataka as measured by cattle's culture fair test of intelligence scale – 3 in relation to their sub – culture, socio – economic status and caste affliction. The hypotheses framed for the study was the subjects of different caste groups did not differ significantly on the general intelligence dimension. The major findings were the subjects of various caste groups differed significantly on the general intelligence dimension.

Jain. S., (1983) conducted a research work entitled "A study of the concept formation as a function of verbal intelligence and achievement motivation." The study sample comprised 405 students of grade X of 10 Hindi medium higher secondary schools of Bilaspur town. The objective of the study was to study the relative interaction of verbal intelligence and achievement motivation on concept formation as a process and product. The major finding of
the study showed that Intelligence was found to be a better predictor of concept formation ability than achievement motivation.

Dani. D.N., (1984) conducted a research work on "A study of scientific attitude and cognitive styles of higher secondary students." The sample of the study comprised of 1265 students (804 boys and 416 girls). The hypotheses of the study were 1. To measure the scientific attitude of higher secondary students. 2. To compare the scientific attitude of boys and girls belong to village, town and city. 3. To investigate the relationship between scientific attitude and cognitive styles of higher secondary students. The major findings of the study were 1. About 80% of the students had positive scientific attitude. 2. Boys and girls did not differ in scientific attitude score. 3. The rural students were found to have a low level of scientific attitude as compared to urban students. 4. The cognitive styles scores could be predicted from the scientific attitude with an efficiency of 4% to 5%.

Chauhan. S.S., (1984) made a comparative study about achievement motivation of scheduled tribe and scheduled caste students of Himachal Pradesh in relation to their intelligence and socio-economic status." The sample of the study comprised of 600 students (Scheduled tribe and 300 scheduled caste) studying in grade X. The objectives of the study were 1. To study the difference in the achievement motivation of boys and girls. 2. To study the difference in the achievement motivation of students at different levels of intelligence i.e., High, Middle and low. The major findings of the study were 1. Boys and girls did not differ significantly in relation to their achievement motivation. 2. The students at different levels in intelligence differed in the achievement motivation.

Bharathi. G., (1984) made a study of Self concept and Achievement motivation of Early Adolescents. The sample of the study comprised of 360
students from high schools and junior colleges of Hyderabad. The objectives of the study were the Achievement motivation and various Self concept measures in different age group and different sex groups. The findings of the study were 1) The strength of Achievement motivation increased significantly from 12 years to 16 years. 2) No sex differences were found in achievement motivation.

Ahluwalia. I., (1985) has undertaken a research work on “A study of factors affecting Achievement motivation.” The sample of the study comprised of 200 children of 8 to 12 years of age and 170 teachers of different types of schools. The objective of the study was 1) To study the effect of sex on Achievement motivation. The finding of the study was Sex of child had no effect on Achievement motivation.

Thirupathi. R.C., (1986) conducted a study of “A study of the achievement motivation it’s correlated of high school students in East Uttar Pradesh.” The sample of the study comprised of 500 high school students at east Uttar Pradesh. The objectives of the study were 1) To make the comparative study of achievement motivation of boys and girls. 2) To determine the amount of effect of intelligence and achievement on an achievement motivation scores of boys and girls separately. 3) To predict n - achievement of students on the basis of their scores on the independent variables. The major findings of the study were 1. The average level of achievement motivation of boys and girls was found to be low. 2. It was found that achievement motivation of boys and girls was highly correlated with intelligence and achievement. 3. Among five correlatives of achievement motivation, academic achievement proved to be a most dominant factor.

Ghosh. S., (1986) made a critical study of scientific attitude and aptitude of the students and determination of some dominants of scientific aptitude.”
The sample of the study comprised of 620 boys and girls (just promoted to class IX). The objective of the study was to find out sex-wise and strata-wise difference, if any, in the scientific aptitude and scientific attitude of the students. The major findings of the study were 1. Boys did not possess better scientific aptitude than girls. 2. Boys did not possess better scientific attitude than girls.

Mandila Shyam Singh, (1988) made a study of "Attitudes of secondary stage students towards science curriculum and its relationship achievement motivation." The sample of the study comprised 500 students. The main objectives of the study were 2. To determine the attitude of science students about science curriculum. 2. To compare the differences between urban/rural, male/female students about the attitudes towards science curricula. The major findings of the study were 1. Students from rural and urban schools as well as male and female had favorable attitude towards science curriculum. 2. There were significant differences in some aspects such as scientific temper, and teaching method.

Darchingpui, (1989) has undertaken a research work on "A study of science achievement, science attitude and problem solving ability among secondary school students in Aizawal." The sample of the study comprised of 812 students of the class IX. The main objectives of the investigation were 1. To study the science achievement, attitude towards science and problem solving ability of high school students. 2. To find the inter relationship of science achievement, attitude towards science vis-a-vis problem solving ability and 3. To examine the relative effect of sex, socio-economic status, parental education, parental occupation, family facility and type of school on science achievement, science attitude and problem solving ability. The major findings of the study were 1. The study indicated significant relationships between scores on science attitude and achievement in science. 2.
Significant sex difference in achievement in science and problem solving ability existed. 3. High socio-economic status, family facility and type of school attended favoured achievement in science, scientific attitude and problem solving ability.

Ghosh Shibani., (1989) made a critical study on scientific attitude and scientific aptitude of the students and determination of some determinations on scientific attitude.” The sample of study comprised 613 students drawn from 13 schools. The objective of the study was to find out the extent of academic motivation of the students sex and strata - wise differences in scientific attitude and aptitude if any. The major finding of the study were to found that scientific aptitude was significantly related to scientific attitude and academic motivation.

Bhaskara Rao., (1990) conducted a comparative study of scientific attitude, scientific aptitude and achievement in Biology at secondary school level. The main objectives of the investigation were to compare the scientific attitude of boys verses girls, English medium verses Telugu medium schools, private verses government schools, residential verses non - residential schools and rural verses urban schools. The major findings of the study were the scientific attitude in secondary school pupils was average there was no influence of sex on scientific attitude, but the pupils studying in private school, rural schools, English medium schools, Residential schools held relatively better scientific attitudes than their counter parts.

Kumar. S. M., (1990) made a critical study on scientific library, attitudes towards science and personality traits of students and teachers. The main objective of the study was to study attitudes towards science of different groups of students and Teachers. The major findings of the study were 1.The total
sample had favourable attitudes towards science. 2. There was effect of type of school and sex on attitude towards science.

Devanesan Paul., (1990) studied Socio economic status, Achievement motivation and scholastic achievement of higher secondary students in Pasumpon Thevar Thirumagan District. The major findings were 1. There was significant and positive relationship between achievement motivation and scholastic achievement of higher secondary students. 2. There was significant and positive relationship between achievement motivation and scholastic achievement of mathematics and science group students.

Veena. S., (1992) undertook a study of creativity among higher secondary students in relation to scientific aptitude and attitude towards science.” The sample of the study comprised 1200 students covering 600 boys and 600 girls who were drawn from higher secondary class of Agra city. The objective of the study was to test significance of difference between the mean of creativity scores, scientific aptitude scores and scientific attitude scores of boys and girls. The major finding of the study was that the girls had more favourable attitude towards science than the boys.

Elango. M., (1994) in his Ph.D. research work entitled “A study of some factors related to Academic Achievement.” IX standard students are taken as sample. The objectives of the study were to study the individual contribution of all the functional variables taken are the study viz S.E.S, CI.CI, Inf creat, Edl, ASP, Stu, Ori, HO, Env, Cl.Tru., Pee.Inf and R.I.A.S.E and C on academic achievement separately for combined sample, rural sample, urban sample of government school sample and private school sample of boys sample and girls sample. The findings of the study are 1. The extent of academic achievement of the combined samples various positively due to intelligence. 2. The extent of
academic achievement of both rural and urban samples various positively due to intelligence. 3. The extent of academic achievement of both government and private schools sample various positively due to intelligence.

Rangaraj. K.R., (1995) conducted a study on Effectiveness of Computer Assisted Instruction in teaching Physics at Higher Secondary stage with the objectives of finding the effectiveness of the different instructional strategies is determined by pupil’s psychological variables viz. Achievement motivation, Intelligence and Scientific Attitude. The findings of the study were 1. There is no significant difference between the means of high and low range scores classified based on different psychological variables except Achievement motivation with regard to their academic achievement for the control group. 2. The students with low range scores on Achievement motivation scored more on the academic achievement in physics when compared with high range scores on the some variables.

Vijayalakshmi. S., (1996) studied that there is no relationship between Achievement in science and school environment.

Palanisamy. K., (1997) found that there is evidence of real association or relationship between socio economic status and achievement of students from urban and rural schools.

Nalayani., (1998) made an inquiry into Development and Validation of Computer assisted instruction in physics for high school students. The sample of the study comprised of 200 IX standard students. The finding of the study was there is no significant difference between attitude towards science between the students who learn through Computer assisted instruction and through traditional method.
Kumar. K.R., (1999) studied the relationship between participation in co-curricular activities and academic achievement among students in selected schools. The major finding was rural area students are better than urban area students in their academic achievement.

Devarajan. P., (2000) has undertaken a research work on “A study of certain Psychological factors effecting achievement of plus two students in Pollachi educational District”. The hypotheses of the study were 1. There is no significant sex difference in the Mental ability of plus two students. 2. There is no significant difference in the Mental ability of plus two students hailing from urban and rural locality. 3. There is no significant difference in the Mental ability of plus two students hailing from different types of schools. The major findings were 1. There is no significant sex difference in the Mental ability of plus two students. 2. There is no significant difference in the Mental ability of plus two students hailing from urban and rural locality. 3. There is significant difference in the Mental ability of plus two students hailing from different types of schools.

Jeyavani. S., (2000) has made a study of “Achievement motivation of higher secondary school students residing in rural and urban areas”. The sample includes 157 boys and 153 girls. The hypotheses of the study were 1. There is no significant difference between urban and rural school students in respect of Achievement motivation. 2. There is no significant difference between girls from urban government schools and girls from rural government schools in respect of Achievement motivation. The major findings of the study were 1. Both urban and rural school student’s posses the same level of Achievement motivation. 2. The girls studying in urban government higher secondary schools are better than rural government higher secondary schools in the level of achievement motivation.
Thomas Varghese., (2001) conducted a research study on "Some correlates of achievement motivation among B.Ed. student teachers". The sample of the study comprised of 97 B.Ed. student teachers of Xavier's college of education, Digha Ghat, Patna. The finding of the study was there is no significant difference between male and female student teachers in their Achievement motivation.

Renukadevi. A., (2002) has undertaken a research work on "A study of interest and achievement in history of students studying in various higher secondary schools in Coimbatore District. The hypothesis of the study was there is no significant relationship between level of intelligence and achievement. Quite contrary to her hypothesis, the finding of the study was there is no significant relationship between level of intelligence and achievement.

Mishra. A.P., (2002) has made a comparative study of high and low achievers in science, history and commerce in creativity, intelligence and anxiety. The findings of the study were intelligence and creativity was statistically correlated among high achievers in science and commerce and low achievers in history.

Abdul Raheem., (2003) has undertaken a research work on "Intelligence, SES and Adjustments as correlates of Academic achievement." The objective of the study was to find out the relationship between academic achievement and intelligence. The finding of the study was the positive correlation was found between academic achievement and intelligence.

Balasubramanian., (2004) in his Ph.D., research work entitled "Emotional Intelligence and Achievement of Teacher trainees at primary level." The study sample comprised 269 teacher trainees at DIETS and TTIs. The finding of the
study was there is a significant low positive correlation between emotional intelligence and total academic achievement.

2.2.2.0: STUDIES CONDUCTED ABROAD

Toshinori. I., (1990) has conducted a cross cultural study of Japanese and American Children's Intelligence from a sequential-simultaneous perspective in the University of Alabama. This study examined high simultaneous low sequential profiles for Japanese Children, the cultural fairness of the K-ABC for use with Japanese children and developmental changes in the factor loadings of face recognition reported in the literature. The findings of the study were American and Japanese children did not differ significantly in their mean mental processing composite scores, based on a two tailed t-test with the Bonferroni Correction for multiple comparisons.

Lynn., (1990) pointed out that large nutritionally-based increases in height have occurred during the same period as the IQ gains; perhaps there have been increases in brain size as well. As we have seen, however, the effects of nutrition on intelligence are themselves not firmly established.

Winfield., (1991) & Hahn, et. al., (1994) showed an association between achievement motivation and "increased high school completion, increased enrollment in college, increased reading and math achievement test scores, and higher grades."

Stevenson, & Stigler., (1992) showed it is quite possible to improve the school learning of American children—even very substantially—without changing their intelligence test scores at all.
San Jose, et. al., (1993) studied immigrant parents from Cambodia, Mexico, the Philippines and Vietnam, as well as native-born Angle-Americans and Mexican-Americans, about their conceptions of child-rearing, appropriate teaching, and children's intelligence. Parents from all groups except Angle-Americans indicated that such characteristics as motivation, social skills, and practical school skills were as or more important than cognitive characteristics for their conceptions of an intelligent first-grade child.

Cerles, & Lin Clachmeier., (1995) made a critical study of Chinese-American and White adolescent's reasoning about academic achievement in the University of California. This research examined how Chinese American and White adolescents judge and reason about academic achievement. Results showed that Chinese American and White students were more similar than different in their evaluations and justifications regarding psychological harm to the parent, the right of the parent to exert authority and the opportunity structure. While Chinese American students were more likely than White students to reason that students are obligated to attain high achievement due to parental sacrifice in the context of academic achievement, obligation was not seen on a moral duty.

Rhee. A., et. al., (1997) has done a study on "Relationship between the Tower of Hanoi, brief measures of cognitive ability and gender". In this study, a sample of 55 undergraduate college students (24 males, 31 females) were administered the TOH and the Kaufman Brief Intelligence Test (K-BIT). Gender differences were not found in mean scores but were found in correlations. Among males, TOH performance was significantly correlated with K-BIT Matrices. Among females, TOH and K-BIT scores did not correlate significantly. Results indicate that gender may play an important role in determining the relationship between intelligence and the cognitive demands tapped by the TOH.
Scales, et. al., (2000) studied Achievement motivation was found to contribute meaningfully to school success.

Vellutino, et. al., (2000) reflected a view regarding the relationship between intelligence and reading achievement long held by many scholars and practitioners—specifically, that the two are sufficiently correlated to justify the use of intelligence test scores to predict reading achievement and, thereby, to define reading disability and other learning disabilities.

Clark. R.M., (2002) made a study of 1058 low and high achieving students. Results of the study indicate that student achievement is highly related to how students, parents and teachers use their time, as well as to the presence of adult mentors in student lives.

Dillihunt. M. L., (2003) has conducted a research study in the Howard University regarding “the effects of multiple intelligence and direct instruction on third and fifth grade student achievement, task engagement student motivation and teacher efficacy.” Research has shown that, low - income urban students that have been placed at - risk or achievement low standardized test scores in mathematics, these students are also un - motivated to learn math, and are disengaged in the math instructional provide by their teachers. Results suggested that students in multiple intelligence classes' performance on post intervention mathematics increased. While students' motivation did not increase, student task engagement did increase in the multiple intelligence classrooms. Teacher efficacy shown no increase. To this end, teachers should develop various strategies to accommodate the various intelligence of their students and place all students at promise for academic success.
Amirault Ray., J., (2003) has made a research study about "A study examining the effectiveness of two instructional treatments on student achievement motivation and cognitive reasoning process in a complete concept domain." The purpose of this study was to determine the effectiveness of a concept focused and a procedure focused instructional approach on adult teacher concept acquisition in terms of performance, motivation, and concept usage in reasoning. The important result of this study was significant positive differences were found for far transfer performance and motivation levels in learners between concept focused group and procedures focused groups. Verbal protocol analysis revealed no differences in time or trial and error strategies learners in the two groups took to solve a far transfer problem.

Cannon, et. al., (2003) has conducted a research study regarding "the stability of intelligence and achievement testing in learning disabled children as applied to the Kaufman Assessment Battery for children." The study examined the long term stability of intelligence and achievement testing by using Kaufman Assessment Battery for children (K-ABC). The following were the results of this study. 1. The stability co-efficient ranged from 0.47 to 0.52 with an average correlation of 0.49. 2. The stability co-efficient found greater increases in sequential and mental processing. Co positive scores when compared to the standardization samples. 3. Less stability for individual sub-tests were found to be significantly correlated between the two administrators of the K-ABC.

Hernandet. M., (2003) has conducted a research study on "Achievement motivation and Mexican immigrant and Mexican American college students; A psychological perspective." In the California University the study was quantitative and qualitative study of 182 Mexican American and Mexican immigrant community college students' achievement motivation. The primary goal of this study was % to test theMcClelland theoretical framework of
achievement motivation by comparing the achievement motivation levels of Mexican origin community college students. To investigate the effect of various levels of achievement motivation on a) The academic achievement of Mexican origin community college students. b) The academic success rate of Mexican origin community college students. c) The educational aspirations of Mexican origin community college students. The results of the present study showed that achievement motivation did not vary between the Mexican American and Mexican immigrant study participants. Mexican origin level of achievement motivation affected the student GPA, academic success rate and educational aspects. This study suggests that McClelland theoretical framework on achievement motivation may not fit the participants of this study.

La Civita. L.K., (2003) has made a research study in 'An examination of emotional intelligence factors; their relationship to academic achievement and the implications for retention of the at -risk community college students. This study examined the relationship between emotional intelligence factors community collage students. This study revealed that the independent variables of independence problem solving and stress tolerance were not significant in predicting academic achievement by the dependent variable, the great point averages of the students.

Al-kharboush. S.S., (2003) has made “An investigation into Pre- service elementary science and science teaching towards teachers' colleges in Saudi Arabia” in Ohio University. The purpose of this study was to investigate the attitudes towards science and science teaching of Saudi pre-service elementary science teachers at male and female teachers' colleges. The findings of this study revealed that both Saudi male and female pre – service elementary science teachers had positive attitudes towards science and towards science teaching, but females had more favorable attitudes towards science than males.
Athman, J.A., (2003) has done a research study on "The effects of environment-based education on students' critical thinking and achievement motivation." In the University of Florida. This study examined the relationship between environmental based education and high school students' disposition towards critical thinking and achievement motivation. The results of the study were. 1. When controlling the pre test scores, GPA, gender, and ethnicity, environment-based programs had a positive effect on 9th grade students' critical thinking and achievement motivation. 2. When controlling for GPA, gender and ethnicity, environment-based programs had a positive effect on 12th grade students' critical thinking skills, disposition towards critical thinking. And achievement motivation the efforts on achievement motivation were moderated by ethnicity. 3. The effects on students' achievement motivation appear to be generalizable beyond the schools in the study a variety of program formats and settings were effective in improving achievement motivation.

Upson, La. R.M., (2004) has made a research study in Tennessee university about the "Effects of an increasingly precise Socio-economic match on mean score differences in non verbal intelligence test scores." The researcher collected data from 3861 participants by conducting universal non-verbal intelligence test. The research study aimed to examine the effects of increased socio-economic on cultural and racial mean difference scores. Results of this study suggests that additional refinement on socio-economic variables does little further reduce mean score I.Q. difference in UNIT standard. FSIQ scores between African Americans and whites (N=168 in each group, mean difference = 8.51) however the 8.51 mean difference is smaller than 15 point difference typically observed between African American and whites and is lower than the 11 point difference shown for WISE III FSIQ scores. There were no significant mean IQ score differences ( N = 162, P>0.05 level between Hispanics and non-Hispanics indicating that additional Socio-economic states refinement does
contribute to reductions in mean score differences in IQ between these populations. In fact Hispanics scored higher than their non Hispanic counter parks on several Sub - scales.

Allardi. I.N., (2004) has done a research investigation in the Boston collage about “Children’s development of personal theories of intelligence and their relationship to achievement motivation.” The aim of this study was to explore and describe how children perceived and defined intelligence at various stages of their elementary school careers. The findings of the study were. 1. Students’ beliefs about intelligence were relatively consistent across age levels, with a focus on superficial and observable qualities. 2. Female students showed a greater tendency to embrace more restrictive beliefs about the value of effort and the flexibility of intelligence more also noted across the category of achievement level.

Berkeley, et. al., (2004) has investigated about “relations of academic achievement motivation and interpretations of family caring among low socio - economic status white and Mexican - American adolescents.” At University of California. This study explored the relation of low socio - economic status white and Mexican - American adolescents’ perspectives of parental caring to their academic achievement and achievement motivation. The findings of the study were few ethnic group differences were found in parenting behaviors and motivation, however parenting and motivation were associated with achievement outcomes differently for each group.

1. Mexican American students who spent more time with parents had stronger correlation with higher great point averages.

2. Motivation to please parents and academic monitoring in the absence of positive emotional states were associated with lower great point averages among white students.
3. Overall caring and availability of parents is predictive of achievement, the ways in which it is expressed and interacts with personal motivation may vary by ethnic group.

Steklay, C.C., (2004) has investigated "the effect of science intervention program on the attitudes and achievement of high school girls in science." in the Union university. The study aimed to assess the girls attitudes towards science in the following areas, social implications of science, normality of scientists, attitude towards scientific inquiry, adaptation of scientific of scientific attitude, employment of science lessons, leisure interest in science and carrier interest in science. The study is also user to determine the extent of the girls participation in sports and the attitude of their parents towards science. The following were the results of this study. 1. No evidence is found that participation in the programmed improved the girls' attitudes or achievement in science. 2. No significant relationship was found between the girls and their parent's perception of science. 3. Girls participation in sports positively affected science achievement.

2.3.0.0: SUMMARY

1. Science students were significantly higher in Achievement motivation when compared with agriculture and the arts group students.

2. Boys and girls do not differ significantly in relation to their Achievement motivation.

3. The students of different levels of intelligence differ in the Achievement motivation accordingly.

4. Achievement motivation does not depend on sex.

5. Both urban and rural school students possess the same level of Achievement motivation.
6. The girls studying in urban government higher secondary schools are better than the girls of rural government higher secondary schools in the level of Achievement motivation.

7. There is no significant difference between male and female B.Ed., student teachers in their Achievement motivation.

8. There exists positive relationship between Achievement motivation and scholastic Achievement of higher secondary students.

9. Boys and girls do not differ in their Scientific attitude score.

10. The rural students are found to have a low level of Scientific attitude when compared to urban students.

11. There exists significant relationship between scores on Scientific attitude and Achievement in science.

12. There is no sex difference in Mental ability of plus two students.

13. There is no significant difference in the Mental ability of plus two students hailing from urban and rural locality.

14. The level of academic achievement of both rural and urban samples varies positively due to intelligence.

15. The level of academic achievement of both government and private school samples vary positively due to intelligence.

2.4.0.0: RATIONALE OF THE PRESENT STUDY

During the past 10 years (1996-2005) there have been many research studies in the field of education in relation to the factors such as intelligence, personality, study habits, correlates of achievement, achievement motivation, attitudes etc. But the above studies are carried out by taking either one of the factors or a group of variables and to find out its relationship with some other
variables. The findings of most of the studies conducted on these variables show that there exists significant relationship among the variables and some studies show significant relationship at all.

Hence the investigator has selected variables to find out the relationship among Achievement motivation, Scientific attitude, Mental ability and Achievement in science of X standard students in Coimbatore district. Therefore the researcher has selected the topic “A study on the relationship among Achievement motivation, Scientific attitude, Mental ability and Achievement in science of X standard students in Coimbatore District.”

2.5.0.0: CONCLUSION

In this chapter, a detailed review of the literature and the research studies conducted on the variables Achievement motivation, Scientific attitude, Mental ability and Achievement in science have been dealt. Based on these, the rationale for selecting the present study has also been given. The next chapter deals with the methodology followed by the investigator.
REFERENCES


