

CHAPTER -II**REVIEW OF THE RELATED LITERATURE**

PART A (i) Theoretical literature on Intelligence.

PART B (i) Research studies on Science.

INTRODUCTION :

This chapter on review of related literature consists of two parts.

Part-A- deals with theoretical literature on Intelligence and Research studies on Intelligence.
Part-B- deals with Research Studies on Science and Research Studies on Academic Achievement.

For any specific project to occupy this place in the development of discipline, the researcher must thoroughly be familiar with previous theory and research (Fox. 1969).

PART-A Theoretical Literature on Intelligence.

Every individual think according to his thinking capacity, i.e. his general mental ability. Individual learns many things from his environmental experience and then he responds to new situations. Abstract reasoning, the ability to see relationship and predictions is also one of the skill of Intelligence. Verbal skills, Memory are some of aspects of Intelligence.

The intelligence tests are used to obtain a person's IQ which is assumed to give an indication of his intelligence.

Some studies on intelligence are given below :

Anand (1923) has studied the effect of Socio economic environment and medium of instruction on the mental abilities and the academic achievement of children in Mysore State. The study was designed to investigate the effect of socio economic environment and medium of instruction on mental abilities and academic achievement.

The sample consisted of 1897 pupils of standards VIII, IX & X. He found out that the three (SES) groups differ significantly from one another in their non verbal and verbal intelligence; high SES group achieved higher mean score than pupils in both low SES group and Middle SES group, whereas the mean score difference between middle and low SES groups was not significant. Different media of instruction differed significantly from each other in their nonverbal and verbal intelligence.

The English medium pupils showed higher nonverbal intelligence than the Kannada Medium pupils. And the Kannada Medium pupils showed greater verbal intelligence than the former. The socio economic environment remained almost identical. But the impact of socio-economic

environment was found to influence mental ability and academic achievement.

Grewal Avinash (1978) investigated the relationship between Hypotheses testing ability and creativity' she developed a test containing problems having short answers from the areas of physics, chemistry and biology in which students were asked to give more than one way of solving a given problem. She also found significant correlations between hypotheses testing ability and creativity variables like fluency and originality.

Passi (1972) has studied the creativity and its relationship with intelligence and achievement in school subjects at Higher Secondary Stage. The aims were-

- (1) To develop a battery of tests of creativity for measuring verbal and non verbal factors involved in creativity.
- (2) To explore the relationship between creativity on the one hand and the variables of intelligence verbal and non verbal scholastic achievement. Sex, residential background and age in the other.

The findings were.

- (1) Creativity scores were normally distributed among higher secondary students.
- (2) The coefficient between creativity and non verbal and verbal intelligence on the other hand was significant.
- (3) The components intelligence and creativity are two different constructs.
- (4) Boys showed superiority in nonverbal creativity and girls in verbal creativity.

Pande (1978) has studied Interest, Aptitude and personality factors as predictors of scholastic achievement. The main objective of the study was to find out how far certain interest, aptitude and personality variables predict the scholastic achievement of students and to develop a battery of tests for the same purpose. The four centroid factors were rotated by the varimax method of rotation. The first method was general scholastic ability with the highest positive loadings of cognitive abilities on it. The second and third rotated factors were personality (non intellectual) and interest (curricular). Eight variables has offered a single classification battery which by means of differential weighting procedures,



enable one to measure differentially the scholastic developments and predict from the scores on variables at the beginning of secondary schooling. The scholastic achievements at the end of class IX of students offering humanity courses and science courses in secondary schools.

Pathak (1983) An attempt was made in the present study to test the interest and intelligence patterns in adolescent students. Sample of 400 students studying in IX to XII. The findings were as follows.

- (1) The children with high IQ's tend to have a wider range of hobbies and interests and tend to be most mature in their interests than children of lesser intelligence do.
- (2) Lower IQ groups are attracted with extra curricular activities.
- (3) Activities such as drama and social publications draws children of higher I.Q.

Rastogi (1964) investigated in the study of the relation between intelligence, interest and achievement of the high school students. The investigation aimed at studying the relationship between intelligence,

interest and achievement in English and science of high school students. The findings were as follows.

- (1) The relationship between intelligence and interest in English and that between intelligence achievement in science were found significantly positive.
- (2) Interest and intelligence were found, more or less, equally correlated with achievement in English and with that in science.
- (3) A combination of intelligence and interest was a better predictor of achievement in English and in Science than either interest or intelligence alone .

Vaidya (1964) using questionnaire approach (N=60) as well as interview approach (N=31) found adolescent boys of two schools in Central London, solving problems over a wide I.Q. range (on 11 + test). The study also revealed that generally the adolescent pupils set up hypotheses which they test against the given data.

Rao (1965) investigated in the study of some factors related to scholastic achievement. The study was undertaken to find out the relationship of intelligence, study habits, socio-economic status, and certain attitudes towards the school with the academic achievement of the grade VIII pupils of Delhi and to find out the feasibility of predicting the academic achievement of these students.

The findings were -

- (1) Intelligence, study habits and school attitude were significantly related to the prediction of scholastic achievement while socio-economic status was not.
- (2) The multiple correlation coefficient between achievement score and the scores of intelligence was quite high.
- (3) Intelligence study habits and attitude towards school accounted for sixty six percent of the predictability of the scholastic achievement and remaining thirty four percent of the variance in achievement remained to be accounted for.

Shahj (1973) has studied sex differences in factorial structure of cognitive area at school level. The major objective of the study were to examine two hypotheses namely there are no sex differences in the organisation of mental abilities of boys and girls and the operation of mental functions cannot be separated from content 400 boys and girls reading in X class were the respondents.

The findings were -

- (1) An independent factor was demonstrated among boys but not among girls.
- (2) No sex difference in mental structure of boys and girls was also not supported.

Sansanwal and Joshi (1979) has studied effect of personality, intelligence and their interaction on achievement through instructional strategy. To collect data regarding intelligence Mandsley personality inventory for personality and criterion test for achievement.

Results - Achievement of students belonging to different levels of intelligence differ significantly. Personality of students did not influence the achievement of students. The interaction of two did

not influence the achievement of the students.

Mathur (1981) investigated the Growth of experimental mind during adolescence on a sample of 120 pupil's studying in grades VI to XI ranging in age between 11 + to 16 + she found the performance on Piaget type tasks show an increasing trend with grade within occassional fluctuations on certain tasks. It was also found that the capacity to grasp the essence of the problem increase with grade.

Ajwani, J.K., (1979) problem solving behavior in relation to personality, intellegence and Age. In his doctoral work found that,

- (1) The subject with high intillegence proved to be better problem solvers than those with low intelligence.
- (2) The problem solving ability of the subjects increased with an increase in age.
- (3) No significant sex difference were observed in the subjects' ability to solve problems.



PART-B Research studies on science.

It was hoped that increasing interest in science would result in increase in science enrolments and increase in experimental mind. The increased attention to the affective outcomes of science has also resulted in a proliferation of attitude research studies (more than 30 such studies were published in 1979 in the United States). More measuring techniques (one recent review identified 50 techniques) and several attempts have been made to measure attitudes towards science on an international scale.

Research Studies On Science :

Beard (1962) studied the effect of schooling on scientific reasoning and found that for 8 to 16 years olds, the level of logical thinking varied extensively between schools. Almost all subjects in one school failed to either treat the variables in the task independently or to conclude that only one variable was significant. In another school nearly all subjects over age 10 were able to separate the variables- yet in another three subjects showed the usual pattern of increasing success with age, previous classroom experience appeared to play an important part in the ability to control variables.

Jha (1970) studied an investigation into some factors related to Achievement in Science by students in secondary schools. The study examined the nature of relationship between intelligence, science aptitude adjustment, anxiety, extraversion, study habits, and socio-economic status on one hand and achievement in science on the other hand. The findings were -

- (1) There was a significant positive relationship between achievement in science and general intelligence, scientific aptitude adjustment.
- (2) There was no relationship between achievement in science and extraversion.

Vai. dya (1975) studied the Growth of Logical Thinking in Science during Adolescence on a sample of 100 boys and 100 girls studying in grades VI to X matched on intelligence SES. They were observed solving a series of seventeen different problems. The main findings of this study are -

- (1) Average performance on each problem increases with grade.
- (2) Pupils commits a large number of errors while engaged in problem solving.
- (3) Adolescent pupils are affected by the content of the problem than the nature of the problem contrary to Piaget's view.

- (4) Whereas adolescent pupils are in a position to set up hypotheses, they are not in a position to test them which shows that their minds have not yet become experimental.

Theoretical Literature on Academic Achievement :

Academic achievement is knowledge attained or skills developed in the school subjects usually designated by the test scores or marks assigned by teachers some studies on Academic Achievement are as follows :

Sharma (1968) studied relationship of self concept with Anxiety and School Achievement of Adolescents. In this study the researcher investigated the relationship of self-concept (two measures: positive/negative self concept, and self-ideal discrepancies) and general anxiety with school achievement. The findings were -

- (1) Both self-concept scores and self-ideal discrepancy scores were curvilinearly related to school achievement.
- (2) The values denoted a significant linear relationship between two measures of self-concept and anxiety.

Bhasin (1974) has studied relationship of school perception to academic achievement at high school level. The study attempted to find out the relationship of total school perception to academic achievement of students of High School Level, keeping in a view the variable of intelligence, self concept, sex, socio-economic status and teacher perception of students behaviour. The sample of 200 students was selected randomly. The findings were -

- (1) The correlations of SPPT with other variables were all positive and significant at 0.01 level.
- (2) The correlations of SPS with other variable were significant.
- (3) Girls showed higher school perception.

Seetha (1975) has studied an enquiry into the psychological and social factors affecting accademic achievement. The findings were -

- (1) High achievers possessed superior intelligence compared with low and non-achievers.
- (2) High achievers possessed good study habits and low achievers had poor study habits.

Goswami (1978) investigated in the study of self concept of Adolescents and its Relationship to scholastic achievement and adjustment. The objectives of the investigation was to study the self-concept of the school-going adolescents and its relationship to sex, intelligence, place of residence scholastic achievement and adjustment. The sample consisted of 765 students (male and female) of class X of the Secondary Schools of Agra City.

The findings were -

- (1) Self-concept and intelligence had a significant positive correlation.
- (2) Self-concept mean scores of urban and rural students had no significant difference.

Subrahmanyam and Ramadevi (1991) had studied some differential characteristics of high and low achievers in Secondary Schools. Objectives of the study were to examine the differences between high and low achievers with regard to their intelligence, creative talent, reading ability and achievement motivation. The conclusions were -

- (1) The high achievers possess higher level of mental ability and low achievers possess low intelligence.



- (2) The high achievers were motivated towards achievement.
- (3) School is the proper place to make use of intellectual ability to nurture the creative potential in pupils to improve reading skills, to inculcate good and healthy attitudes towards educational and goals of life.

SRIVASTAVA, N.N., (1980) has studied the scientific attitude and its measurement. The main findings of the study were -

- (1) The amount of scientific knowledge or general exposure to science courses made impact on scientific attitude positively.
- (2) Scientific knowledge helped in the formation of scientific attitude.
- (3) Boys and girls differed in respect of scientific attitude.
- (4) Male teachers and female teachers did not differ in respect of scientific attitude.

Nayar, P.P., (1971) studied some predictors of achievements in science at the Secondary School stage. He reveals that-
The differences between the mean scores of boys and girls on Numerical ability problem solving and critical thinking. Appraisal Tests were significant at 0.01 level, boys being superior.

Deshpande Sulbha,(1991) She studied relationship between scientific attitude and academic achievement of Adolescents at different levels of intelligence and found that,

- (1) There is no relationship between academic achievement of students and level of scientific attitude.
- (2) The achievement of those with high I.Q. is higher than that of the low I.Q.
- (3) There is relation between the scientific attitude and intelligence.