# CHAPTER – II

# REVIEW OF RELATED LITERATURE AND RESEARCH

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STUDIES ON COGNITIVE DEVELOPMENT

RESEARCH STUDIES DIRECTLY AND INDIRECTLY RELATED TO THE PROBLEM

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## STUDIES ON COGNITIVE DEVELOPOMENT

The following research works are related to the formal operational thinking ability of higher age groups.

**Anand, C.L. (1923)** investigated, How socio-economic conditions and medium of instructions affect the mental ability and school performance of the children in Mysore (Karnataka) state.

This study was based on the effect of socio-economic conditions and medium of instruction on the mental ability and school performance of the children. In this study, he found that, in non-verbal intelligence, the performance of English medium students is more than Kannada medium students. And in verbal intelligence performance of Kannada medium students is more than that of English medium students. He also found that, how the socio-economic conditions and medium of instruction affects mental ability and school performance of the children.

**Smoke (1961)** investigated, in his study of "Role of Hypotheses in Concept Formation", that in the concept formation

there is a specific group and stating of hypotheses plays a very important role in concept formation.

**Vaidya, N. (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, D.G. (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 attitude 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.

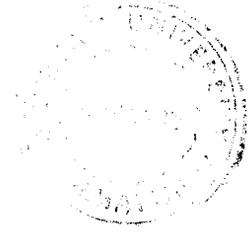
3. Intelligence study habits and attitude towards school accounted for sixty six per cent of the predictability of the scholastic achievement and remaining thirty four per cent of the variance in achievement remained to be accounted for.

**Passi, B.K. (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 ion the other hand was significant.
3. The components intelligence and creativity are two different constructs.
4. Boys showed superiority in non-verbal creativity and girls in creativity.



**Shahj, S.L. (1973)** has studied sex differences in factoral 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.

**Pande, M.B. (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 intellective) 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 predicts from the scores on variables at the beginning of secondary schooling. The scholastic achievement at the end of class IX of students offering humanity courses and science courses in secondary schools.

**Ajwani, J.K. (1979)** problem solving behaviour in relation to personality, intelligence and age. In this doctoral work found that –

1. The subject with high intelligence proved to be better problem solver tan those with low intelligence.
2. The problem solving ability f the subjects increased with an increased in age.
3. No significant sex difference were observed in the subjects ability to solve problems.

**Sansanwal, D.N.** and **Joshi, A. (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 of student. The interaction of two did not influence the achievement of the students.

**Mathur, M.A. (1981)** investigated the growth of experimental mind during adolescence on a sample of 120 pupils studying in grades VI to XI ranging in age between 11+ to 16+. She found the performance on Piaget type task show an increasing trend with grade within occasional fluctuations on certain tasks. It was also found that the capacity to grasp the essence of the problem increase with grade.

**Pathak, K.C. (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 I.Qs 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 I.Q. groups are attracted with extra curricular activities.
3. Activities such as drama and social publications draws children of higher I.Q.

## RESEARCH STUDIES INDIRECTLY RELATED TO THE PROBLEM

The research work indirectly related to the problem.

**Mecke, G. and Mecke, V. (1971)** are the only investigator who found a sample of 15 years olds who all appeared to use formal operations. However, they determined that a subject used formal operations, if he simply used a systematic approach to eliminate the irrelevant variables emhasizes the need for clear, workable standards for further research on formal operations. The task used, the subjects previous experience, and the definition of formal operations all effect the performance of subject said to exhibit formal operations.

**Mishra, R.M. (1973)** investigated the role of hypothesis in problem solving among grade X science students. His study indicated that no sex difference 'exist between the top group and the bottom group on the number of hypothesis emitted by them.' It was also found that the problems were solved over a wide I.Q.,. range and many adolescents had found difficulty in testing hypothesis.

**Somerville, S.C. (1974)** administered Inhelder and Piaget's (1958) Pendulum problem on a sample of 236, ten to fourteen years old individually and their responses were recorded verbatim.

The author concludes, 'overall level of performance on the pendulum problem is strongly related to age, but not to sex or to the school attended'' The results in general support Inhelder and Piaget's account of the transition from concrete to formal thinking.

**Karplus, R., Karplus, E., Formisano, M. and Paulsen, A. (1975)** gave both proportional reasoning problems and controlling variables problems to 13 to 15 years old in seven countries. About 25% of the subjects used formal operations on proportional reasoning. While about 20% used formal operation on controlling variables. The relative difficulty of the two tasks were not well correlated over the entire population. They concluded that, the programme used for teaching Science and Mathematics in each country influenced the likehood of demonstrating formal reasoning ability. These findings parallel those Lovell (1961) for school within England.

**Joyce, L.K. (1977)** in 'A' study of formal reasoning in Elementary Education – Majors, found that subjects were most successful with the syllogism, and least successful with the pendulum problem. The pendulum task required stating and testing of hypothesis and only one third of the subjects in this

study were able to control with the suggested variables in a logical and consistent manner.

**Grewal, Avinash (1978)** investigated the relationship between hypothesis 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 significantly co-relations between hypothesis testing ability and creativity variables like fluency originality.

**Kansakar, L. (1979)** conducted a study on exclusion of variables during adolescence using a Piaget type problems ion a sample of 100 students of classes VIII, IX,X and XI (25 from each class) the age ranged between 12 to 17 years. She found, (1) mean performance on all the problems show an increasing trend for stating and testing hypothesis with grade. (2) All the problems are strongly correlated with other. (3) Using the top 25% and bottom 25% groups, it was seen that they differ significantly from each other in respect of variables, age and grade but not in intelligence.

**Padmini, M.S. (1982)** investigated in the study of the Growth of Exclusion of Variables During Adolescence. The investigation aimed at studying the scheme of thought as

propounded by Jean Peaget and the relationship between the scores of certain aspects of exclusion of variables and some outside variables such as Age, Sex, Intelligence, Personality characteristics and Aptitude.

The findings were as follows :

1. The four problems of stating of hypotheses have attracted a wide spectrum of thought.
2. Mean performance on this variable (stating hypotheses) increase with grade and indirectly with chronological age.
3. Sex differences with occasional fluctuation exist favouring girls, across grades as well as across problems of testing hypotheses.
4. Ability to formulate novel questions with minor fluctuation was found to increase with grade.
5. Majority of the adolescent pupils are attracted more by the content rather than the form of the problems.
6. The successful problem solvers are good hypotheses stater and testers.

**Borage, M.B. (1995)** investigated in the study of Effect of Medium of Instruction on the intellectual development of the adolescents. The investigation aimed at to investigate

incorporating Piaget's task and to find out the ability of stating and testing hypotheses between adolescent from English medium school and adolescent from Marathi medium school.

The findings were as follows :

1. The ability to state hypotheses and test hypotheses increase with age.
2. There is significant sex difference in ability to state and text hypotheses.

No attempt has been made earlier to study the student-teachers formal operational reasoning ability along with the effect of medium of their instruction in the geographical area of Belgaum district. This study will be the first attempt to this nature in the geographical area of Belgaum district.