CHAPTER II
CHAPTER II

A REVIEW OF LITERATURE

The present study attempted to investigate scholastic achievement in relation to the cognitive abilities of creativity and intelligence. More specifically, it aimed at studying the effects of creativity and intelligence on achievement in the school subjects of English, Mathematics, and Science. As stated in the previous chapter, the variable of intelligence has been added here because it has been found to affect both creativity and achievement. However, the major objective of the study is to investigate scholastic achievement as it is affected by creativity.

A number of studies have been made, both at the school and collegiate level, to discover the
extent to which creativity and intelligence contribute to academic success. An account of these studies is presented in this chapter.

**INTELLIGENCE AND SCHOLASTIC ACHIEVEMENT**

Studies on the contribution of intelligence to academic achievement have been so numerous that they have been well-documented in the literature. An exhaustive review of them is therefore, not attempted. However, some of the comprehensive studies together with reports summarizing the findings of a number of other studies in this area are included here.

Chauncey (1929) found a correlation of .593 between ninth grade intelligence and achievement. With age and socio-economic status held constant, the correlation dropped slightly to .541. Hence the relationship between intelligence and
achievement in this study was little influenced by age and socio-economic status.

John (1930) collated the results of almost 400 studies, conducted at the elementary school level, and found high positive correlations, averaging around +.60, between I.Q. and achievement scores.

Kemp (1955) studied children from fifty primary schools in London with two criteria of attainment, viz., comprehension and rote learning, and with several environmental variables. Among his main conclusions is the one that the main factors determining level of attainment in the formal school subjects are, in decreasing order of importance, intelligence, socio-economic status, and size of school.

Mollenkopf (1956) reported a study of 18,000 ninth and twelfth grade pupils in 206 schools in U.S.A. He concluded that the I.Q. of the students predicted
the achievement test means considerably better (0.90) than did the best-weighted composite of school, parent and community characteristics (.59).

Rossi, et al. (1959) analyzed the studies reported on the relationship between intelligence and achievement at the high school level and found a strong positive relationship between them.

Kennedy (1960) isolated for study a group of 40 adolescents from a pool of 5000 applicants on the basis of proficiency in Mathematics. Specific selection of this kind in terms of Mathematics skill was found to yield a group that was extremely high on all of a variety of measures of verbal and performance intelligence.

Cline, Richards and Keedham (1963) administered to high school students of both sexes the California Mental Maturity Inventory, among others. They collected the grade-point-averages also. It was found, among others, that intelligence and grade-point-average were quite highly related.
Cain, Michaels and Burich (1964, p.860), summarizing the results of a number of studies, have concluded that "the instrument most widely used for predicting general scholarship at the secondary school level is still the intelligence test". They found the average correlation between intelligence and high school achievement in general to be slightly less than .50.

Wallach and Kogan (1965) studied 70 boys and 81 girls of the fifth grade with a number of tests. They employed the verbal and quantitative measures of the School and College Ability Test (S.C.A.T.) and three subtests from the Wechsler Intelligence Scale for Children (W.I.S.C.) for obtaining measures of intelligence. Five tests from the Sequential Tests of Educational Progress (S.T.E.P.) were used as achievement indicators. They found that out of 15 correlations between W.I.S.C. and S.T.E.P. (three subtests of W.I.S.C. x 5 S.T.E.P. tests), 14 were statistically significant. Further, all the ten correlations between the S.C.A.T. and the S.T.E.P. were significant. These findings speak of the close relationship between
intelligence and achievement (Wallach, 1970).

Edwards and Tyler (1965) found for the 181 ninth graders that the correlation between performance on the School and Colleges Ability Test and Sequential Tests of Educational Progress was .86. They furthermore reported that the correlation between the intelligence index and the grade-point-average was .66.

Bowers (1966) studied almost 300 ninth grade pupils with the Otis Quick Scoring Test of Mental Ability and the Iowa Tests of Educational Development, among others. They found the correlation between the intelligence measure and achievement to be .60 or .70.

In the Hassan and Butcher (1966) replication of the Getzels-Jackson work, the intelligence score, the verbal achievement index and the numerical achievement index, among others were intercorrelated with sufficient strength - in the 60s, 70s, and 80s - to indicate that they clearly were functioning as alternative measures of the same dimension.
Yamamoto and Chizbidis (1966), utilizing a sample of almost 800 fifth graders, administered, among others, the verbal battery of the Lorge-Thorndike Intelligence Test and the Stanford Achievement Test battery. They found a substantial relationship between intelligence and achievement.

Employing the verbal and mathematical parts of the Scholastic Aptitude Test (S.A.T.) as the criteria of intelligence, and the Class-Rank position and the Freshman-Quality Point Ratio as measures of high school and college achievement respectively, Wallach and Wing (1969) studied the relationship of academic achievement to intelligence, among others. Their sample, consisted of 503 students of both sexes, from incoming University Freshman class. They found highly significant relationships between intelligence, on the one hand, and high school and college achievements on the other.

**INDIAN STUDIES**

In India also, a number of studies have been conducted in this area. Some of the recent ones are
relevant here.

Tamhankar (1968) administered to 626 X grade boys, sets I and II of the Coloured Progressive Matrices. The marks of these boys in the final examination were obtained from the school records. The correlation of these marks with scores on set II was .28 which was significant beyond .01 level.

Rao (1970) investigated the relationship of intelligence, socio-economic status and other variables to scholastic achievement. He administered to 500 boys of the Delhi school studying in VIII Grade, the C.I.R. group intelligence test, Kuppuswamy's Socio-Economic Status Scale, and the Janis Achievement Test Battery, among others. There was a significant relationship between intelligence and scholastic achievement, the correlation being .81. The coefficient of partial regression of intelligence on scholastic achievement showed that 61% of the variation in achievement was contributed by intelligence. Equally high correlations were obtained between intelligence and achievement in all the subjects included in the
study (the range of 'r' being .67 to .69).

There was also significant correlation between socio-economic status and achievement in that the 'r' was .39. Further, intelligence was found to be affected by environmental factors (socio-economic status).

Gupta (1971) administered Bhatia's Battery of Performance Tests of Intelligence to a group of 50 male college students and the marks obtained by the subjects in the 10th class examination were taken as the index of educational attainment. The results showed that the correlation between educational attainment and intelligence was .38 which was significant at the .01 level.

Mundal, Sudhaker and Sidhu (1972) administered Cattell's Culture-Fair test, among others to 400 boys and girls of the Punjab University. For the indices of academic achievement, the percentage of marks in the matriculation and the B.A./B.Sc. examinations were taken. They found that academic success was related to intelligence.
Mathur and Mundal (1972) studied the relationship of intelligence and school achievement to the socio-economic background factors. They administered to 100 students of the IX standard of a higher secondary school, Mundal's intelligence test in Punjabi, an achievement test devised for the purpose and a questionnaire having 26 items designed to measure the socio-economic background factors. Correlation technique was employed to establish the relationship between school achievement, intelligence and socio-economic background factors. The correlation between intelligence and school achievement was found to be .82. When the effect of socio-economic background factors was partialled out, the partial correlation was reduced to .68 showing that socio-economic background factors influence both school achievement and intelligence, increasing their mutual positive relationship.

Upta (1973) investigated the relative importance of the different correlates of academic achievement. He administered to students of class IX, a verbal group test of intelligence, among others. The aggregate school marks in the annual examination were utilized
as the achievement index. Of all the variables in his study, Gupta found intelligence to effect academic performance to a very significant degree. He concluded that "Intelligence seems to be the best single predictor of academic success" (p.80).

In sum, research evidence is overwhelmingly in favour of a positive relationship between intelligence and scholastic achievement both of which are convergent indices.

CREATIVITY AND SCHOLASTIC ACHIEVEMENT

A number of studies have been carried out to study the relationship between creativity and scholastic achievement. Some studies have used the Gezels and Jackson creativity measures while the majority of them have employed tests from the Guilford and Torrance group. Some have employed teacher ratings for creativity whereas only a few have utilized the Wallach-Kogan battery of creativity instruments for the measure of creativity. Studies employing the
Guilford tests can serve as convenient beginning for reviewing some of the studies relevant to the problem.

**STUDIES WITH GUILFORD TESTS**

Guilford (1956a) correlated a score for expressional fluency, based on his tests, with grades in a course in astronomy. He found a correlation of .25 between them, for "unknown reason." Further, he maintains that the factor of adaptive flexibility has consistently shown some small relationships to performance in Mathematics and in one instance to achievement in Physics, with the 'r' being .23.

For two groups of engineering students of hundred each, Guilford (1959) found an average correlation of .27 between a test of originality and average grades in Science and Mathematics.

Cline, Richards and Needham (1963) administered to 79 male and 40 female high school students a battery of tasks designed to tap a range of divergent thinking factors. California Mental Maturity Inventory score
provided the intelligence measure, with the grade-point averages providing the achievement measures. They found significant correlations between creativity measures and grade-point-average.

Feldhusen, Denny and Condon (1965) utilized an alternate uses task as the basis for assessing spontaneous flexibility, while using a consequences procedure as the basis for assessing both ideational fluency and originality, with the seventh and eighth graders. The School and College Ability Test (S.C.A.T.) was used for a measure of intelligence and the Sequential Tests of Educational Progress (S.T.E.P.) was employed for a measure of academic achievement. The results showed that spontaneous flexibility was related to both S.C.A.T. and S.T.E.P. measures for both sexes, whereas ideational fluency was not related to either of the convergent measures. Originality turned out to be related to both the convergent thinking indicators for boys, but not for the girls.

Copley (1967) divided 320 Canadian children of grade seven that he studied into the following four
groups on the basis of data obtained with a battery of thirteen tests, six 'convergent' and seven 'divergent'. The convergent tests included among others, the academic average of each child for core courses and the Large-Thorndike tests. The divergent tests included a local version of Mednick's (1962) Remote Associates Test and six Guilford-Torrance tests. The four groups were the High-High Group, which consisted of those in the top half of both creativity and intelligence, the Low-Low group, which consisted of those in the lower half of both measures, the High-Low group, consisting of those high on I.Q. but not on creativity, and the Low-High group with those low on I.Q. but high on creativity. If creativity contributes to academic success and creativity measures discriminate significantly between those likely to achieve highly and those likely to do less well, it should be possible to discriminate between high and low achievers on the basis of creativity scores, even after I.Q. differences have been removed. Thus, it would be expected that the High-High group would achieve significantly better than the High-Low group, despite the absence of I.Q.
differences, and similarly, the Low-high group would surpass the Low-Low group, again despite the absence of differences in I.Q. Both the expectations were borne out by the results. In fact, the mean achievement scores formed a hierarchy in descending order, with the High-High averaging 69.6 percent, the High-Lows 63.5 percent, the Low-High 56.6 percent and the Low-Lows 51.9 percent. Thus, although the group high only on intelligence surpassed both low I.Q. groups as might be expected, the intellectual all-rounders (high on both kinds of thinking) did best of all.

The evidence with the use of Guilford tests shows a positive relationship between creativity and achievement. However, it is questionable if the creativity tests of Guilford assess a unitary dimension of creativity which is different from intelligence because the various component tests correlated among themselves only about the extent to which they correlated with intelligence. Hence, the relationship observed here with achievement might have been mediated by intelligence.
STUDIES WITH GETZELS-JACKSON BATTERY OF TESTS

Getzels and Jackson (1957) compared two groups of children: the high I.Q. group, consisting of those in the top 20% on I.Q., but not on creativity and the high creative group comprising those in the top 20% on creativity, but not on I.Q. The mean I.Q.'s of the two groups were 150 and 127 respectively. They found no significant differences in academic achievement between the two groups, despite an I.Q. difference of 23 points.

Their finding has been criticised on the ground that their sample of children was an unrepresentative one. Their high creative group, though selected such as to exclude children of really high I.Q., nevertheless had a mean I.Q. of 127. Thus in most classrooms their subjects of relatively low I.Q. (high creative group) would be considered very bright children.

With 110 sixth graders as subjects, Flesher (1963) derived a creativity index by summing the standardized scores on seven procedures which were even broader and more heterogenous in content range than the Getzels-Jackson battery. This creativity
index had only low correlation with I.C. derived from
the California Test of Mental Maturity, the 'average r'
between them being .04. Employing such a creativity
index, Flescher obtained very low correlations with
academic achievement measures. However, it may be
noted that there was no warrant for summing the various
creativity measures into a single, overall index in
Flescher's study, as the average correlation among the
creativity measures was only .11.

An extensive replication of Getzels and Jackson
work was reported by Hassan and Butcher (1966). The
subjects were 175 male and female students in their second
year of high school, to whom were administered ten
creativity instruments that included all the tasks from
the Getzels-Jackson battery, except the hidden shapes
test. Standard measures of verbal achievement and
numerical achievement were also obtained, among others.
The creativity measure yielded the same overall order-
ings of students as provided by the achievement. The
creativity composite score, intelligence score, verbal
achievement index and numerical achievement index, all
inter-correlated with sufficient strength; the r's were
in the 60s, 70s and 80s.

Studies with the Getzels-Jackson battery of tests have also revealed significant positive relationship of creativity to achievement. The same criticism that was made of Guilford tests of creativity may also be levelled against the Getzels-Jackson battery. As Wallach and Kogan (1965) have pointed out, the sub-tests in the battery of Getzels and Jackson correlate among themselves only about the extent to which they correlate with intelligence. Hence, a dimension of individual differences which is unitary and different from intelligence cannot be claimed to be indicated by the Getzels Jackson battery.

STUDIES WITH TORRANCE TESTS

Torrance (1960) carried out eight partial replications of the Getzels-Jackson study, avoiding some of its shortcomings. Six of these were conducted on elementary school children and two with university students. The mean I.Q. of the highly divergent thinkers (which did not include the top 20% in I.Q.) ranged between 97.9 and 126.5. In four of the
elementary school samples, Torrance did not find any significant differences in the over-all academic achievement between the high I.Q. group and the high creative group. The same was true of both the university samples.

Fleming and Weintraub (1962) utilized a specially selected sample of 'gifted children' with a very high mean I.Q. (approximately 136) and found Torrance measures of creativity unrelated to achievement indicators. This can be explained in terms of restriction of I.Q. range and also in terms of partialling out of age from the intelligence but not from the creativity index.

Torrance (1963) administered his creativity tests and the Wechsler Intelligence Scale for Children (W.I.S.C.) to pupils in his laboratory school. He obtained results similar to those of Gertzels and Jackson (1962), in the early school years. Despite a mean difference of 25.6 I.Q. points on the W.I.S.C. between the highly intelligent group and the highly creative group, there were no statistically significant differences in achievement, as measured by the Iowa
Achievement Battery and the Gates Reading Test. Even the direction of the insignificant differences was not consistent. The high I.Q. group was slightly better on study, work skills and arithmetic skills, and the high creative group excelled slightly on reading skills and English skills on the Iowa Battery.

Eish (1964) in a study of 21 fourth, fifth and sixth graders, used the verbal and figural tests of Torrance Tests of Creative Thinking for a measure of creativity and the California Achievement Test for a measure of achievement. All the correlations between the verbal measures of creativity and achievement, ranging from .36 to .42, were significant at the .001 level. The correlations between the non-verbal measures and achievement were not significant.

Cicirelli (1964) studied 600 sixth grade pupils with the verbal and figural forms of Torrance tests, Gates Reading Test and California Arithmetic and Language tests. The combined verbal fluency, flexibility and originality scores correlated .32, .26 and .26 while the verbal elaboration scores correlated .37, .25 and .31 with the above mentioned achievement tests respectively.
Cicirelli also found significant correlations between figural measures and achievement. When the effects of intelligence were partialled out, the correlations with the verbal measures remained significant, though reduced whereas the same was not true with the figural measures.

Yamamoto (1964) compared the academic performance of secondary school children who were selected on the basis of Getzels-Jackson method. He obtained clear-cut results. Despite I.Q. differences of 20 points, the divergent thinking group did as well on the Iowa Tests of Educational Development as did the high I.Q. group. This finding was true for both boys and girls separately and also together.

In another study, Yamamoto (1964) compared the achievement scores of a high creative group with those of a low creative group, allowing for differences in I.Q. between the two groups. He wanted to see if children who score high on tests of creativity do better on classroom achievement than those who score low on such tests, after controlling the effects of I.Q. He
found the highly creative thinkers surpassing the low creative children and hence concluded that there were differences in achievement between the highly divergent thinkers and the non-creative students which were not due to differences in I.Q. Thus, he posited that there is a distinct relationship between performance on creativity tests and success in school learning.

Yamamoto (1964c) found no difference in academic achievement between high creativity groups and high intelligence groups, despite a mean difference of about 20 points in I.Q. between the two kinds of groups. High creative individuals were also found to be significantly superior to low creative individuals on all sub-tests of the Iowa Test of Educational Development, when the effects of intelligence was controlled statistically.

Ciarcia (1965) found that most of the ability of the Torrance indices to predict various academic achievement criteria depended on shared variance with intelligence. Of the twelve r's computed between creativity and achievement measures, eight were .20 or better. However, when intelligence was held constant
by partiailling out I.Q. scores, only three of the twelve r's remained .20 or better.

Edwards and Tyler (1965) studied 181 ninth graders with Torrance tests of creativity. They employed the School and College Ability Test (S.C.A.T.) for a measure of intelligence and the Sequential Tests of Educational Progress (S.T.E.P.) and the grade-point-average for measures of achievement. They found that the creativity measures and the achievement indicators were unrelated. The upper and the lower thirds of the sample, on the basis of intelligence and of creativity were studied with respect to achievement. They found that the group high on the S.C.A.T. had higher achievement than the high creativity group. Although those high on both intelligence and creativity did not differ from those high on intelligence in their achievement based on S.T.E.P., the former were actually lower than the latter on grade-point-average.

This finding can be explained on the grounds that they summed a single figural and a single verbal creativity task, even though the figural and the verbal domains show relatively low coherence (Torrance and
Gowan, 1963), and that the relationship with intelligence or achievement criteria are stronger for the verbal than for the figural task (Bish, 1964).

Bowers (1966) administered to 135 boys and 143 girls of the ninth grade, five verbal and two figural procedures from the Torrance creativity battery, from which was derived an overall-creativity index. The achievement criteria were grade level and scores on the Iowa Tests of Educational Development. The Otis Quick Scoring Test of Mental Ability provided the intelligence measure. Through factor-analysis, Bowers reduced the number of creativity scores to ten and then computed both zero-order correlations and multiple correlations of intelligence scores and the ten creative thinking scores with the criteria of achievement for boys and girls separately and for the total sample. He found that intelligence and creative thinking both contributed to the prediction of both criteria. The performance of boys was more difficult to forecast than that of girls.

Bowers (1966) also split his groups at the
median of intelligence score and computed zero-order
and multiple correlations between creativity and
achievement measures. It was found that creativity
contributed more to the prediction of achievement
in the lower half of intelligence than in the upper
half.

Ferry (1966) administered a verbal battery of
the Torrance tests to sixth grade children who had been
continuously enrolled in the same school since
kindergarten. Their creativity index scores yielded
significant rho correlation of .54 with the kindergarten
administration of the Metropolitan Reading Readiness
test; .44, .46 and .50 with the sixth grade adminis-
trations of the Reading comprehension, Arithmetic
Reasoning, and Spelling Achievement tests, respectively
from the Stanford Achievement Test battery; and .55
with an overall academic achievement score, derived
from the sixth grade administration of the Stanford
Achievement Test battery.

Yamamoto and Childs (1966) utilized a sample of
almost 800 fifth graders, administering a battery of
verbal and figural creativity instruments, from which was derived a single creativity index, the Stanford Achievement Test battery and the Large-Thorndike Intelligence Test. With a mean I.Q. of 110.30 for the entire sample, a division was made between children with I.Q. of 121 and above and those with I.Q. of 120 and below. The relationships between creativity and achievement were substantial for all the three groups - for the total sample, the lower I.Q. group and the higher I.Q. group. When, however, partial correlations were computed between creativity and academic achievement, holding intelligence constant, all of the relationships turned out to be nearly zero.

Starr and Nicholls (1975) administered to a sample of 110 pupils, 73 boys and 37 girls, who were candidates for the Muffield ordinary level physics examination, the AH4 group test of intelligence, the Torrance tests of creative thinking, both verbal and figural, among others. They used the grades obtained in O-level physics as the achievement measures. No support was found for the hypothesis that creativity would be related to performance in Muffield Physics of
which the most important correlate was general intelligence.

The evidence here is overwhelmingly in the same direction as those with the Guilford tests and the Getzels-Jackson battery. The same shortcoming that was found with the Guilford and the Getzels-Jackson battery holds for Torrance battery also, i.e., they do not possess convergent and discriminant validity (Wallach and Kogan, 1965). Hence, the effect of creativity on achievement that was seen in these studies would have been mostly due to intelligence.

**STUDIES WITH THE R.A.T.**

Miller (1960) found that high R.A.T. scores tended to get higher grades from teachers rated as flexible than from teachers rated as dogmatic. Conversely, low R.A.T. scorers received higher grades from teachers rated dogmatic than from teachers rated as flexible.

A correlation of -.27 was found between the R.A.T. scores and the first two year grade-point-averages for 74 undergraduates at an engineering school, while the
same correlation of -.27 was found between the R.A.T. and summer grades for a smaller group of 34 summer school students at a liberal arts college (Mednick, 1962; Mednick and Mednick, 1964). The correlation was significant for the first sample, but not for the second.

Mednick (1963) reported a non-significant correlation of -.11 between the R.A.T. and grade-point averages for a sample of psychology graduate students. In another study, Mednick (1963) found that there was no relationship between ratings for research creativity and grade-point average, the correlation between them being .06. The obtaining of additional negative correlations between college grades and R.A.T. scores has also been mentioned (Mednick and Mednick, 1964).

Studies with R.A.T. has provided evidence balanced on both sides. Whereas some studies have shown a negative relationship, some others have yielded evidence for a positive link. The R.A.T. is a test based on associative concept of creativity and as such is expected to yield evidence for no relationship between creativity and achievement. However, it has been found.
to be lacking in discriminant validity as some investigators (Schlicht et al., 1965) have found it to be significantly correlated with intelligence test.

STUDIES WITH TEACHER-RATINGS

In an extensive study of more than 1000 high school seniors who were National Merit Scholarship finalists, Holland (1959) obtained ratings for the trait of originality from the students' teachers and principals. The originality ratings exhibited strong correlation with academic grades.

Rivlin (1959) asked the teachers of tenth and eleventh graders to study such criteria of creativity as "will venture into unfamiliar or new areas" and "demonstrates imaginative and original solutions to problems". The teachers then were to select from each of their classes five students who were not only intelligent but also creative, and five students who were equally intelligent but not creative. With over 100 high school students thus selected, the creative students were found to score significantly higher than the non-creatives on, among others, the Iowa Tests of
Educational Development.

Wallen and Stevenson (1960) obtained teacher's judgment of the creativity of fifth graders' composition. With high agreement among judges and high consistency over stories for a pupil, the creativity ratings turned out to be strongly correlated (approximately .60 or .70) with achievement measures.

These studies based on ratings for creativity given by teachers have shown an unmistakable link between creativity and achievement. However, the trouble with judgment for creativity done by teachers and others is that there is the 'halo effect' of intelligence on their ratings and in effect, those with good intelligence are judged creative and those with less intelligence as non-creative. Thus, the effect of creativity seen on achievement in these studies might have been mediated by intelligence.

STUDIES WITH WALLACH-KOGAN INSTRUMENTS

Wallach and Kogan (1965) studied 70 boys and 81 girls of the fifth grade with five creativity instruments, which they devised on the basis of their
associative orientation. Two measures of creativity, viz., number and uniqueness were derived. Three sub-tests from Wechsler Intelligence Scale for children (W.I.S.C.), the School and College Ability Test (S.C.A.T.), the Sequential Tests of Educational Progress (S.T.E.P.), among others, were utilized for obtaining convergent measures.

They found that out of 50 correlations between creativity measures and measures of scholastic achievement, only eight were significant at the .05 level, and only five at the .01 level, and the rest very low and not significant. Four of them were low negatives.

With respect to the data for the sexes separately, it was found that out of the 50 correlations for the boys' data, only two were significant at the .05 level and only one at the .01 level, and the rest not significant. Thirteen of the non-significant correlations were negative; some of them were substantial. For the girls' data, only seven correlations out of 50 were significant at the .05 level and only four at the .01 level and the rest not significant, four of which were
Thus, the results of Wallach and Kogan (1965) show that there is no relationship between creativity and academic achievement.

Wallach and Wing (1969) studied 302 male and 201 female subjects from freshman class at Duke University with four procedures from the Wallach-Kogan creativity instruments and the verbal and mathematical parts of the Scholastic Aptitude Test.

Two measures of creativity were utilized, viz., ideational productivity and ideational uniqueness. The class-rank position provided the achievement measure in high school and the freshman quality-point-ratio represented achievement in college.

It was found that there were significant differences between the high productivity and the low productivity groups and between the high uniqueness and the low uniqueness groups in school achievement. The difference was significant with respect to productivity, for the sexes separately and also together; but in
the case of the uniqueness variable, the difference was not significant for the female sample.

As regards college achievement, it was found that the high productivity group was significantly superior to the low productivity group, considering the sexes separately and also together. The difference between the high uniqueness and the low uniqueness groups was not significant for either of the sexes separately or together.

Paramesh (1973) studied 155 boys of the s.s.l.c. class in the city of Madras with Paramesh adaptation (1971) of the Wallach-Kogan battery of creativity instruments for an index of creativity and with the Raven's Standard Progressive Matrices (Raven, 1960) for a measure of intelligence. The subjects were divided into four groups, on the basis of their joint standing on creativity and intelligence. The analysis of variance of the data showed that creativity was consistently found to have no significant relationship with achievement in any of the school subjects, except History and Geography, while intelligence was found
to have significant effects on all performance measures, again except history and Geography. There were positive, though insignificant, trends for the relation of creativity to achievement, in English, science and the elective subject.

Studies employing the Wallach-Kogan instruments for determining the relation of creativity to academic achievement have not been many. Nevertheless, the studies of Wallach and Kogan (1965) and Paramesh (1973) have brought forth clear-cut results, in the expected direction. However, the findings of Wallach and Wing (1967) contradict the expectation. They obtained positive effects of both intelligence and creativity on both high school and collegiate achievement. However the results with their uniqueness as variable was not supportive of the general trend of their findings.

In sum, studies which employed tests from the Guilford, the Torrance and the Getzels-Jackson battery, and also ratings for creativity done by teachers, for assessing creativity have already yielded results
which point to a significant, positive link of creativity with achievement. However, as stated in the previous chapter, these devices suffer from the inability to tap a unified dimension of creativity which is distinct from intelligence. Therefore, the effect of creativity on achievement that was seen in these studies might be reflective of the effect of intelligence on achievement. However, studies employing the Wallach-Kogan instruments but for the one by Wallach and Wing (1960), have generally shown the absence of a positive link between creativity and achievement.