CHAPTER – II
REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

This chapter deals with the review of related literature. It is an attempt to discover the relevant material published in the problem area under study. This covers the empirical research studies done previously in the problem area. The studies conducted during the last few decades, which were found relevant and pertinent to the research investigator are discussed in this chapter.

2.2 NEED AND IMPORTANCE OF REVIEW OF RELATED LITERATURE.

Review of related literature besides allowing the researchers to acquaint them with current knowledge in the field or area in which one is conducting research serves the following purposes.

1) The review of related literature enables the researchers to define the limits of his / her field. It helps the researcher to define their problem. The knowledge of related literature brings the researchers up to date on the world which others have done and thus to state the objectives clearly and concisely.

2) By reviewing the related literature the researcher can avoid unfruitful and useless problem areas. Here the investigator has selected those areas which have positive findings, very likely to result and likely to add the knowledge in a meaningful way.

3) Through the review of related literature the researcher can avoid unintentional duplication of well established findings. It is no use to replicate a study when the stability and validity of its results have been clearly established.
4) The review of related literature gives the researcher an understanding of research methodology which conducted. It helps the researcher to know about the tools and instruments which proved to be useful and promising in the previous studies. The advantage of the related literature is also to provide insight into the statistical methods through which validity of the results is to be established.

5) The final and important specific reason for reviewing the related literature is to know about the recommendations of previous researchers listed in their studies for further research.

6) It provides the up to data information about the literature to his / her own problem related to his / her own problem related to the present topic already done by others. It is considered as a pre-requisite actual planning conducted by the study.

7) It provides significant information in the formulation of hypotheses, objectives and definitions of technical terms, selection of tools and the whole methodology.

2.3 STUDIES RELATED TO SCIENTIFIC CREATIVITY AND ACADEMIC ACHIEVEMENT

- **Ekta Sharma (2009)** studied ‘Relationship of creativity with academic achievement, achievement motivation, self-concept and levels of adjustment among adolescents’.

The study attempted to (i) Identify different levels of creativity, Achievement, Motivation, self-concept, Index of brightness and adjustment among adolescents (ii) study the contribution of creativity, achievement motivation, self concept, index of brightness, adjustment (iii) study the interaction between creativity, achievement motivation, self concept, index of brightness and adjustment and its effect on academic achievement of adolescents (iv) study the relationship between all the variables to accomplish the objectives the data was
collected through sample of 770 students of Government schools of West Delhi in the age group of 14-15 years, using the Baqer Mehdi’s Test of creative thinking, Deo-Mohan’s Achievement motivation (D-ACM) Scale, Pandey’s Adolescent adjustment analyzer, Pratibha Deo’s Self concept scale, Mohsin’s General Intelligence test and school cumulative records. The data so collected was quantitatively analyzed through statistical techniques of ANOVA, Regression analysis, Pearson’s Product Moment Coefficient of correlation and F-test. The different levels of all independent variables were found and by taking three variables at a time, it was found that (i) there is no significant interaction effect of creativity, Achievement motivation, Self-concept, Index of brightness and adjustment on mean performance of academic achievement of adolescents (ii) There was significant contribution of creativity, achievement motivation and index of brightness in predicting Academic achievement of adolescents, whereas self-concept and adjustment didn’t contribute in predicting Academic achievement of adolescents. (iii) Index of Brightness and adjustment were negatively correlated to creativity, Academic motivation, Self-concept and academic achievement among adolescents. However both these variables were positively correlated to each other.

- **Bracha (Bar) Ariele (2007)** college of Education Kansas state University Mahattan Kansas.

Has explored the inclusion of creative drama into science teaching as an instructional strategy for enhancing elementary school students understanding of scientific concepts. A treatment group of sixth grade students was taught a full option science system (FOSS) science limit on mixtures and solutions with the addition of creative drama while control group was taught using only the FOSS teaching protocol. The researcher concluded that the inclusion of creative drama with the FOSS unit enhanced student’s scientific knowledge and understanding beyond that of the FOSS unit alone that both teachers and
students reacted positively to creative drama in science and that creatively
drama requires more time.

- **Venkoba Narayanappa and Syeeda Akthar 2007** conducted a study on
creativity of secondary school students in relation to their academic
achievement and socio economic status.

  Objectives of the study were - 1) To identify the scientific creativity
among the secondary school students. 2) To identify the significant positive
correlation between the scientific creativity and academic achievement if
secondary school students. 3) To identify the significant positivity correlation
between the scientific creativity and socio economic status of secondary school
students. Methodology: 100 secondary school students of a standard of Bijapur
city in Karnataka formed the sample of the study. Tools and were verbal test of
scientific creativity developed and standardized by V .P. Sharma and J.P.
Shukla.

  The percentage means score and standard deviation were computed,
the‘t’ test correlation were used for analysis of the data. Findings were - 1)
there is a scientific creativity among 9th standard students. 2) There is
significant difference between the subgroups i.e. Urban and Rural Govt. and
private in their scientific creativity. 3) There is no significant difference
between the sub groups i.e. boys and girls Urban boys and Urban girls, Rural
boys and Rural girls Urban Govt. school and Urban private, Rural govt. school
and Rural private school in their scientific creativity. 4) There is a significant
positive correlation between the scientific creativity and academic achievement
of the subgroups is all 9th standard students urban school Urban Govt. school
girls of Urban Govt. School and Rural govt. school. 5) There is no significant
positive correlation between the scientific creativity and academic achievement
of the subgroups i.e. rural school rural private school and boys.
Patel, M.M. 1992. Conducted Study on an enquiry into the scholastic achievement in the context of intellectual ability, creativity, personality traits, family background and other personal variables of talent search scholars of Gujarat.

Objectives were: i) To study the individual as well as joint contribution of intelligence, originality, fluency, flexibility, total creativity, socio-economic status, the factors of personality and study habits in predicting scholastic achievement of TSS of Gujarat, ii) to study all above-mentioned variables of top students of Gujarat, as rated high by their teachers, iii) to find out the relationship among intellectual ability, creativity, personality traits, socio-economic status, study habits and SA of TSS of Gujarat as well as of top students of Gujarat as rated high by their teachers, iv) to compare: SA of TSS belonging to first, second and above second birth order by taking intelligence and creativity as covariates; and also that of top students as rated high by their teachers, v) to compare: SA and each factor of personality of TSS varying with their fathers and mothers educational qualification, taking intelligence and creativity as covariates; as well as that of top students as rated high by their teachers, vi) to compare the scholastic achievement of TSS and top students as rated high by their teachers, and vii) to study the difference between those two groups in respect of intelligence, creativity, personality traits, socio-economic status and study habits separately. Methodology was as follows: out of the total 188 Gujarati medium school pupils of 1987 and 1988 whose names were recommended by the Gujarat State Examination Board for the national talent search examination, the data could be collected for 111 pupils out of which 11 pupils were dropped out as the data gathered was incomplete. Thus the sample consisted of 100 pupils from eleven different places of Gujarat and another group of 100 pupils who were studying in the same schools from which TSS were taken up and rated as top students by the teachers. Thus the sample was purposive, spread over the whole of Gujarat. The tools
utilized for data collection were, General Ability Test (GAT) developed by Pallavi Patel, Creative Ability Test (CAT) developed by Lilaben Devda, High School Personality Questionnaire (HSPQ) developed by R. Thakur, Scoio-economic Status Scale developed by Patel and Vora and Study Habits Inventory (SHI) developed by B.Patel. Multiple regression and multiple coefficient of corelational analyses as well as ANOVA and ‘t’ tests were utilized for the analysis of data. Major Findings were; 1) In group A (TSS), the joint contribution of intelligence, originality, fluency, flexibility, creativity, personality traits, and socio-economic status and study habits in the prediction of SA was 39.70%; the same for group B (pupils rated as top) was 24.63%. 2) The respective contribution of intelligence, creativity, factor G and factor J was 6.04, 16.59, 9.11 and 4.11 percentages in group A while in group B, the maximum contribution was of creativity (6.83%) followed by intelligence (6.65%). In group A, the contribution of fluency was 11.62% that is fluency seemed to cause a hindrance in the SA of pupils; in group B, the contribution of fluency was 3.69% in the prediction of SA. 3) In group A, correlations of intelligence, originality, fluency, flexibility, creativity, factors G and J socio-economic status, study habits with SA were 0.281, 0.072, 0.204, 0.258, 0.228, 0.238, 0.215, 0.161, while the respective values for group B were 0.28, 0.091, 0.298, 0.250 and 0.32; personality traits G and J, socio-economic status (0.15) and study habits (0.17) had non-significant correlation. 4) It was found that in groups A and B, the birth order, father’s and mother’s education did not influence SA; in group A only factor G was found to be an influence on SA; SA of group A was higher than that of group B; group A excelled group B in intelligence, fluency, flexibility and creativity; in factor B group B excelled group A, while in factor G, group A excelled group B. Pupils selected for talent search examination were found to be superior to top pupils rated by teachers in many variables such as intelligence, originality, creativity, flexibility, fluency, factor G, etc. (JHS 1052)
• **Kaur Parvinder. 1992.** Conducted Study on Relationship among creativity, intelligence and academic achievement in different subjects of X Graders.

Objectives were: i) To determine the relationship of composite creativity and its dimensions with intelligence and subject-wise academic achievement of male and female students, ii) to determine the common effect of intelligence on the relationship between creativity and subject-wise academic achievement of males and females, iii) to explore the relationship of intelligence with subject-wise academic achievement of males and females, iv) to study the common effect of creativity on the relationship between intelligence and subject-wise academic achievement of males and females, v) to determine the relative efficiency of creativity and intelligence as the predictors of subject-wise academic achievement of males and females, and vi) to study the conjoint effect of creativity and intelligence towards the predication of subject-wise academic achievement of males and females. Methodology was as follows; the sample comprised 600 Class X students, 300 boys (150 rural, 150 urban), 300 girls (150 rural, 150 urban) selected through stratified random sampling technique from 30 high/higher secondary schools of Patiala District of Punjab. The tools used were Torrance Test of Creative Thinking (Verbal Form A), and Samoohik Mansik yogyata Pariksha by R.K. Tandon, apart from the marks of students in the Class IX annual examination conducted by Punjab School Education Board. Product-moment correlation, partial correlation, multiple co-relation, coefficients of determination for relative predictive efficiency, F-ratios for level of significance of R values were the statistics used for data analysis.

Major Findings were: 1) For males intelligence was positively correlated with fluency, flexibility, originality and composite creativity. 2) (a) For males fluency, flexibility, originality and composite creativity were positively related with achievement in Punjabi, Hindi, English, Mathematics and general science and originality and composite creativity
were also related with achievement in social studies. (b) For females as well as the total sample, fluency, flexibility, originality, and composite creativity were positively and significantly related with achievement in each of the five subjects. 3) For males when intelligence was (a) fluency was positively related with achievement in Punjabi but negatively with the social studies but not with the other subjects, (b) flexibility was not related with achievement in any of the six subjects, (c) originality was positively related with achievement in Punjabi, and mathematics, (d) composite creativity was related with achievement in Punjabi and mathematics but not with the other four subjects. 4) For females when intelligence was partialled out(a) fluency was positively related with achievement in all the subjects, except general science, (b) flexibility was related with achievement in the three languages but not with the other three subjects. (c) Originality as well as composite creativity was related with achievement in all the six subjects. 5) For the total sample when intelligence was partialled out fluency was related with achievement in Hindi and English originality was related with achievement in the three languages and general science, composite creativity was related with achievement in all subjects (r from 0.11 to 0.16) except social studies. 6) For males as well as females intelligence was positively related with achievement in all the subjects; the same was true for the total sample. 7) For both males and females, when the effect of creativity or its dimensions were partialled out. All the inter-correlations between intelligence and achievement ranged from 0.16 and 0.61 and from 0.28 to 0.50 for the total sample. 8) Intelligence was found to be a better predictor than fluency, flexibility and originality of achievement in all subjects. Intelligence was also a better predictor of achievement in all subjects than the total creativity except in the case of females where achievement in English and Hindi was slightly better predicted by composite creativity. 9) The prediction of achievement in school subjects when made on the basis of conjoint effect of creativity and intelligence was higher than if made on the basis of each variable separately. (AK 1670)

Objectives were: i) To develop and validate a test of scientific creativity, problem-solving and risk-taking behavior for children in the age group of 12+ residing in Madhya Pradesh, ii) to investigate the differences between tribal and urban students with respect to scientific creativity, problem-solving ability and risk-taking tendency, iii) to investigate the sex differences with respect to scientific creativity, problem-solving ability and risk-taking tendency, iv) to study the relationships between scientific creativity, problem-solving ability and risk-taking tendency, and v) to study the factor structure for tribal student and for urban students with respect to the components of scientific creativity, problem-solving ability (with Greene’s classification) and risk-taking in ten areas. Methodology was as follows: Six hundred and fifty urban students formed the sample of the study. The tools used included Scientific Creativity, Problem-solving Ability, and Risk Taking Tendency- all developed by the investigator. Mean, SD, ‘t’ test, F, and the Varimax technique of factor analysis were used for the analysis of data. Major findings were: 1) Urban students were significantly better than the tribal’s in fluency, flexibility and originality. 2) Urban students were superior to tribals in all the levels of Green’s classification of problem-solving ability and risk-taking tendency. 3) There was no sex difference with respect to scientific creativity. 4) Girls were superior to boys in problem-solving ability. 5) Boys were superior to girls in risk-taking. 6) There was a significant relationship between scientific creativity and risk-taking; scientific creativity and problem-solving; and problem-solving and risk-taking. (JSP 1304)
Gujarathi, Nalini M. 1992. Conducted Study on Preparation of a integrated programme of training in scientific creativity and experimental study of its effects on students of Grade IX.

Objectives were; i) To prepare an integrated programme of training in scientific creativity and ii) to test it experimentally on secondary school students studying in Grade IX. Methodology was as follows; the sample consisted of 60 students. The tools used were Majumdar Scientific Creativity Test. (Part I and II), Scientific Creativity Test developed by the researcher, and Progressive Matrices Test by Raven. The Wilcoxon Mann-Whitney ‘U’-test was used for the purpose of analysis of data. Major Findings were: 1) On the Scientific Creativity Test, the experimental group received higher Z and expected. The results were highly significant. 2) On results for the researcher’s scientific test, as the experimental Z score was much higher than the table value of Z on all the four scores of creative abilities, the results were highly significant. 3) The main objective of preparing an integrated training programme in scientific creativity was achieved. 4) The test in scientific creativity constructed by the researcher was reliable and valid for measuring the effectiveness of the training programme. 5) The gains in the tests of scientific creativity by the experimental group were highly significant. (AGB 1286)

Gautam, Shashi. 1992. Conducted Study on Development of creative thinking and leadership among Navodaya Vidyalaya students

Objectives were i) To study the development patter of creative thinking and leadership behavior characteristics among the Navodaya Vidyalaya students of Himachal Pradesh, and ii) to study the sex differences in the development patter of creative thinking and leadership behaviour among the Navodaya Vidyalaya students of Himachal Pradesh. Methodology was as follows : many as 866 randomly selected students from Grades VI, VII and VIII from five Navodaya Vidyalayas formed the sample of the study. The
tools used were leadership Behavior Characteristics Questionnaire, Verbal Test of Creative Thinking, and Socio-economic Status Scale Questionnaire. Analysis of variance was used for the purpose of analysis of data. Major Findings were: 1) There was a significant development pattern of creative thinking among the Navodaya Vidyalaya students of Himachal Pradesh in the case of the dimensional components of fluency and flexibility but not in the case of the originality component of creative thinking. 2) There were no significant sex differences in the development pattern of creative thinking, though girls tended to be more creative than boys on dimensional scores of fluency, flexibility, and originality, as well as, on total scores of creative thinking. 3) The high and the low socio-economic status groups of students did not differ on creativity. 4) There was a significant development pattern from Grades VI to VIII among students of Himachal Pradesh in the total leadership behavior. 5) The low SES students exhibited better leadership qualities as compared to their high SES counterparts. 6) There was significant development pattern of communication qualities of leadership behavior among the students. (LK 1318)

- **Singh, Daljit. 1991.** Conducted Study on Creativity and intelligence as correlates of teaching effectiveness of secondary school teachers.

Objectives were: i) to study the relationship of teaching effectiveness with intelligence and creativity among male and female teachers, and ii) to predict extent of effect of creativity and intelligence on teaching effectiveness. Methodology was as follows: The sample included 150 male and 150 female secondary school teachers of Punjab, selected through the multi-stage stratified random sampling technique. The instruments employed in the study included the Torrance Tests of Creative Thinking-Verbal Form A, the Samoohik Mansik Yogyata Pariksha (Group Test of Intelligence) of R.K. Tandon, and the Teacher Effectiveness Scale of Pramod Kumar and D.N. Mutha. Coefficient and correlation regression
lines and their standard errors of estimation, multiple correlation and F-ratio were calculated while treating the data. Major Findings were: 1) among the male and female teachers, teaching effectiveness was positively related with fluency, flexibility originality, composite creativity and intelligence. 2) Creativity and intelligence taken jointly were considered better predictors of teaching effectiveness than taken separately. (AK 1854)

- **Ghosh, M.C. 1991.** Conducted Study on A study in creativity, motor ability and motor creativity of adolescent students.

  Objectives were i) To find the relationship between creativity, motor ability and motor creativity, ii) to study whether motor creativity was dependent upon creativity or on motor ability or on both, iii) to study whether sex or strata (in this case, athlete and non athlete) had any influence on creativity and its components, on motor ability, and on motor creativity, and iv) to study whether motor creativity could predicted if the original scores of creativity and motor ability were known. Methodology was as follows; the sample comprised 600 students aged between 13 to 16 years. The tools used were Passi Tests of Creativity (Bengali version by M.C. Ghosh), Motor Ability measured through five Standardized Tests, and Motor Creativity measured through a newly constructed Motor Creativity Test consisting of five test items. Descriptive statistics, Analysis of variance, product-moment correlation, multiple correlation, and regression analysis were used for the analysis of data. Major Findings were; 1) Boys were superior to girls in motor ability, creativity and its components. 2) Athletes were superior to non-athletes in motor creativity. 3) The boys athlete group was superior in all the parameters to the other three groups. 4) Creativity, motor ability and motor creativity were positively related with each other. 5) The scores of all the four groups in motor creativity, creativity and motor ability had a significant relationship. 6) Motor creativity scores were directly related with scores in motor ability and
creativity, and were also dependent upon them. 7) Motor creativity scores
could be predicted from the multiple regression equation with the help of
creativity and motor creativity scores. (PDR 0618)

- **Padhan, G. 1990.** Conducted Study on creative thinking in relation to
socio-economic status and scholastic achievement of the higher secondary
students of Baroda City.

Objectives were: i) To find out the various levels of creative thinking,
ii) to identify the dominant factors related to creative thinking, iii) to study
the relationship between creative thinking and socio-economic status, and
iv) to study the relationship between creative thinking and scholastic
achievement. Methodology was as follows: The sample of the study
comprised 201 students of Standard XI of three English medium schools of
Baroda City selected through random sampling technique. The tools used
for collecting the data were three sub-tests of the Passi Test of Creativity
(verbal), and Socio-economic Status Scale by Rao. The collected data were
treated using quartile deviations, and correlation coefficient. Major Findings
were; 1) Sensitivity, fluency, flexibility and originality were identified as
the main factors linked with creative thinking. 2) There was no significant
relationship between creative thinking and socio-economic status.
However, it was found that there was significant and positive relationship
between creative thinking and scholastic achievement, 3) Relationship of
fluency and originality with socio-economic status was found significant
while relationship between flexibility and socio-economic status was found
to be insignificant. However, it was found that there was a positive and
significant relationship between fluency, flexibility originality and
scholastic achievement. (MSY 0934)
Singh, S. 1990. Conducted Study on Creative thinking in relation to level of aspiration field dependence/independence and study habits among Scheduled Castes and Scheduled Tribes students.

Objectives were: i) To compare high and low verbal creatives among Scheduled castes and non-Scheduled Castes students in relation to their level of aspiration, field dependence/independence and study habits, ii) to compare high and low picture creatives among Scheduled Castes and non-Scheduled Castes students in relation to the above variables, and iii) to study the effect of locality, faculty, level of achievement and sex of students in relation to their creativity. Methodology was as follows: One hundred and sixty-five Scheduled Castes and 447 non-Scheduled Castes students from Classes XI and XII studying in 15 secondary schools in the Rohilkhand region were selected by the multi-stage random sampling technique. Verbal and Non-verbal Tests of Creative Thinking by Torrance Test of Level of Aspiration by Shah and Bhargava, Group Embedded Figures Test by Oltman, Raskin and Witkin and Study Habit Inventory by Raina and Kumar were used in the present study. The statistical techniques used included ‘t’ test, ‘F’ test, correlation matrix and analysis of variance. Major Findings were: 1) there was no significant relationship between creativity and level of aspiration of Scheduled Castes as well as non-Scheduled Castes students. 2) Among Scheduled Castes students, high picture creatives were more filed-independent than the low picture creatives. 3) Among the non-Scheduled Castes students, high verbal creatives were significantly more field-independent than their low verbal creative counterparts. 4) The difference between the study habits of high creative and low creative Scheduled Castes students was insignificant. 5) High and low picture creatives of non-Scheduled Castes group differed significantly and positively in terms of study habits. 6) On verbal creativity, the Scheduled Castes urban and science students excelled significantly as compared to their rural-group and arts-group counterparts.
7) Among non-Scheduled Castes students, the urban group and high achievers showed significantly higher verbal-creativity than their rural group and low-achiever counterparts. 8) Among Scheduled Castes students, urban students were found to be significantly better with respect to picture creativity than the rural students. 9) Among the non-Scheduled Castes students under the urban category, female and science groups were significantly better in picture creativity than their counterparts of rural, male and arts groups, respectively. 10) The creativity of any student did not influence his level of aspiration. 11) In the case of Scheduled Castes students, picture creativity had positively influenced the field-independence, whereas in the case of non-Scheduled Castes students, it was verbal creativity. 12) The creativity of Scheduled Castes students did not affect their orientation towards the syllabus whereas non-Scheduled Castes students’ picture creativity was found directly proportional to the syllabus-free orientation. 13) In the case of Scheduled Castes student’s locality and faculty of the students had affected their level of creativity. 14) In the case of non-Scheduled Castes students, along with locality and faculty, the sex and the achievement level of the students had also affected their level of creativity. (BS 0959)

- **Gautam, Rajni. 1990.** Conducted study on, A study of creativity values, educational achievement and attitude towards education among Scheduled Castes and other castes students.

Objectives were : i) To study the difference in creativity among Scheduled Castes and other castes students, ii) to study the difference in values among Scheduled Castes and other castes students, iii) to study the differences in the achievement among Scheduled Castes and other castes students, iv) to study the differences in teaching attitude among Scheduled Castes and other castes students, v) to study the sex-difference in creativity, values, educational achievement and teaching attitude, and vi) to study the
effect of subject selection on creativity values, educational achievement and teaching attitude. Methodology was as follows: Two hundred and seventy Savaran, 270 Scheduled Castes and 270 backward classes’ candidates were selected through random sampling. The data was collected with the help of Verbal Test of Creative Thinking by Baqer Mehdi, Personal Value Questionnaire by Sherry and Verma, and Teaching Attitude Inventory by R.M. Saraswat. Various measures, viz. ‘t’ test and correlation, were used as statistical techniques for processing the data. Major Findings were - 1) No significant difference was found in creativity on the basis of caste, sex and subject selection. 2) A significant difference was found in personal values among the students of different castes and sex. 3) A significant difference was found in teaching attitude among the different castes. 4) Different castes, sex and subject groups differed significantly in their achievement scores. 5) A significant difference was found in creativity, values, teaching attitude and achievement among the different groups formed on the basis of sex and subject. 6) Castes, sex and subject selection played no role in promoting or demoting creativity, while caste and sex influenced values. (SS 0761)

- **Tripathi, S.N. and Shukla, M. 1990.** Conducted Study on Development of instructional material for promoting creativity, and its effectiveness. Independent study. Bhopal: Regional College of Education. (ERIC Funded)

  Objectives were : i) To find out whether creativity as measured by Torrance Tests of Creative Thinking (TTCT) can be increased by using creative methods of teaching biology, ii) to find out whether as a result of being taught through creative methods, students show better achievement in problem-solving ability in biology. iii) to prepare instructional material in biology for class IX students which may help to promote creative thinking, iv) to find out whether by giving greater scope to divergent thinking (fluency and elaboration) and imagination in the day-to-day teaching of
biology, an improvement can be brought about in the 18 dimensions of TTCT, and v) to find out the relative effect of the training programme on each of the 18 dimensions. Methodology was as follows: Two groups - experimental and control groups - identified on the basis of pretesting involving intelligence, achievement in biology and creativity-formed the sample of the study. The tools used were Intelligence Test (culture fair intelligence test), Achievement Tests (two achievement tests in biology for Class IX) and Torrance and Ball Tests of Creative Thinking. Mean, median, SD, and factor analysis was used for the analysis of data. Major Findings were; 1) There were certain dimensions of creativity that could be developed through a training programme, however, there were other dimensions which failed to any noticeable impact of the training programme, 2) The training programme did not show any significant gains in terms of originality scores which are so crucial to creativity.


Objectives were: i) To study differences in the performance of reflective and impulsive children on various measures of creativity, ii) to study the relationship between matching familiar figure test (MFFT) performance and creativity. Methodology was as follows - Sixty children of Grade VIII from the Institute of Integral Education, Bhubaneswar formed the sample of the study. The tools used were Matching Familiar Figure Test (MFFT) by Cairo and Cammocko. Progressive Matrices (RPM) by Raven, and the Creative Achievement Test marks of the test examination of the children in painting, handwork, music, and physical education taken from the school record. Mean, covariance and correlation coefficient were used for the analysis of data.
Major Findings were: 1) There was a negative but significant relationship between Matching Familiar Figure Test errors and Matching Familiar Figure Test latency. As errors increased the latencies decreased, and vice versa. 2) There was a significant difference between reflective and impulsive children. 3) There was no significant difference between the scores obtained by the reflective and impulsive children on painting and handwork, music and physical education. 4) The co relational analysis showed that the RPM score and MFFT latencies had a moderate positive correlation with painting, music, and physical handwork. MFFT error had negatively related with all the above subjects except with handwork (KCP 0418)


The objectives of the study were: i) To study the difference between the low and high scientifically creative adolescents on various dimensions of creativity based on the S.I. model of Guilford, ii) to study personality differences between low and high scientifically creative adolescents in terms of cattell’s trait theory, iii) to examine the perception of the home environment (different dimensions) by low and high scientific creative adolescents, and iv) to examine the perception of the school environment (different dimensions) by low and high scientifically creative adolescents. Methodology was as follows; Two hundred students of +2 level from nine private and government schools formed the sample of the study. The tools used were Scientific Creativity Test (MSCT) developed by Majumdar, Jr. Sr. High School Personality Questionnaire (Form A) by Cattell, and questionnaires to measure perception of home and school environment. Descriptive and inferential statistics were used for the analysis of data. Major Findings were: 1) Lower Scientific Creativity (LSC) and Higher Scientific Creativity (HSC) groups differed significantly on all the three parameters of structure of intellect model. The HSC group was found to be better than LSC group on these parameters. 2)
HSC adolescents differed markedly from the LSC adolescents in terms of most of the personality traits. Both groups differed significantly, so far as perceived impacts of home and school environment were concerned. (RDM 0351)

- **Roy, Bina. 1990.** Conducted Study on A study on verbal creativity, general anxiety and self-concept as predictors of creative reading ability of students.

The objectives were: i) To ascertain the creative reading ability of students with the help of a standardized CRA test, ii) to appraise the extent of self-concept and general anxiety of the students with the help of two weighted scales in the two dimensions. iii) to find out sex-wise differences, if any, in the CRA test, iv) to determine the relationship between the creative reading ability of the students and the independent variables stated above in (iii), and v) to develop a regression equation of CRA of the students on the determinants identified in the study. Methodology was as follows, Students of Class VIII of 15 schools in Calcutta and in rural areas formed the sample of the study. The tools used were Creative Reading Test (CRT), Self-concept Questionnaire (SCQ), General Anxiety Neurosis (GAN), and Verbal Creativity (VC). Major Findings were: 1) Boys did not show better creative reading ability (CRA) than girls, while urban students showed better in CRA as compared to rural students. 2) Boys did not show better self-concept than girls. 3) Rural students did not show better self-concept than the urban students. 4) Boys exhibited less anxiety than girls. 5) Creative reading ability and self-concept were found to be significantly correlated. 6) There was a positive correlation between the scores obtained by the students in the CRA test and the VC test. 7) There was a negative correlation between GAN and VC. 8) Creative reading ability could be predicted from SCQ, GAQ, and VCT (PDR 0641)
• **Reddy, Sudhakara Y. 1990.** Conducted Study on An investigation into the creativity of adolescent boys and girls.

Objectives were: i) To find out whether boys and girls differ in their creativity ii) to find out whether urban and rural children differ in their creativity. III) to find out whether creativity is affected by differences in length of schooling and iv) to find out whether high and low creatives differ in their personality characteristics, intelligence, SES, certain familial variables, and personal characteristics and habits of life. Methodology was as follows: Nine hundred children belonging to Classes VIII, IX and X served as the sample of the study. The tools used were a Creativity Test Battery by Venkata Ram Reddy. Raven’s Progressive Matrices, S.V. Socio-economic Status Scale, High School Personality Questionnaire (HSPQ) by Cattell and a Personal Data Sheet. Analysis of variance, ‘t’ test and chi-square were used for the purpose of analysis of data.

Major Findings were: 1) In case of verbal tests urban children were found to be more creative than rural children. 2) There was a significant difference between the creativity the Classes VIII, IX and X children. Each group differed from the other. 3) Though boys scored better than girls the difference between means was not significant. Similar results were obtained for all the three components of creativity, viz. fluency, flexibility and originality and composite creativity. 4) in the case of non-verbal tests, boys scored significantly better than girls. 5) There was a significant difference between the creativity of Classes VIII, IX and X children. Each group differed from the other. Similar results were obtained for all the components of creativity and composite creativity. 6) Rural children tended to score better than urban children on all the components. The difference between means was significant in the case of flexibility, originality and composite creativity but not in the case of fluency. 7) When creativity as measured by both types of tests put together, was analyzed, it was found that a) there was no significant increase in the creativity of children from Classes VIII to IX and IX and X and
this was true for all the components of creativity; b) boys scored better than girls but the difference between means was significant only in the case of fluency; c) similarly, urban children scored better than rural children, but the difference between means was however, significant in the case of fluency only.

8) High and low creatives (drawn from the whole group) were differentiated by all the personality factors except Q4 as measured by the HSPQ. High creatives scored higher on factors B, C,F,G,H, I,J,Q2 and Q3, while low creatives scored higher on factors A,D,E and O. 9) When the analysis was carried out separately for different subgroups (boys-girls, urban-rural children, and children of Classes VIII, IX and X) slight differences in the pattern cited above were seen. 10) There was a significant difference between: a) the mental ability, and b) SES of high creatives and low creatives in favour of the former group. This was true for all the subgroups of children. 11) Compared to low creatives a larger percentage of high creatives; a) tended to do things in an unconventional way; b) read story books, magazines, etc, more frequently; c) had a better general state of health; d) tended to come from nuclear families, and e) perceived a close affinity between the members of the family. 12) High and low creatives did not differ on a) the frequency with which they got silly ideas, b) the number of friends they had, c) the liberty given by parents in doing things, d) the frequency with which they were published by their parents for their mistakes, and e) order of birth. 13) Multiple regression analysis showed that about 37% of the variance in creativity was predicted by the different independent variables included in the study. (AVRR 1258)

- **Gore. C.V.1990.** Conducted Study on ‘A study of the future orientation of Grade IX boys and girls with high level of creativity with respect to certain cognitive and non-cognitive variables’.

  Objective was: To understand the relationship of future orientation among the Grade IX boys and girls with their academic performance as well as their cognitive and non-cognitive personality attributes. Methodology was as
follows: The sample comprised 429 students of Grade IX from 10 different schools located in Nagpur. The tools used were perceived Instrumentality index (P1). High School Personality Questionnaire (HSPQ), Test of Creativity (Cr). Abstract Reasoning Test (AR) by J.M. Ojha (Hindi Version), Achievement Value and Anxiety Inventory (AVAI), and Verbal Test and Intelligence (Parts I and II). Median, un-weighted mean analysis, frequencies, and harmonic mean were calculated for analysis of the data. Major Findings were: 1) those who perceived the relationship between SSC marks and future career goals to be more important and more achievement oriented scored more marks at the SSC. 2) Differences in perceived instrumentality produced differences in SSC examination marks among those who were high in achievement motivation but not among those low in achievement-motivation. 3) Higher achievement oriented students of Grade IX obtained more marks at their SSC examination; also as those who perceived the relationship more important obtained more marks in that examination. 4) When boys and girls were considered separately, instrumental tendencies did not appear to have influenced their examination performance. 5) The perceived instrumentality tended to serve as a significant source of variance in examination performance for the girls but not for boys. 6) The achievement motive served as significant source of variance in examination performance for boys, but not for girls (GPE-1593)


Objectives were: i) To study the development of creativity- Fluency, Flexibility, and Originality- in relation to educational level. ii) To study sex differences in relation to the development of creativity, and iii) to study creativity in relation to locale. Methodology was as follows: The sample comprised 300 rural and urban students. The tool used was the Verbal Test of
Creative Thinking by Baqer Mehdi. Mean. SD, and ‘t’ test were used for the purpose of analysis of data. Major Findings were: 1) A significant developmental change in the mean creativity scores was perceptible among teachers of Classes VI to VIII but the change between classes VI and VIII was only marginal and insignificant. 2) Females were significantly superior to males in creativity. 3) Development differences in creativity existed between urban area students of Classes VI and VII, and VI and VIII as well as their counterparts in rural areas. (SS 0774)

- **Irudayaraj, M. 1989.** Conducted Study on A study of creativity and scholastic achievement in science of standard X students in Devakottai Educational District.

  Objectives were: 1) to identify the level of creativity of the students, ii) to find the achievement level of students in the subject of science, and iii) to identify the association between creativity and achievement scores of students. Methodology was as follows: The sample size was limited to 307 students, i.e., 8% of the population from 10 high and higher secondary schools in Devakottai Educational District for final study. The schools were stratified into government aided and minority institutions. Due consideration was also given to urban, rural boys, girls and co-education schools while selecting samples. The tools adopted in the study were Wallach and Kogan Battery of instruments which were used to measure the creativity level of students, and a Scholastic Achievement Test in Science was constructed and validated by the investigator. Chi-square and ‘t’ test were used for data analysis. Major Findings were: There was no significant relationship between science achievement and creativity of high school students. (SM 1739)

  Objectives were: To find out the relationship between figural creative thinking abilities of student-teachers on the one hand, and teacher-centered intellectual climate of the classroom and pupil-centered intellectual climate of the classroom, on the other. Methodology was as follows: The sample consisted of 100 teacher-trainees-46 male and 54 female (being trained for secondary school teaching) drawn from one of the colleges of education in Haryana. The tools used were the Torrance Tests of Creative Thinking-Figural Form A (TTCT Figural) and the Jangira Interaction Analysis Category System (JIACS). The collected data were treated with Mean, SD and ‘t’ test. Major Findings were : 1) High creative teachers as compared to the less creative teachers talked more (both lecturing and asking questions) at the convergent, divergent and evaluative levels and less at the cognitive memory level. 2) In the classrooms of high creative teachers (barring a few exceptions), pupils responded significantly more at the factual level as compare to the students of the less creative teachers. 3) Creative teachers did not welcome pupil participation at the factual level; they (high on figural originality) did welcome pupil initiation, especially of volunteering information at this level. (Spr 144)

- **Singh. Om Prakash. 1989.** Conducted Study on A study for identification of certain skills of science teaching and their effectiveness in relation to their creative ability.

  Objectives were: i) to identify certain science teaching skills required for science teaching in secondary schools.  ii) To prepare an observation schedule for observing the teaching competencies of science teachers. iii) To identify the components of identified science teaching skills. iv) To compare the effectiveness of the micro-teaching technique with the traditional technique to
teacher training in the development of certain science teaching skills. v) to
evaluate the effect of training in micro-teaching technique through Flanders interaction analysis system, iv) to study the effectiveness of traditional technique of training and micro-teaching technique in the development of six science teaching skills, vii) to compare the effectiveness of micro-teaching technique with the traditional technique of teacher training in the development of certain science teaching skills so far as creative thinking in concerned, and viii) to compare the coefficients of correlation between the teachers trained through micro-teaching technique and traditional technique of teacher training.

Methodology was as follows: The sample of the study consisted of 44 student-teachers out of 165 student-teachers admitted for B.Ed in RHS Degree College, Singraman, selected through stratified random sampling method. The tools included in the study were Flanders Interaction Analysis, Verbal and Non-verbal Tests of Creativity by Baqer Mehdi, and Science Classroom Teaching Competence cum-Observation Scheme (SCTCS) by the investigator. The collected data were treated with mean, SD, ‘t’ test and product-moment coefficient of correlation. Major Findings were: 1) The structure of micro-teaching encouraged a combination of theory and practice, research and training, innovation and implementation. The central idea at the core of this concept was that there were certain patterns of behaviours, rather strategies, which were crucial to effective classroom interaction. 2) Combining micro-teaching with interaction might help to make micro-teaching a more potent training experience than would be true without interaction analysis in our present Indian conditions. 3) Although, the traditional technique of training had a significant impact on the modification of teacher behavior, yet bountiful beneficial results were evidenced when using the innovative technique of micro-teaching and FIACS in the modification of student-teacher behavior. 4) Micro-teaching combined with FIACS might be useful for teacher training institutions to impart knowledge and practice of both the innovations which might bring more and more awareness among the student-teacher about their classroom behavior. It appeared that such training might be of great help for
teacher education institutions to produce better teacher education. 5) From the point of improving a lesson, micro-teaching technique was again useful as if provided a chance of self-evaluation.

- **Reddy, Mahender S. 1989.** Conducted Study on The development of reasoning and creativity among the standard IX students.

  Objectives were: i) To construct a battery of reasoning tests (BRT) for the students of Standard IX, ii) to find out whether there is any significant difference: a) on reasoning ability, between Standard IX boys and girls, and between private and government schools, and b) on creative thinking between boys and girls, and between private and government schools, and iii) to find out whether there is any relationship between reasoning and creativity. Methodology was as follows: Four hundred pupils from 20 government and private schools of Hyderabad City formed the sample of study. The tools used included a Battery of Reasoning Test developed by the investigator, and the Non-verbal Test of Creativity by Baqer Mehdi. Mean, SD correlation, analysis of variance, and percentiles were used for the analysis of data. Major Findings were: 1) The private and government school students differed significantly in favour of private school students on reasoning ability. 2) The government and private school students differed significantly on creative thinking in favour of private school students. 3) The boys from private schools were better than boys from government schools in reasoning ability. (MDA 1393)

- **Srivastava, R.K. 1988.** Conducted Study on A study of needs in relation to creativity among high school pupils.

  Objectives were: i) To explore the relationship between need and creativity, and between need and the three components of creativity, namely fluency, flexibility and originality, among high school pupils, and ii) to identify the dominating needs associated with different components of creativity.
Methodology was as follows: Five hundred and forty high school pupils formed the sample of the study. The tools used included Standardized Intelligence Test by P.N. Mehrotra, Personal Preference schedule by Tripathi, and Verbal Test of Creative Thinking by Baqer Mehdi. Mean, SD and product-moment coefficient of correlation were used for the analysis of data. Major Findings were: In every case of boys and girls belonging to urban and rural locality there existed a difference among the fifteen-needs associated with fluency, flexibility, and originality components of creativity at high, average and low level of intelligence. (KBB 0543)

- **Singh, Bhoodev. 1988.** Conducted Study on Development of tools for identifying creative thinking abilities among pre-school children for their education and proper personality development. Independent study, Sultanpur: Kamla Nehru Institute. (ERIC Funded)

  Objectives were: i) To develop verbal and non-verbal instruments to measure the creative thinking abilities of pre-school children, ii) to determine whether there is any sex, culture and age bias in the verbal and non-verbal tests, and iii) to study the interaction effect of culture, age and sex on the creative thinking abilities of pre-school children. Methodology was as follows: Seven hundred and ninety pre-school children of age-group 3 to 5 years selected from the rural and urban areas of Sultanpur District formed the sample of the study. The tools used were Shishu Srijanatmak Parikshan Verbal and Non-verbal, and Hindi adaptation of Thinking Creativity in Action and Movement. Analysis of variance was used for the analysis of data. Major Findings were: 1) The content validity of the SSP(V) and SSP(NV) on both the tests was found to be high. 2) Convergent and discriminant validity of the SSP(V) test were found to be satisfactory. 3) Test-retest reliability coefficients of the traits and the total creativity scores were also found to be satisfactory. 4) There was no sex, culture and age bias in the SSP(V) and SSP(NV) tests. 5) The interaction effect of sex, culture and age on the creative thinking abilities of pre-school children
were not found to be significant. 6) The effect of pre-school education was found to be significant on the creative thinking abilities of Grade 1 children. 7) The effect of pre-school education was found to be significant on the creative thinking abilities of Grade I children. 8) Creativity reached a high point during the fourth year and declined in the fifth year. (Author 1340)

- **Sharma, Shri Bhagwan. 1988** Conducted Study on Creativity in relation to self-disclosure, need-achievement and frustration.

  Objectives were: i) To find out the nature and extent of the relationship between creativity and self-disclosure for the various groups ii) to find out the nature and extent of the relationship between creativity and need achievement for various groups, and iii) to find out the nature and extent of the relationship between the creativity and frustration for the various groups. Methodology was as follows: Two hundred rural (100 males and 100 females) and 200 urban (100 males and 100 females) students of Class X from the schools of Agra District formed the sample of the study. The tools used were Verbal Test of Creative Thinking by Baqer Mehdi, Non-Verbal Test of Need Achievement by Prayag Mehta, and Naireshya Meep by Chauhan and Tiwari. Mean SD, correlation, ‘t’ test regression and multiple-R were used for the analysis of data. Major Findings were: 1) Creativity was relation to self-disclosure for TG, UG, UMG, and UFC having high scores on self-disclosure, 2) Creativity was related to need achievement for RG and RFG having high scores on n-ach and for UG and RMG having low scores on n-ach. 3) Creativity was related to frustration for TG and RFG; it was related to frustration for UG; UFA had high scores on frustration; and UFG and RMS groups had low scores on frustration. 4) Rural and urban students differed significantly on their creativity, need achievement, self-disclosure and frustration scores but the difference in regression scores for the various groups was not statistically significant. 5) Male and female students differed significantly on their creativity, self-disclosure, need achievement and frustration scores but the difference for the fixation scores
was statistically not significant. 6) Various groups of science and arts faculties differed significantly on their creativity, self-disclosure, need achievement and frustration scores but the difference in the regression scores of the various groups was not statistically significant. (SS 0795)

- **Gupta Krishna Kumari. 1988.** Conducted Study on The creative development of secondary school children in relation to sex, intelligence and urban and rural background.

  Objectives were: To study the creative development of secondary school boys and girls along the age continuum and education in order to i) Know the trends of creative development of boys and girls, ii) estimate the sex difference in creative development, iii) find out zonal (urban and rural) differences in the creative development patterns of boys and girls; and iv) find the relationship between creativity and intelligence of boys and girls of urban and rural areas at different stages of development. Methodology was as follows: Two thousand urban and rural students, between age of 11-15 years, studying in government-aided secondary schools situated in Aligarh District were selected to form the sample of the study. The tools used were; Creativity Thinking Test (Verbal and Non-verbal) developed by Giriraj Kishore, and Mohsin’s General Intelligence Test. Major Findings were: 1) Urban and rural boys and girls developed rapidly in creativity from the age of 11 (Grade VI) to the age of 13 (in the case of boys), and 14 (in the case of girls –Grade VIII) but later there was a sharp decline up to the age of 15 years (Grade X). 2) In general, creativity had a tendency to rise from the age of 11 (Grade VII and continue to do so up to Grades VIII and IX. After this stage there appeared a sharp decline. The development of creativity was at its peak between the age of 13-14 years (Grades VIII and IX). 3) Creativity had a significant correspondence with age and grade up to 13 years (Grade VIII). 4) In general, girls showed excellence as compared to boys in creative development between the ages of 13-15 years, both in urban and rural areas. 5) The trends of creative
development of boys and girls were not linear. 6) Urban students were superior to rural students in creative development, especially during the age of 11-15 years. 7) There existed a low but positive relationship between creativity and intelligence of secondary school boys and girls of urban and rural areas. 8) The creativity and intelligence of rural children were lower than those of the corresponding urban students. 9) Creativity factors were positively but slightly correlated with the intelligence at each grade, i.e., from Grade VI to X, both in urban and rural areas. 10) The value of correlation coefficient between creativity factors and intelligence in the case of rural students was comparatively lower than in the case of the urban students. 11) Creativity had a significant correspondence with intelligence from Grade VI to Grade III, i.e., from the age of 11 to 13 years both in urban and rural areas. 12) There was a decline in the relationship between creativity and intelligence at Grade level IX-X, i.e., from the age of 14 to 15 both in urban and rural areas. (SS 0825)

2.4 STUDIES RELATED TO SCIENTIFIC ATTITUDE AND ACADEMIC ACHIEVEMENT

- **Shaik Liyakath Ali 2009** undertaken a study to measure and compare the scientific attitudes of class VII Urdu and Telugu Medium students. objectives of the study were - 1) To measure and understand the scientific attitudes of class VII Urdu and Telugu medium class VII students. 3) To identify and compare the scientific attitudes of class VII Telugu and Urdu medium students. Methodology 150 class VII students (75 each from Urdu and Telugu medium). Schools were randomly selected from Mahabutnagar town the tools used was the scientific attitude scale (based on Likert’s method) developed by late professor VenkatRam Reddy (SVO) was adopted for measuring scientific attitudes. Findings of the study were - 1) It was observed that in general the students of class VII have modularity more favorable scientific attitudes irrespective of medium 2) Gender was not a significant factor in influencing the scientific attitudes of both Telugu and Urdu medium students. 3) It was also
formed that medium of instruction was not a significant factor in determining scientific attitudes.

- Narain Archana. 1992. Chemistry achievement and science attitude of Indian students, stemming from lecture-demonstration and small-group laboratory teaching methods.

  Objectives of the study were i) To study the effect of two methods of teaching chemistry, namely large-group lecture-demonstration method and small-group laboratory method, on secondary school students of Lucknow City, ii) to find out the difference between the two teaching-method groups on achievement in chemistry and attitude towards science, and iii) to assess the relationship between students attitude towards science and their achievement in chemistry. Methodology: The study used the purposive sampling technique in the initial stage. Several extraneous variables (intelligence, academic achievement, age and socio-economic status) were controlled. The final sample consisted of 79 girls and 91 boys who were randomly assigned to the two teaching-method groups. The tools used included Chemistry Achievement Test (Forms A and B) constructed by the researcher and Attitude Survey for Junior High School of Fisher. For the treatment programme, six lesson plans in chemistry were prepared. The investigator taught these lessons by the two teaching methods. The data consisted of pre-test scores and post-test scores. Comparisons were made by using ‘t’ test, critical ratio and the Pearson product-moment correlation.

Major findings: 1) some learning was found to be better through demonstration and some through practical work. Neither of the methods was so superior to the other in teaching all aspects of science as to force us to use it to the exclusion of the other. 2) In lessons connected with analytical chemistry, there had been an increase in knowledge through the lecture-demonstration method, while there was increase in understanding and laboratory skills through the small-group laboratory method. The lessons in inorganic chemistry showed that there
had been an increase in knowledge through lecture-demonstration. In lessons of physical chemistry, no definite trend was visible but the overall observation suggested that the laboratory method had a more positive effect. 3) There was no effect of sex on the achievement in chemistry. 4) No significant difference was found between the two teaching-method groups with regard to attitude towards science. 5) A positive relationship was found between achievement in chemistry and attitude towards science. (RJS 0679)


Objectives of the study were: i) To study the relationship between learning environment and scientific attitude and scientific interests, ii) to study the relationship between the levels of learning environment (high and low) and scientific attitude and interests, iii) to find out the difference between the levels of learning environment and scientific attitude and interests, and iv) to find out if there is any significant difference between boys and girls, urban and rural and high and low level learning environment groups in respect of their scientific attitude and scientific interests. Methodology: The sample of the study comprised 645 higher secondary biology students covering 380 boys and 265 girls from 19 different schools covering 11 urban and eight rural areas of South Arcot District in Tamil Nadu. They were selected through the cluster sampling technique. The tools used to collect the data were learning Environment Scale and a Science Interest Inventory constructed by the investigator and a Scientific Attitude Scale by G.M. Patted. The collected data were treated with mean, standard deviation, correlation, phi-coefficient, chi-square, contingency coefficient and critical ratios. Major findings : 1) There was a strong relationship between the high and low total learning environment of the higher secondary biology students and their scientific attitude and scientific interests. 2) The total learning environment and the scientific attitude
and scientific interests of the higher secondary biology students were significantly related in respect of the entire sample and of the various categories of sub-samples. 3) The high and low total learning environment groups of the higher secondary biology students significantly differed in their scientific attitude and scientific interest and this was true in respect of the entire sample, urban students, rural students, boys and girls. Significant difference was observed only between the high and low learning environment group combinations among the various combinations of sub-samples involving sex, locality and levels of learning environment in respect of the scientific attitude and scientific interests. (MDa 0988)


Objectives of the study were: i) To ascertain achievement of students in physical science, ii) to appraise the extent of self-concept in science, and iii) to find out the extent of motivation of the students in science and determine the relation among and between them. Methodology: The sample comprised 594 students of Class IX in 1 schools distributed over all of South West Bengal. The tools used were a Self-concept in Science Questionnaire, a Motivation Science Questionnaire, and an Achievement Test in physical science. Descriptive statistics, ANOVA and regression analysis were used to treat the data. Major findings: 1) In physical science urban boys achieved higher than rural boys and urban girls, urban students achieved better than rural students. 2) There was no difference in the achievement in physical science of boys and girls. 3) There was no difference in the self-concept of science between urban and rural students. (PDR 0623)
Kumar, Udaya Sam. 1991. The teaching of general science and the development of scientific attitude in secondary school students in relation to achievement in general science.

Objective of the study were: i) to find out the extent of scientific attitude of the secondary school students. ii) to find out whether there was any significant difference in the perception of teaching science and scientific attitudes of pupils of low effective group, high effective group and average effective group, and iii) to find out the nature of relationship between the scientific attitudes and achievement of the secondary school students in general science. Methodology: The sample of the study comprised 402 students drawn at random from eight different schools in Cuddalore educational district of Tamil Nadu. The tools used in the study included the scientific Attitude Test (SAT) by F.M. Phateed and Pupil’s Perception of Teaching Science constructed by the researcher. Mean standard deviation, ‘t’ test, correlation, and chi-square tests were used for interpreting the collected data. Findings of the study indicate that 1) there was a significant difference between the mean scores of boys in the average effective group in respect of perception of teaching of science. 2) The urban and rural pupils of average group differed in respect of perception of teaching of science. 3) There was no significant difference between the mean scores of scientific attitude of secondary school students of boys and girls in the high effective group in respect of perception of teaching science. 4) There was no significant difference between the mean scores of perception teaching of pupils of urban and rural areas in the high group. 5) The scientific attitude test differed significantly and there was no significant difference between the means of scientific attitude scores of the pupils of urban, rural areas the average group. 6) The mean scores of the scientific attitude test of boys and girls did not significantly in the high group and the mean of the scientific attitude test of the pupils urban and rural areas in the high group differed significantly. 7) There existed a relationship between urban boys and urban girls scientific attitude test scores. 8) The science test
scores of urban boys and urban girls were positively correlated. 9) The means of boys and girls in low group did not differ significantly in respect of scientific attitudes. 10) There was a significant difference between the means of the boys and girls in the low group in respect of perception of teaching of science. 11) There was a significant difference between the means of the pupils of urban and rural areas in the low group in respect of perception of teaching of science. (MDa 1401)


Objectives of the study were i) To study the differences in attitude towards science, understanding of the nature of science and concept-attainment in science among Grade VIII children who had followed the HSTP curriculum or the NCERT(adopted) curriculum, and ii) to evaluate the HSTP and the NCERT curricula on three criteria, viz. attitude towards science, understanding the nature of science and concept-attainment.

Methodology: A sample of 1,147 Grade VIII students (HSTP-564, NCERT -583) was taken from 28 government middle schools from three districts of Madhya Pradesh. The tools used to collect data were: Adapted Version of B.J. Fraser’s Science-related Attitude Test (TOSRA), Hindi adoption of Klopfer, Carrier and Geis Test of Understanding science, Test of Concept-Attainment in Science developed by the investigator and Jalota’s Group Test of Mental Ability.

Major Findings: 1) The HSTP students performed better than the NCERT curriculum students on TOSRA. 2) The HSTP students had a significantly more favorable attitude towards scientific enquiry than those who followed the NCERT curriculum. 3) Both groups lacked a sound understanding of the nature of science. (SPR 0608)
• **Sharma, Munishwar Kumar. 1990.** A study of scientific literacy, attitude towards science and personality traits of students and teachers.

Objectives of the study were i) to study the level of scientific literacy of different groups of students and teachers. ii) To study attitudes to science of different groups of students and teachers, and iii) to study personality traits of students and teachers. Methodology: The study sample comprised science students and science teachers. The tools used in the study included Scientific Literacy Scale, Attitude to Science Scale, and Cattell’s 16 personality Factors Questionnaire. The collected data were treated with ANOVA. Major Findings: 1) The total sample had higher level of scientific literacy than the theoretical mean. 2) There was significant difference between the general group and SC/ST group. 3) The total sample had favorable attitude towards science. 4) There was effect of type of school and sex on attitude towards science. 5) There was no significant difference between students and teachers on personality factors. (JKS 0696)

• **Rao, Digumarti Bhaskara. 1990.** A comparative study of scientific attitude, scientific aptitude and achievement in biology at secondary school level.

Objectives of the study were :i) To find out the scientific attitude and scientific aptitude possessed by the secondary pupils along with their achievements in biology, ii) to find out the association among scientific attitude, scientific aptitude and achievement in biology of secondary school pupils, and iii) to compare scientific attitude, scientific aptitude and biology achievement of boys versus girls, English medium versus Telugu medium schools, private versus government schools, residential versus non-residential schools and rural versus urban schools.  

Methodology: The sample of the study considered 600 pupils studying in class IX, who were selected through stratified sampling method. The tools used in
the study included Scientific Attitude Scale of J.K. Sood and R.P. Nair, et al. the statistical techniques used in this study were mean, SD, t-test and correlation. Major Findings: 1) It was observed that the scientific attitude in secondary school pupils was average. There was no influence of sex on scientific attitude. But the pupils studying in private schools, rural schools, English medium schools and residential schools held relatively better scientific attitudes than their counterparts. 2) The scientific aptitude in secondary school pupils was also average. The pupils of private schools, urban schools, English medium schools and residential schools held a bit more scientific aptitude. 3) The achievement in biology was average. The rural schools, government schools English medium schools and residential schools were better in achievement. 4) There was a highly significant and positive association among scientific attitude, scientific aptitude and biology achievement.

- **Kar, D.K. 1990.** A study of relationship between attitude towards and achievement in general science of class IX students of Cuttack city.

  Objective of the study was, to assess the relationship between the attitude and achievement in general science of Class IX students of Cuttack City.

  Methodology: The sample of the study comprised 700 students studying in Class X from 10 high schools of Cuttack City, and also included 74 science teachers and some science experts, professors, educationists, and headmasters of the schools, who were selected through random stratified sampling method. The tools used to collect the data were Questionnaire, Interview Schedule, Achievement Test in Science and Attitude Scale. The collected data were analyzed statistically measure of central tendency, variability, and correlation coefficient .Major Findings: 1) It was found that the distribution of the attitude score was negatively skewed. 2) Boys were found to be more favorably
disposed towards science than girls. 3) There was positive relationship between attitude and achievement. (KCP 0442)


  Objective of the study was to find out the scientific attitudes of in-service and pre-service science teachers.

  Methodology: The total sample comprised 183 teachers, covering 36 in-service and 147 pre-service teachers. The tools used included a tool to measure freedom from superstition, the Cause-Effect Relationship tool of D. Gopal Krishna and the Open Mindedness Tool of M. James Kozlow and Marshall A. Nay. Mean, standard deviation and chi-square were calculated while treating the data. Major Findings: 1) the distribution of scientific attitudes, namely freedom from superstition, ability to identify the cause-and-effect relationship and open mindedness, was not normal. 2) There was not much difference in the attitude between in-service and pre-service science teachers. 3) 34.33% (41.67% in-service and 32.65% pre-service) teachers were not superstitious. 4) 54.25% of the sample (only pre-service) were able to identify the cause-and-effect relationship. 5) 24.04% (33.33% in-service and 21.77% pre-service) of the sample were open-minded. 6) None of the variables were associated with the attitudes except the medium of instruction. 7) Scientific attitudes were distributed independently in the sample and were independent of each other. (SPr 1430)


  Objective of the study was to study the attitudes of teachers of per- and post- higher secondary stages towards creative learning and teaching in order to
ascertain their attitude towards creative learning and teaching. Methodology: Using the purposive sampling technique. 180 teachers from two junior high schools, four high schools, four higher secondary schools, and two PG colleges of Agra comprised the sample. Using the revised scale entitled Opinions on Creative Learning and Teaching of Torrance and Phillips, the relevant data were collected. Using the percentage analysis, the collected data were analyzed. Major Findings: 1) It was found that 90% of the pre-higher secondary and 84% of the higher secondary teachers tended to have unfavorable attitudes towards creative learning. 2) Pre-higher secondary and higher secondary teachers tended to have unfavorable attitudes towards creative teaching. But this was not so in the case of post-higher secondary teachers. (SPr 1435)

- **Ghosh, Shibani. 1989.** Conducted a critical study of scientific attitude and aptitude of the students and determination of some determinants of scientific attitude.

  Objectives were: i) To find out the extent of academic motivation of the students, sex and strata-wise differences in scientific attitude and aptitude, if any, and ii) to find out the relation between scientific aptitude, the above stated independent variables and a regression equation of the scientific aptitude on other independent variables. Methodology: The sample of the study comprised 613 students were drawn from 13 schools belonging to different localities; rural-urban, boys schools, girls schools and co-educational schools. The tools used were Scientific Attitude Test, Scientific Aptitude Test, Academic Motivation Test by Bhattacharya, and Socio-Economic Status Scale of Kuppuswami along with used interview. Correlations, ANOVA were employed to treat the data. Major findings: 1) it was found that scientific attitude was significantly related to scientific attitude and academic motivation. 2) No significant difference was observed with respect sex, socio-economic conditions or place of motivation. (PDR 0637)
• **Darchingpui, 1989.** A study of science achievement, science attitude and problem-solving ability among secondary school students in Aizawal.

Objectives were i) To study the science achievement, attitude towards science and problem-solving ability high school students, ii) to find the interrelationships of science achievement, attitude towards science vis-à-vis problem-solving ability, and iii) 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. Methodology: The study sample comprised 812 students of Class IX selected randomly after giving weight age to outside factors such as location and typology of school attended. The tools used to collect the data were the Science Test developed by the investigator, the Science Attitude Scale developed by Growl, and Problem-Solving Ability Test developed by the investigator. Major Findings: 1) the study indicated significant relationships between scores on scientific attitude and achievement in science. 2) Significant sex differences in achievement in science and problem-solving ability existed. 3) High socio-economic status, family facility and type of school attended favored achievement in sciences, scientific attitudes and problem-solving ability. (PPG 0180)

• **Singh, S.K. 1988.** undertook a study of the relationship between verbal interaction of teachers in class and attitude towards teaching.

Objective was to develop a category system for the systematic observation of teachers and for determining the relationship between observed behaviors and measures of teacher’s attitude.

Methodology: The sample consisted of 500 B.Ed. students (250 male and 250 female) selected from the training colleges of Gorakhpur University. All the pupil-teachers taught their lessons through the question answer method but
variables such as academic qualifications, regency of training and knowledge of theory and practice were not controlled. The tools used were the Minnesota Teacher Attitude Inventory and the Flanders Interaction Analysis Category System (FIACS). Percentages and correlation were used to treat the data. Major Findings included: 1) Indirect influence, pupil talk, indirect-to-direct ratio, pupil initiation ratio teacher response and question ratios appeared to be significantly related to attitude towards teaching in male and female groups, teaching subject groups, and teaching classes. 2) There was a significant relationship between attitude towards teaching and classroom verbal interaction of student teachers at the secondary level. 3) Lecturing, criticizing and justifying

- **Shrivastava, Madhulika. 1988.** Conducted an investigation into the scientific aptitude of higher secondary science students in relation to their cognitive style.

  Objective of the study was to assess the scientific aptitude of the students in relation to the cognitive style of those who want to execute their studies in the field of science.

  Methodology: The sample of the study comprised 500 students, covering 250 boys and 250 girls, who were randomly drawn from higher secondary schools. The tools used in the study included Scientific Aptitude Test by K.K. Agrawal, a test of General Mental Ability by M.C. Joshi, Hindi adaptation, and Dogmatism Scale by Hasan, based on the ‘D’ form of the original Rokeach’s scale. The descriptive and inferential statistics were used in the present study. Major Findings: 1) the male students were better than female students in the area of scientific aptitude as significant difference was found between both the groups. 2) Both the group’s boys and girls were of high scientific aptitude and had insignificant difference on dogmatism. 3) The male and female students of low scientific aptitude had significant difference on dogmatism.
2.5 SOME ABROAD STUDIES RELATED TO SCIENTIFIC CREATIVITY.

- Carlo magno. De La Salla University Manila (2011) Assessed the relationship of scientific thinking self-regulation in research and creativity in a measurement model. He investigated the relationship of the constructs of scientific thinking self-regulation in research, and creativity in a measurement model. The initial results showed a four factor structure of scientific thinking, analytical interest, intellectual independence and discourse assertiveness. On the easement model structured scientific thinking, self-regulation in creativity with their subscales as the manifest variable. The model showed significant relationships and path estimates for each manifest variable. The two other models were tested for the undergraduate and graduate students showed model in variable.

The objective of this research was to examine if a relationship exists between creativity and academic achievement and if the relationship differs between males and females. Creativity was measured using the Khatena-Torrance Creative Perception Inventory (KTCPI).

Regression surfaces were constructed from models that examined possible linear, curvilinear, and interaction relations between the variables. The Jackknife technique was used to adjust the significance levels. It was also found that there were sex differences in relation between school attitudes, at each attitude level, increases.


The objective of this research to examine if a relationship exists between creativity and academic achievement and if the relationship differs between males and females participants (N=153, Male = 105 and female = 48) completed creativity test creativity was measured using the khatema Torrance
creative perception inventory. Pearson correlation analysis indicated that the aspects of creativity are related to academic achievement for both males and females.


  The purpose of the study was to investigate the possible relation between creativity and academic achievement in particular, to see if this relation might be different for boys and girls. By canonical correlation and analysis the following results were found. If operationalized by the teachers ratings, creativity was related to academic achievement for both boys and girls. For boys, flexibility was the predominant factor that related to all 6 academic subject areas for girls elaboration related to 4 of the academic subject areas (Spanish, Basque, English and social science) and fluency related to natural science and mathematics. If operationalized by the other three matures (TICT, CTE and VAT) however creativity was barely related to academic achievement.

2.6 FOREIGN STUDIES TO RELATE TO SCIENTIFIC ATTITUDE:

  Gregory J. Feist

  Predicting interest in and attitudes towards science from personality and need for cognition (2012) One important task for psychologists of science is to examine call factors (such as personality or cognition) that underlie who are interested in science and what kind of attitudes people develop towards science. They predicted that the personality dimension of openness to experience. Conscientiousness and introversion as well as the cognitive style need for cognition would each predict level of interest in science. Results confirmed this prediction although the effect sizes tended to be small. Further analyses revealed that need for cognition explained variance in interest in science over and above variance explained by personality.
• Babalola J. Ogunkola (2011) Studied High School student’s Attitude to Use of Technology in Science Teaching, Interest in Science and Study. He studied habits as Determinants of Science Achievement in Barbados. It was designed to determine if there were statistically significant differences in the selected student’s performance linked to their attitude toward use of technology in science teaching, interest in science and study habit as well as to determine the effects of the three selected variables on student’s achievement in science. The results showed that there were significant differences in students’ science achievement based on their attitude to use of technology in science teaching, interest in science, and study habit. All the variables except study habit individually contributed significantly to science achievement with attitude to use of technology in science teaching contributing the most and study habit, the least. Therefore, students should be motivated to cultivate positive attitude to the use of technology in science, teaching, be more interested in science and employ better study habits in order to improve in science achievement in schools.

• Marigoribanks Kavien (2010) investigated relationship between school-related attitudes and measures of English mathematics, French, and physical and biological science at different levels of verbal and nonverbal reasoning abilities and creativity. The jackknife technique was used to adjust the significance levels in the analysis Results indicated that there are sex differences in relation between school attitudes, ability and achievement.

• Syh - Jong Jang (2009) Studied creativity by integrating web based technology into an innovative science curriculum in Chung yuan christian University Taiwan. The study provided information to enhance students expression of sensitivity, fluency, flexibility, originality and elaboration of scientific creativities. The students creativity was motivated by the online interactive and the teachers inquiry.
T.J. Vidyapati T.V.S Prakasa Rao RIE. Bhuvaneshwar PGT Orissa (Indian study). Conducted a study on gender and socio cultural differences in scientific attitude, creative ability and science achievement of ninth graders. The results revealed that there exists a significant gender difference in favor of girls in science achievement. Apart from this no significant gender difference in scientific attitude scientific creative abilities and no significant socio cultural differences in scientific attitude, scientific creative abilities and science achievement was observed.


The purpose of their study was to examine how pupil’s attitudes towards science and their beliefs about themselves affect their achievement in science and vice versa. Cyprus provide an interesting location for the study being a developing nation that has adopted educational ideas from a variety of countries including the US, UK and Greece. The results of this study reported science achievement and science attitudes can have on each other, depending on the characteristics of the Educational systems of the country.
Jeffrey P. Dorman, Australian Catholic University, Australia, Darrell L. Fisher, Curtin University of Technology, Australia, Bruce G. Waldrip, University of Southern Queensland I, Australia has studied on perceptions of learning environments and assessment with academic efficacy and attitude to science in Australian secondary schools. Multiple regression and structural equation modeling with LISREL 83 were used to study relationships among these variables and the extent to which a postulated model fitted the data. Results showed that classroom environment and student perceptions of assessment were significant positive predictors of academic efficacy and attitude to science.

The study investigated whether science-related attitudes can help predict the amount of effort put forth by high school students while using an educational computer science program. The finding is congruent with the idea that science-related attitudes can help predict amount of effort put forth by high school students. Also found was that science-related attitudes did not significantly differ before and after the completion of the program.

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This studied, examined the relationship between primary school student’s attitudes towards science and their science achievement. The sampling of the study encompassed 330 subjects of whom are female and are male. The data were analyzed by ANOVA, t and Scheffe’s tests, and correlation co-efficient. The results of the study indicated that students’ gender, socio-economic of their families, their perceptions of their preparation attitudes and their perceptions of science adjustments have a significant effects on their attitudes towards science. The results of the study also depicted a meaningful relationship between the primary school students’ attitudes towards science and their science achievement.

The results showed that effective teachers produced better performing students. However the observed differences in student and school environment
related factors which were not included in this study. It was concluded that teacher’s effect is not the only determinant on student’s academic achievement.

RELEVANT STUDIES RELATED TO SCIENTIFIC INTEREST WERE VERY SCANTY AND NOT AVAILABLE ALONG WITH THE OTHER VARIABLES SUCH AS SCIENTIFIC CREATIVITY, AND SCIENTIFIC ATTITUDE.