

CHAPTER VI

DISCUSSION OF RESULTS

6.0.0 Introduction

In the present study, an attempt has been made to develop verbal creativity instructional materials and ascertain their effectiveness on the creativity scores of different types of students. The rationale of the study, need for developing instructional materials and objectives have been presented in chapter I. The review of related literature is included in chapter II. The details regarding methodology adopted for formative and summative evaluation have been explained in chapter III. The characteristics of the instructional materials along with formative evaluation and summative evaluation are included in chapter IV. The analysis and interpretation of the data form chapter V. In this chapter, results of the experiment will be discussed, in the light of previous research findings. Firstly, the results of analysis of covariance will be discussed; secondly, the results of analysis of ten hypotheses would be taken up; then, thirdly, other types of validation that have been done would also be discussed; Lastly,

the question of appropriateness of creativity instructional materials, to foster creativity would be taken up for discussion. Implications of the results will be seen in terms of evidences available in other studies, as well as social, cultural and instructional processes existent in the country.

6.0.1 Covariance Analysis

It has been found from analysis of covariance, that the experimental school children have done significantly better than the control children, even surpassing test-sensitization effect. Two parallel forms of the Passi tests of Creativity were not available, and therefore, the same tests had to be used for pre-test and post-test in both the experimental and control schools. As the same tests were used, test - sensitization became an important factor to be controlled. The result of analysis of covariance revealed that experimental children have done significantly better than the control children even taking care of test-sensitization. (Vide section 5.0.1.). This probably indicates that verbal creativity instructional materials were capable of producing significant effects in the experimental school children in terms of gains in the creativity test scores.

6.1.0 On Hypotheses

Ten hypotheses of the study pertained to the effectiveness of the verbal creativity instructional materials, and were related to the different variables studied. The hypotheses were tested on the basis of scores of experimental school children. As the purpose of the present study was to develop instructional materials and experimentally find their effectiveness, the control school children were not considered in the hypotheses. Out of the ten hypotheses, four of them are major hypotheses on the levels of creative potential, levels of socio-economic status, sex and rural-urban backgrounds, the remaining six are on interaction of these four variables taken two at a time. The reason for not examining higher order interaction of these variables has already been given in section 5.0.1 p 160 .

6.1.1 Hypothesis 1 states : there will be no significant difference in the effect of verbal creativity instructional materials on the students of different creative potentials.

Out of the three levels of creative potential, viz., high, middle and low, null hypothesis was rejected in case of middle and low creative potential groups. The null hypothesis was not rejected in case of high creative potential group.

It was found by analysis (Vide section 5.1.2.1 p 167) that the students of middle creative potential and low creative potential did significantly better in the post-test compared to the pre-test. The students of high creative potential have not done significantly better; this could be due to 'statistical regression' (Vide section 6.5.0 p 263).

This finding partially agrees with the findings of Parnes (1962) and Khatena (1977) who found that high and low creatives were equally benefitted by the creativity training programmes. Parnes studied the series of researches conducted on creative problem solving courses by Creative education foundation, Buffalo. Khatena developed a special training programme to use simile, metaphor, personification and allusion as comparison forms within four analogy classifications, viz., direct, personal, symbolic and fantasy analogy; and to differentiate between simple and complex images on the production of analogies. In the present study the ideas of both the above programmes have been present, but not in the strict sense of the techniques. The children have indulged in creative problem solving; use of simile, metaphor in the production of poems, and analogies in the riddle construction, etc., but the findings are different, may be, the verbal creativity instructional materials were lacking

in provision of exercises to high creative potential students, or it could be taken as a merit that the instructional materials were capable of raising the creative abilities of middle and low creative potential students.

In the second part of the analysis (Section 5.1.2.1 p168) the null hypotheses had to be rejected in all the three cases (high Vs middle, middle Vs low and low Vs high creative potentials) owing to the significance values of test statistics, whether parametric or nonparametric.

That is to say that high creative potential students have done significantly better than the middle creative potential students, who in turn have done significantly better than the low creative potential students. The high and low creative potential students obviously differ significantly from each other.

This finding probably means that the high, middle and low creative potential groups have been able to benefit from the instructional materials according to their capacities, when the post-test scores were taken for consideration.

This also indicates that the verbal creativity instructional materials may be ability based and so the post-test means after taking the instructional materials in case of three

groups are significantly different from one another.

6.1.2 Hypothesis 2 states : there will be no significant difference in the effect of verbal creativity instructional materials on the students of different socio-economic status.

The statistical test results necessitated the rejection of null hypothesis in case of high SES students and middle SES students.

The analysis (Vide section 5.1.2.2 pp.170,171) revealed that both the groups of students, viz., high SES students and middle SES students have done significantly better in the post-test, when compared to the pre-test. The middle socio-economic status students have done better compared to the other group in terms of significance.

The above finding is in full agreement with the study of Edward (1978), whose suggestive - Accelerative Learning and Teaching ' (SALT) Programme favoured middle socio-economic status students in all 10 measures of creativity, five of them being significant; verbal flexibility and originality, figural elaboration, abstract titles and creative strengths. The Torrance Tests of Creative Thinking (TTCT) was used, the sample being 175 students of fifth

through eight grades.

The finding is in partial agreement with the studies of Davis (1971) and Ogletree and Wilma (1973). Davis combined the main components of various strategies for stimulating creativity, which is both interesting and informative for adolescents, in a package, viz., 'Thinking Creatively; a guide to training imagination'. In his study, the upper middle class - seventh grade students, 23 of them produced 65 percent more ideas on three divergent thinking task than 32 controls. Ogletree and Wilma (1973) in a study of 1165 primary school children found that children from upper class families obtained significantly higher creativity scores, than children of middle and lower class families; the same significant difference was found in middle class children and lower class children too.

In the present study, the second part of the above evidence was found to be similar but not the first, that is, the middle class children did significantly better in creativity tests than the lower class children. In the study of Davis (1971), all the children of the sample had come from upper middle class, and no comparison was done between the groups. In the present study, students belonging to all the levels of socio-economic status, viz., high, middle and low

were present in the sample, and comparisons were possible.

In the second part of the analysis (Vide section 5.1.2.2 p 179) the null hypotheses were ^{not} rejected in all the three cases. That is the high SES students were not significantly different from middle SES students, who in turn were not significantly different from low SES students. The interesting finding has been that the high SES students, do not differ significantly from low SES students also, when post-test means of creativity scores were taken into consideration for testing significance of differences.

The finding that the three groups of SES students do not differ significantly from one another, indicates that the socio-economic status is not an important factor to make gains in the post-test after taking instructional materials or, the verbal creativity instructional materials are not biased towards any one of these groups. This finding gets credence when we see it in relation to the second part of the analysis of hypothesis No. 1. That is, the verbal creativity instructional materials are ability based and not socio-economic status based.

6.1.3 Hypothesis 3 states : There will be no significant difference in the effect of verbal creativity instructional materials on the students of rural and urban backgrounds.

The null hypotheses were rejected in both the cases of rural students and urban students with respect to the significant differences from pre-test to post-test scores.

That is, the rural and urban children did significantly better in the post-test, when compared to the pre-test. The gains obtained by both the groups are nearly equal.

This finding could be seen in the light of a couple of related studies by Amran and Giese (1969) and Davis (1971).

Amran and Giese gave six week training programme to 63 students of average ability, but meagre cultural backgrounds. The training programme was on becoming aware of surroundings and experience noting habits and functional fixations; finding idea - spurring questions, listing, modifying and attributing, for stimulating imagination. The specific inference from the study was that 'Creativity training' should be included in the school curriculum, particularly for the socially handicapped. Davis, using the same package, 'thinking creatively; a guide to training imagination', in another study found that disadvantaged sixth and eighth graders showed significant improvement in divergent thinking scores. Sharma (1971) in his interactional study of creativity with intelligence, interests and culture found that the rural students were more creative than urban students,

the sample being 414 male students of standard X.

In both the interventional studies mentioned above, only disadvantaged and socially handicapped children have been experimented upon and no comparison has been made between them and well to do or advantaged class sample. Sharma's study being correlational, does not come under direct comparison with the present study. In the present study a comparison of rural and urban students has been made, as well as the comparison between three levels of socio-economic status (Vide section 5.1.2.3 p. 172.).

The second part of the analysis (Vide section 5.1.2.3 p 173) the null hypothesis was rejected in favour of urban students, when post-test means of rural and urban students were considered. This indicates that the urban students have done significantly better than the rural students. But the interesting finding has been that the gains of both the groups are nearly equal, eventhough the rural group was sufficiently low, when compared to the urban group, in the pre-test itself. This finding probably shows again, the ability based nature of verbal creativity instructional materials, as the urban students who were high remained high and rural students who were low in the pre-test, remained comparatively low, even though their gains are approximately equal.

6.1.4 Hypothesis 4 states : There will be no significant difference in the effect of verbal creativity instructional materials on male and female students.

The statistical tests necessitated the rejection of null hypotheses for both boys and girls. That is to say, both boys and girls have done significantly better in the post-test, compared to the pre-test (Vide section 5.1.2.4 p175) This most probably indicates that the verbal creativity instructional materials were able to enhance the creativity scores of both boys and girls significantly.

This finding is in agreement with the findings of the study by Wardrop and others (1969), who used a series of self-instructional programmed lessons to investigate the extent to which creativity and problem-solving skills of children could be nurtured. Improvements in productive thinking skills were found for both boys and girls of both higher and lower I.Q. Organ (1977) also could not find sex difference in her study of the effect of an experimental creative thought production programme on figural creativity scores, the sample being 80 second and third graders.

In the second part of the analysis (Vide section 5.1.2.4 P175) when analysis of Covariance was done to adjust the effect of

pre-test scores, the boys were found to excel girls.

This finding is in agreement with the studies by Raina (1966, 1969), Passi (1971), Prakash (1963), which ^{are} correlational by nature. Similar to these studies done at Arab country is by Mar I (1971), who found that Arab rural males did significantly better than the females in nine out of thirteen types of scores drawn from the battery of Torrance Tests of Creative Thinking (TTCT). But, none of these is an intervention study, where the effect of the instructional materials on sex has been studied.

Again, this finding is in contrast to the findings of Allen Car (1974), Johnson (1975), Williams (1977), Davis and Bull (1978), Schneider (1978) and Fairchild (1979), who found that girls excel boys in their Creativity training programmes, through intervention studies.

Allencar (1974) tried to find out the effectiveness on 'The Purdue Creative Thinking Programme' on fourth and fifth grade pupils. Reinforcement was introduced as an additional variable. Parallel forms of Torrance Tests of Creative Thinking (TTCT) were used as pre-test and post-test. Sex differences were found with girls' performance excelling boys' on figural fluency and verbal fluency.

Johnson (1975) conducted a study to investigate the effects of special guided lessons in creative thinking upon the creative thinking ability, achievement and intelligence of fourth graders. Torrance Tests of Creative Thinking (TTCT) were used to measure the criterion variable, viz., creative thinking. Analysis of variance between the experimental boys and girls revealed a significantly higher F ratio for girls on total creative thinking and on the test of flexible thinking. Even in other tests the means were high in case of girls but were not significant.

Williams (1977) developed a programme utilising a direct approach involving the learner in terms of creative product, the creative person, the creative process, including the instruction in the use of Brain-storming and studied its effectiveness on secondary school children of average and below average ability. Statistical analysis revealed that females were more creative than males, as measured by test instruments.

Davis and Bull (1978) tried to investigate into the effect of affective components (attitudes and interests) on undergraduate students. How do you think (HDYT) and Adjective Check List (ACL) were used interchangeably to test the students for creativity. The training effect was found to be stronger and for females than males.

Schneider (1978) tried to determine the effects of a set of productive thinking and forecasting activities on the creativity and self-esteem scores of fifth and sixth grade children. The subjects of the study were 191 fifth and sixth graders from six rural elementary schools. The major finding of the study was that girls score higher on verbal creativity measures than boys.

Fairchild (1978) investigated into a special programme of creativity-developing activities on 'low-creative' gifted fifth and sixth graders. The specific conclusion was that females were more responsive to activities than males.

The boys scoring significantly better than girls, as found in the present investigation has socio-cultural reasons. The Indian girls face many restrictions in family and society and find less opportunities for free expression of their ideas and views. The process of nurturing has a heavy dosage of verbal aspect. Our schools, too emphasize the same. The teachers talk more and the practical work, learning by doing, etc., are less in our school curriculum. Women's education has been lagging behind although with the limited scope at their disposal, wherever possible, they have shown their merit, like, in the field of teaching, medicine, etc.

In United States, the girls perform better than boys in most of the verbal tests of creative thinking. It is difficult to believe that in the United States, girls are born superior to boys in verbal creativity and that the reverse is true in India. Differences in the nurturing influences of the cultures involved, help explain these differences. In Indian cities, one has to know several languages, and verbal abilities are given heavy emphasis. In the United States, schools and middle class culture reward verbal skills. This has not been true, however, in the Negro and lower socio-economic subcultures. (Torrance, 1971). For a detailed picture the socialization process has to be considered.

Socialization involves training in behaving in ways that are valued by the society into which one is being socialized. Thus, a major effect of socialization is to stabilize behaviour in well-socialized individuals and to reduce the range of variety of behaviours they exhibit. In a given culture, a socially stereotyped band of highly desirable behaviours exists, along with a Penumbra of tolerable behaviours, and an area of undesirable, ill-mannered, or even proscribed behaviours. An individual is normally restricted to exhibiting behaviours which lie within the tolerated limits of his

society, and suffers various punishments, if his behaviour falls into his society's shadow region. In a certain sense, then the acquisition of a culture's 'modus operandi' restricts variety in behaviour (Cropley, 1973).

Each culture differs regarding behaviours it expects its members to exhibit and not to exhibit. The same culture may have differential rewards to males and females, for the same task. This being the case in India, the girls naturally tend to perform less effectively than boys in creativity tests. Greater freedom and individuality, if permitted, will most probably decrease the sex differences in creativity. Individual creativity is likely to increase, as societies move towards a less restrictive code. (Sharma, 1971).

Torrance (1962) puts forth another observation : Creativity, by its very nature requires both sensitivity and independence. In Indian culture sensitivity is more a feminine virtue, while independence is a masculine virtue. Thus, we may expect the highly creative boys to appear to be more effeminate than their peers and the highly creative girls appear more masculine than their peers. In the longitudinal studies, Torrance (1962) found examples of children, who sacrificed their creativity in order to maintain their masculinity or their femininity, as the case may be. Thus culture has

an inhibiting effect too, and reduction of masculinity in males and femininity in females, may bring the sexes closer to their potentials and induced development of traits, which may lead to 'no sex difference in creative thinking abilities'.

Eventhough American society is known to be more liberated, there also we find sex differences in creative thinking abilities, may be in favour of girls. As Edwards (1968) points out 'the question of sex differences is yet to be answered clearly by the researchers, may be the clue lies elsewhere'.

6.2.0 Hypotheses 5 through 10 : Six hypotheses, out of four variables considered pertain to levels of creative potential, levels of socio-economic status, rural-urban background and sex, taken two variables at a time. The reason for not examining the higher order interactions has already been mentioned in section 5.0.1 p 160 . All the six interactional hypotheses were stated in null form. Each one of them would be discussed under separate headings.

6.2.1 Levels of Creative Potential X Levels of Socio-Economic Status

The students belonging to middle SES with middle creative potential and middle SES with low creative potential have

done significantly better in the post-test compared to the pre-test. High SES students of all the three creative potential levels and middle SES students with high creative potential have not done significantly better in the post-test compared to the pre-test (Vide section 5.1.2.5 p. 250)

This finding is in contrast to the study of Haley (1979), who trained advantaged and disadvantaged black Kindergarteners in sociodrama and tried to find its effects on creativity. The finding of the study was that affluent black children were more verbally creative, while poor black children were more kinesthetically creative, although overall mean creativity scores did not differ significantly.

The possible reason for this could be that high SES students might not get positive reinforcements for their creative ideas, innovations, etc., in the family. As all the children were treated in the same manner without the knowledge of their antecedents or initial creative potential, only the family could provide the answer.

The middle SES students except those having high creative potential have done significantly well. The middle SES group generally suffers from the status consciousness'. Only the achievement of children could bring them up and not

family position. Therefore, the middle SES parents try hard to recognize the salient points in their children's personality and reinforce them, especially in the urban areas.

The observations made above regarding middle SES parents got supported in the interviews with them where from information was obtained about the way they treat their children, the pride with which they tell about their children's achievements, etc.

6.2.2 Levels of Creative Potential X Rural-Urban Backgrounds

All the types of students of urban or rural areas with different creative potentials, except the urban high creative potential group, have done significantly better in the post-test compared to the pre-test (Vide section 5.1.2.6 P 180.).

This finding supports the earlier inference that all students irrespective of their being in rural or urban area could do significant progress because of the input, ~~or~~ or it may also mean that the students' abilities are more important than the place of residence, in making significant gains on the post-test, over the pre-test.

The break up of the 6 top gainers supports the above finding out of the 3 urban top gainers, two belonged to the

middle creative potential group and one to the low creative potential group, and none to the high creative group. All the three rural top gainers belonged to high creative potential group where the ability of the children has mattered much in making superior progress.

It may be said at this stage, that five out of six interactions of levels of creative potential and rural-urban background, were found significant, which speak of the merit of verbal creativity instructional materials.

6.2.3 Sex X Levels of Creative Potential

The males of middle and low creative potential and females of middle and low creative potential were found to gain significantly. But males and females of high creative potential could not gain significantly in the post-test over the pre-test (Vide section 5.1.2.7 P. 182.).

This finding is an extension and further confirmation of the finding on levels of creative potential (Vide section 5.1.2.1. P. 167). It was found in Hypothesis 1 that students of high creative potential could not do significantly better in the post-test compared to the pre-test. Here, again, it has been found that both males and females of high creative potential could not make significant progress

because of the input.

This finding agrees to some extent with the findings of Fairchild (1978), who tried to determine the effect of specific instruction in creativity-developing activities on gifted fifth and sixth graders having low creative potential. He found that middle creative females showed significantly greater growth and the divergent group scored significantly higher than the convergent group. Females, high, middle and low creatives, scored significantly higher than did males on total scores.

It can be said at this stage that the instructional materials are either more biased towards middle and low creative students or the 'statistical regression' might have played its part for both boys and girls. (Vide Section 6.5.0 P.262.)

Four out of six interactions of sex and levels of creative potential were found to be significant, which again shows the ability based nature of the instructional materials.

6.2.4 Rural-Urban Background X Levels of Socio-economic Status

The high SES students and middle SES students of urban area and middle SES students of rural area have done

significantly better in the post-test, compared to the pre-test. Only the rural high SES students have not gained significantly (Vide Section 5.1.2.8 P.184).

It was observed in the discussion under section 6.5.0 p263 that middle SES students have done considerably well than others. The similar result here also, adds consistency to the observation.

The high SES students have not done significantly better consistently (Vide section 6.5.0) raises an important question, viz., Why they have not been able to make use of instructional materials to gain more ? The reasons for this could be : (i) The high SES students get variety of books, comics, etc., which might have induced them not to bother much about the instructional materials and consequently they probably did not work on them properly; (ii) the story telling method might not have motivated them sufficiently; and (iii) a general apathy on the part of high SES students, towards the curricular activities in the school, arising out of a sense probably possessed by these students that their achievement in school is not a necessary condition to thrive in life.

6.2.5 Sex X Levels of Socio-economic Status

The high SES and middle SES males and middle SES females have done significantly better in the post-test, compared to the pre-test. Only the females of high SES have not done well in terms of gains in the creativity test (Vide Section 5.1.2.9 P.186.).

The high SES students not doing significantly better was taken up for discussion in the preceding section. From the result of this interaction hypothesis, it seems that, the females of high SES group, more than the males, have shown the nonsignificant results. It may be that the females of high SES group, more than the males, suffer from the excess of parental supervision, and comparatively have less experience of the outer world. Provision of more freedom to the children and less of supervision of their activities help growth of creative thinking abilities, which may not be found in high SES families. May be, the high SES parents want their daughters to achieve better in tests and examinations than in other types of activities; what happens as a result is mainly an encouragement of convergent thinking. It has been the common knowledge that some unusual activities of girls called boyish and are stunted very much in the peer groups. The stories told in the family, books that are read by the girls, all portray a 'model woman', i.e., to be docile, convergers, than

to be active divergers. Parents generally insist on the above 'role assumption' by their daughters, probably as it does not bring any problems of adjustment to them in the family.

6.2.6 Sex X Rural - Urban Backgrounds

Males of rural and urban areas and females of rural area have done significantly better in the post-test, compared to the pre-test. Only the urban females have not done significantly better to attain the level of significance.

The males of rural and urban areas doing well is an extension and further confirmation of the results of hypothesis 3 (Vide Section 5.1.2.3. P. 172.). In the preceeding section the discussion centred around females of high SES. In this section it may be observed that females of urban area have not done significantly better in the post-test. The females in both the sections seem to be the common factor. This again is an extension and further confirmation of the results of hypothesis 4 Vide Section 5.1.2.4 P. 175.). The females have been found to do less better than the males consistently. The possible reason for the urban females not doing significantly better

in creativity tests may be again found, in the difference between rural and urban settings contributing to development of creative abilities in their tender years of life. The urban girls seem to grow in more restrictive environs than their rural counterparts, in terms of activities and movements. They are made to model after somebody, may be, by hints from elders. Quite unintentionally also, they would be following the adolescent fashion models, cinema models, and such other 'influences' as are profusely available in the urban life. The net result of all this, as the experts say, is the dwarfing of urban girls' creative imagination.

6.3.0 On Correlation Between Comprehension Test and Pre-test Creativity Scores

The correlation coefficients between comprehension test scores and pre-test creativity scores was found to be 0.28, 0.22 and 0.34 for urban experimentals, rural experimentals and both of them together respectively (Vide Section 5.2.0 P. 190). The coefficient of correlation indicates the extent of relationship between two sets of scores. As the values are well below 0.4, there is positive but low correlation between comprehension scores and pre-test

creativity scores. The comprehension test was administered to know the ability of children to comprehend a written passage and answer ^{the} questions given. The verbal creativity instructional materials also had to be comprehended and questions had to be answered. Therefore, it was thought to know the correlation between the two abilities mentioned above.

The 'r' imply that it is necessary to comprehend the ideas, before the children can think divergently, the low relationship shows that its effect is rather low. Had there been high correlation, then both types of abilities would have become very similar to each other. The comprehension ability that is required for creative thinking is not literal comprehension, but functional comprehension. Mastery of the students in this ability, in fact, becomes a block to creative thinking, as the mastery may impose strict procedures to be followed in using of words, phrases, etc.

Verbal learning, science, etc., are linked with the left hemisphere of the brain whereas divergent thinking, non-rational thinking, etc., are linked with the right hemisphere. The correlation coefficient most probably shows that both the hemispheres have to contribute in creative thinking. But the beginning is to be made by the left hemisphere, which will be built on by the right hemisphere.

The low 'r's imply that the verbal creativity instructional materials are to be comprehended well before an attempt is made to think creatively, the effect of such an ability is not much in the increase of creativity scores of students, because the instructional materials are based on creative thinking abilities (Vide sections 5.1.2.2, 5.1.2.3)

6.4.0 On Appropriateness of Instructional Materials to Foster Creativity

Some of the important issues that the present study has kept in view are : the extent of systematisation in instructional materials, complementary nature of convergent and divergent thinking, appropriateness of preparing instructional materials and how far they really help develop creativity, etc. These issues have been taken up for discussion in this section.

Successful performance of an activity requires certain concrete steps to be followed, which may be considered as the structure of that activity. In the similar way, structuring or systematisation of instructional process must help in creating conditions, so that creativity of children finds expression. For any creative production, the basic knowledge of things, materials, processes, etc., are necessary. Then only a person can leap forward to use his creative abilities and produce something unusual or original. It has been increasingly

recognized that both convergent and divergent thinking are necessary for creativity. It seems they are the two aspects of the same process. This view gets support from the physiological psychologists' view of the thinking process, that is, brain as the seat and the determiner of thinking process. Both the hemispheres should complement each other in creative thinking. The left hemisphere of the brain known for rational thinking, temporal relationships and sequential thought, should cooperate with right hemisphere of the brain, known for non-rational thinking, spatial relationships, holistic thinking and image production.

Covington (1968) discusses the question of utility, values and other issues with respect to instructional materials. One of the most fundamental questions raised by the present study is whether programmes designed to promote creative thinking are actually needed, seen in the perspective of a child's total educational career. No matter, how beneficial a given programme may be, it is likely that untutored children will sooner or later catch up, simply through the normal process of intellectual maturation and accumulating experience. Generally, more permanent and meaningful changes will occur only on the basis of accumulation, and therefore, longer programmes consisting of coordinating curriculum units, which have gradual increase of complexity, are ever more necessary.

No doubt, both the trained and untrained children would love to expand their intellectual capabilities, but there remains a point, whether the untrained children can use the capabilities to the same extent as the trained children. The untrained children say elementary children, cannot be expected all of sudden to start using all capabilities at a later age.

Another important point concerns the development of attitudes and values which favour the exercise of creative thought. Attitude cannot absolutely be a function of age, and so, attitudinal disposition of trained children will be certainly beneficial from the point of view of putting the learnt skills to meaningful use. Therefore, the learning experiences should be of working on challenging but meaningful problems such that the sense of satisfaction of discovering a solution could be felt by the child, or even the frustration may lead to persevering bent of mind. If such experiences are faced by the child at important points in the process of development, they will strengthen the attitudes and values which prepare him to undertake the creative tasks, than increasing his sheer competence of problem-solving by skills training only.

6.5.0 An Overview

An examination of the results of first four hypotheses reveals that 9 out of 10 subgroups have done significantly better in the post-test compared to the pre-test. That is, 90% of the groups of students have gained significantly better by working with the verbal creativity instructional materials taken in between the pre-test and post-test. Both the techniques of statistical analysis of data, viz., parametric and non-parametric have led the investigator to the same inference, is a point of importance, while considering the effectiveness of instructional materials. From 9 out of 10 significant results it can be inferred that verbal creativity instructional materials have been effective in terms of gains in the creativity test scores (Vide section 5.1.2.1 to section 5.1.2.4)

An examination of the results from hypotheses 5 to 10, shows that 20 out of 29 interactions have been significant (Vide section 5.1.2.5 to section 5.1.2.9). That is, these groups have done significantly better in the post-test compared to the pre-test. As the majority of the interactions have been significant, it can be inferred that the verbal creativity instructional materials have been effective in terms of significant gains in the creativity test scores, when two variables were considered together. Both the parametric and nonparametric techniques of analysis of data having given the

same results adds weight to the above inference.

When the 10 groups of students from both the above categories, who could not obtain significant gains are considered, a pattern emerges. These ten groups are :

- (i) High creative potential group.
- (ii) Males and females of high creative potential group.
- (iii) High SES students, with all the three levels of creative potential.
- (iv) High SES females.
- (v) Middle SES students with high creative potential.
- (vi) Urban high creative potential group
- (vii) Urban females

The common groups which have not gained significantly are high creative potential groups, high SES groups and some groups of females. Some of the reasons for these groups not gaining significantly could be : (i) the verbal creativity instructional materials have not catered to these groups well; (ii) there could be socio-economic and familywise reasons; and (iii) one of the main reasons for high creative potential groups (6 out of 10 mentioned) above) not gaining significantly could be the statistical regression. Seen in the context of learning, statistical regression is a tendency of the high achievers and low achievers to converge towards

the mean position. In the present study also the high creative potential students and low creative potential students might have converged towards the mean. In the case of low creative potential students, this, in addition to the effect of instructional materials might have produced significant results. But in the case of high creative potential students, as they converge to the mean position, their scores come down and may be this has resulted in non-significant results. A clue from this could be that the verbal creativity instructional materials are to be modified in such a way that the high creative potential students get better scope to enliven their high creativeness fully. The specific learning needs of these high creative potential students are to be catered to, as they are very important from the point of view of nation's development.

Even though some of the groups could not gain significantly after working with the instructional materials, on the whole, the verbal creativity instructional materials seem to have served the purpose, in terms of : (i) 9 significant results in respect of four variables of the study; and (ii) the results of other validating measures as reported in chapter V.

The results of other measures of validation apart from statistical treatment of creativity test scores, were :

(i) correlation coefficient between comprehension test scores

and pre-test creativity scores being low ; (ii) significant differences in post-rating and pre-rating of students by teachers; (iii) majority of children liking the stories and components, as obtained in the reaction questionnaire data; (iv) characteristic differences of creativity having been found in the high gainers, when compared to the low gainers, as revealed by the students interview data; and (v) some differences in creativity characteristics of high gainers and low gainers, as revealed by the parents' interview data.

When the results of analyses of all the above validation measures are viewed in a summative fashion, the investigator has reason to believe that verbal creativity instructional materials are capable of fostering creativity in children. In this respect the main evidences, the present study has produced are the following : (i) Significant increases were found in creativity scores from pre-test to post-test in case of 29 subgroups out of 39. (ii) Significant differences were found in the ratings got by the children by their teachers, from pre-treatment rating to post-treatment rating. (iii) Majority of the children have liked the instructional materials and have enjoyed solving problems, writing poems, etc. (iv) The instructional materials have produced important creativity characteristics in high gainers when compared to the low gainers, as revealed by the responses of the children.
