CHAPTER VII

SUMMARY OF PROCEDURE, CONCLUSIONS
AND SUGGESTIONS
7.0 SUMMARY OF PROCEDURE, CONCLUSIONS AND SUGGESTIONS

PROCEDURE

The study, as indicated in the earlier sections of this report, has been designed to compare the personality factors of two extreme creativity levels within a group of high-intelligence secondary school subjects. The study involved two major procedures: (a) the identification of the two experimental groups viz., the High-intelligence-High Creative thinkers (HI-HC) and the High-intelligence-Low Creative thinkers (HI-LO); and (b) the derivation of personality factor structures for the resulting groups with respect to a specified group of personality variables. The two main stages of the study have been divided into a series of component procedures as reported below:

(i) Two types of intelligence measures viz., the Kerala University Verbal Group Test of Intelligence and the Kerala Non-Verbal Group Test of Intelligence were administered to a representative sample of 5137 secondary school subjects, selected using the proportionate stratified sampling method. The elimination of defective and incomplete score sheets etc. reduced the sample to 4982. The mean and standard deviation of the scores in the intelligence tests (Verbal and Non-verbal scores) were worked out separately. Subjects who scored at or above the rounded value of (Mean + S.D.) for the verbal test score and also at or above the rounded value of (Mean + S.D.) for the Non-Verbal test score, were marked as the high-intelligence group of subjects.
The mean ($M_1$) and standard deviation ($\sigma_1$) for the Verbal Group Test was found to be 60.32 and 11.77 respectively. The mean ($M_2$) and standard deviation ($\sigma_2$) of the Non-Verbal Group Test of Intelligence was found to be 31.12 and 9.17 respectively. Thus subjects getting scores at or above 72 (the rounded value of $M_1 + \sigma_1$) for the Verbal Group Test of Intelligence and scores at or above 40 (the rounded value of $M_2 + \sigma_2$) for the Non-Verbal Group Test of Intelligence were identified as the 'High-intelligence' subjects for the purpose of the study. The deviation IQ's of these 'High-intelligence' subjects roughly exceeded 115 as measured by either of these intelligence tests. The above classification yielded 614 high-intelligence subjects.

(ii) The second stage was the identification of the 'HI-HC' and 'HI-LC' groups within the 614 'High-intelligence' subjects. This was done with the help of the Kerala University Test of Creative Thinking which was administered to the 614 high-intelligence subjects. After eliminating the defective score sheets etc., the answer sheets of the remaining 596 subjects were scored for the three components of creativity viz., fluency, flexibility and originality and the component scores were used to find out the total creativity scores for this group. The mean ($M_3$) and standard deviation ($\sigma_3$) of the creativity test scores for this 596 subjects were worked out. The mean and standard deviation was found to be 84.17 and 13.02 respectively. Those subjects getting creativity test scores at or above 97 (the rounded value of $M_3 + \sigma_3$) have been classified as the 'High intelligence-High creative' thinkers for the present study. Similarly those subjects getting creativity test scores at or below 71 (the rounded value of $M_3 - \sigma_3$) have been classified as the 'High intelligence
Low creative' thinkers. This classification yielded 128 'High intelligence-High creative' (HI-HC) subjects and 159 'High intelligence-Low Creative (HI-LC) subjects.

(iii) The select personality tests (listed below) were administered on the two experimental groups viz., the 'HI-HC' and 'HI-LC' groups.

1. Self-Reliance
2. Sense of Personal Worth
3. Sense of Personal Freedom
4. Feeling of Belonging
5. Withdrawing Tendencies (Freedom from)
6. Nervous Symptoms (Freedom from)
7. Social Standards
8. Social Skills
9. Anti-social Tendencies (Freedom from)
10. Family Relations
11. School Relations
12. Community Relations
13. General Anxiety
14. Test Anxiety.

The scores on the above personality variables (14 in number) were used for analysis.

(iv) The first part of the analysis was aimed to find out the personality variables which will discriminate between the two extreme creativity groups (viz., 'HI-HC' and 'HI-LC' groups). The mean and standard deviation of the test scores were worked out for the two groups separately for each of the fourteen personality variables. The data were used for testing the significance of the difference between means of the two groups. This has been done by computing
critical ratios for large independent samples.

(v) The second part of the analysis has been directed towards the extraction of factor structures for the 'HI-HC' and 'HI-LC' groups. This was done, first, by working out the correlation matrices of the 14 experimental variables of the two groups and factor analysing the two matrices by using the 'Principal Axes Method' of factor analysis. The extracted factors were tested for significance by applying 'Humphrey's Rule' and the first six significant factors in each group were retained for interpretation. The resulting factors were subjected to 'Vari-max' rotations before interpretation.

CONCLUSIONS

The two types of analyses led to a number of important conclusions. A summary of the important conclusions is attempted below:

(i) A considerable number of personality variables employed in the study could discriminate between the two extreme creativity levels compared in the study viz., the high intelligence-high creative group and the high intelligence-low creative group. Among the fourteen personality variables subjected to investigation, it was noticed that eight variables named below discriminated significantly between the two groups:

1. Self-Reliance
2. Withdrawing Tendencies (freedom from)
3. Nervous Symptoms (Freedom from)
4. Social Standards
5. Anti-Social Tendencies (Freedom from)
6. Family Relations
7. School Relations
8. General Anxiety

The magnitude and direction of the differences were also seen to vary for the above variables. In the case of 'Social Standards' and 'General Anxiety', higher mean scores were seen to be associated with the superior creativity group (HI-HC) whereas for the remaining six variables in the above list, higher mean scores were seen to be associated with the inferior creativity group (HI-LC). Thus considering the 'HI-HC' as the first and the 'HI-LC' as the second group for working out the mean difference, two variables viz., 'Social Standards' and 'General Anxiety' discriminate positively between the two groups in question (positive critical ratios) while the remaining six variables discriminate negatively (negative critical ratios) between the same groups. Among the eight discriminating variables, except for one variable viz., 'Withdrawing Tendencies (Freedom from)', all the others discriminate at the .01 level of significance. Withdrawing Tendencies (Freedom from) discriminates only at the .05 level.

(ii) The personality variables which are not helpful in discriminating between the 'HI-HC' and the 'HI-LC' groups (six variables) are given below:

1. Sense of Personal Worth
2. Sense of Personal Freedom
3. Feeling of Belonging
4. Social Skills
5. Community Relations
6. Test Anxiety.
(iii) Factor analysis of the correlation matrix of the 'HI-BC' group in the fourteen personality variables revealed that the intercorrelations could be explained in terms of six personality factors as detailed below:

<table>
<thead>
<tr>
<th>Factor</th>
<th>Percentage Variance accounted for by the factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_H$</td>
<td>Non-Anxious Disposition</td>
</tr>
<tr>
<td>$II_H$</td>
<td>Group Adjustment</td>
</tr>
<tr>
<td>$III_H$</td>
<td>Individual Adjustment</td>
</tr>
<tr>
<td>$IV_H$</td>
<td>Social Conformity</td>
</tr>
<tr>
<td>$V_H$</td>
<td>Performance Anxiety</td>
</tr>
<tr>
<td>$VI_H$</td>
<td>Freedom Orientation</td>
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</tbody>
</table>

Among the six factors, the first three viz., 'Non-Anxious Disposition', 'Group Adjustment' and 'Individual Adjustment' are the major factors (over 68 per cent of the variance could be explained in terms of these factors) which characterise the personality structure of the high intelligence-high creative group.

(iv) The correlation matrix (of the fourteen personality variables) for the 'HI-LC' group could be reduced to six personality factors as detailed below:

<table>
<thead>
<tr>
<th>Factor</th>
<th>Percentage Variance accounted for by the factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>$I_L$</td>
<td>Self-Adjustment</td>
</tr>
<tr>
<td>$II_L$</td>
<td>Social Adjustment</td>
</tr>
<tr>
<td>$III_L$</td>
<td>Social Anxiety</td>
</tr>
<tr>
<td>$IV_L$</td>
<td>Personal Adjustment</td>
</tr>
<tr>
<td>$V_L$</td>
<td>Social Disposition</td>
</tr>
<tr>
<td>$VI_L$</td>
<td>Total Adjustment</td>
</tr>
</tbody>
</table>
Almost fifty per cent of the variance of the battery of tests could be explained in terms of the first two factors viz., 'Self Adjustment' and 'Social Adjustment'. These two major factors characterise the personality structure of the high intelligence-low creative group.

(v) Comparison of the factor structures of the 'HI-HC' group and the 'HI-LO' group revealed that there are four similar factors for the two groups. Thus:

(a) the 'Non-Anxious Disposition' factor \((I_H^1)\) of the 'HI-HC' group is highly comparable with the 'Self-adjustment' factor \((I_L^1)\) of the 'HI-LO' group;

(b) the 'Group Adjustment' factor \((II_H^1)\) of the 'HI-HC' group is comparable to a great extent with the 'Social Adjustment' factor \((II_L^1)\) of the 'HI-LO' group;

(c) the 'Individual Adjustment' factor \((III_H^1)\) of the 'HI-HC' group is somewhat similar to the 'Personal Adjustment' factor \((IV_L^1)\) of the 'HI-LO' group; and

(d) the 'Performance Anxiety' factor \((V_H^1)\) obtained for the 'HI-HC' group is to somewhat extent comparable with the 'Social Anxiety' factor \((III_L^1)\) of the 'HI-LO' group.

The four comparable factors obtained for the two groups are only similar in varying degrees, but not identical. Therefore it will not be inappropriate to assume that these factors also contribute at least in a small way to the dissimilarity of the factor patterns of the 'HI-HC' and the 'HI-LO' groups.
(vi) The dissimilarity of the factor patterns for the 'HI-HC' and the 'HI-LC' groups is caused by the presence of two factors in each of the groups. Thus there are two factors within the 'HI-HC' group viz., 'Social Conformity' ($IV_H$) and 'Freedom Orientation' ($VI_H$) against which similar factors do not exist in the 'HI-LC' group. Similarly for the 'HI-LC' group, there are two factors viz., 'Social Disposition' ($V_L$) and 'Total Adjustment' ($VI_L$) for which comparable factors do not exist for the 'HI-HC' group.

(vii) The hypothesis set for the study viz., that 'within any group of high-intelligence subjects, two extreme creativity groups will exhibit significantly different factor patterns with respect to any specified set of personality measures' mostly stands confirmed. In view of the special nature of the personality variables employed for the study (adjustment variables), it may be concluded that the 'HI-HC' group and the 'HI-LC' group significantly differ in their adjustment traits.

SUGGESTIONS FOR IMPROVING EDUCATIONAL PRACTICE

The findings of the study, besides contributing to a major theoretical point of view regarding the nature of creativity, suggests a means of identifying creative individuals belonging to the high-intelligence group of secondary school subjects.

The difference between the 'HI-HC' and the 'HI-LC' groups was located in the existence of factors like 'Social Conformity' and 'Freedom Orientation' present in the 'HI-HC' but not in the 'HI-LC' group and also the 'Social Disposition' and 'Total Adjustment' factors present in the 'HI-LC' group
but not in the 'HI-HC' group.

Since the nature of the personality factors (more precisely the adjustment factors) which cause the creativity differences within the high-intelligence group is known to us, it is possible to develop special tests for measuring each these factors and use it for identifying creative performers within this group. Although the dissimilar factors identified here are theoretical in nature, it should be possible to develop special tests for measuring each (mostly on the lines of the Primary Mental Abilities Test) by operationally defining each and selecting items with a very high degree of internal consistency. The different measures can be used to develop a prediction equation with creativity as the criterion performance. If $Y$ is the criterion performance (creativity) and $X_1$, $X_2$, $X_3$ and $X_4$ are the independent variables (tests in the four factors mentioned above), it is possible to develop an equation of the following type:

$$Y = a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4.$$  

where, $a_1$, $a_2$, $a_3$ and $a_4$ are the weights which can be estimated in terms of the intercorrelations and the means and standard deviations of the four variables for the group in question.

This procedure, obviously, helps to identify very important group of creative thinkers in schools - the high intelligence-high creative thinkers. The present-day practice of neglecting this important group in our educational system can be minimised to a very great extent, when once proper methods of identifying this type of children are
available. With these subjects identified, it should be possible for the teachers to give special educational treat-
tment for the creative individuals.

Knowledge of the variables associated with high-crea-
tivity would naturally help to encourage the incidence of positive factors associated with creativity and decrease the incidence of negative factors. Even while we admit that there is less agreement among researchers as to the extent to which creativity can be fostered under class-room conditions, and as to the extent to which personality fac-
tors themselves can be changed, there is some agreement as to the types of educational experiences which are most liable to foster creativity. For, once we assume that creati-
vity differences within a particular intelligence level is caused by personality differences, and since personality is more a learned behaviour (than a genetic disposition accord-
ing to current research findings), it should be possible to work out a series of organized and focussed experiences both within and outside classrooms to bring about desirable chan-
ges in related personality traits that would ultimately help to foster creative behaviour.

Evidence in support of the above view is available from two important studies. The study by Khatena,1 for ex-
ample, where he studied 148 males and 148 females from 12 representative school systems, indicates the possibility of developing the different types of creativity scores through

1. Joe, Khatena, 'Developmental Patterns in Training Chil-
dren between the Ages of 5 and 11 to Think Creativity with Pictures'. Educational Trends, 8: 138-149, 1973.
suitable forms of environmental stimulations. Williams, on the basis of his experience with the in-service preparation of teachers asserts that it is possible to evolve a specific theoretical teaching model for developing divergent-production thinking. Guilford, again, would associate creative productions with motivational qualities which are most liable to educational treatment and change. However, it may be presumed that locating the personality characteristics which are associated with creative performance, it should be possible to develop some of the positive factors and curtail some of the negative factors (in so far as they are capable of being manipulated through external treatment or environmental manipulation) so as to foster the creative potential present in a person.

The following specific suggestions would go a long way towards fostering creative thinkers in schools:

(a) Identification of Creative thinkers: It is very unlikely that under the existing situations, the average class-room teacher in India will be provided with standardized tests or biographical data for identifying or measuring creative-thinking abilities. Hence the Indian classroom teacher will have to think in terms of identifying creative thinkers on the basis of important visible characteristics as stated by Barron.

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(i) Creative people are more observant and therefore take note of even unusual details

(ii) They take note of what is usually not observed by the vast majority

(iii) They see things in a new light - see things as others do not.

(iv) They value the importance of clear understanding

(v) They can hold more ideas and information than ordinary people

(vi) They have a very high estimate of themselves.

Torrance's\(^5\) process definition of creativity could also be of use to teachers in locating potential creative talent. He suggests that creativity involves one or all of the following behaviours: (i) the process of sensing difficulties, being aware of problems, or detecting gaps or missing elements in the information presented; (ii) the process of formulating hypotheses, making guesses, asking questions or investigating and manipulating information; (iii) the process of testing and revising hypotheses, guesses or questions formed earlier; and (iv) the process of communicating the results to others.

It will also be of help if the teacher be on the perpetual look out for students who consistently exhibit behaviours like the following: demonstrate the existence of original ideas, possesses unique methods of communication, visualises very unusual situations and consequences, produces new or improved tools and appliances, advances new arguments

to establish known results, produces drawings which deviate in form and technique from the conventional ones, produces new tonal patterns, writes parodies of well-known poems, develops or uses new literary styles, suggests new organizational patterns to achieve better effect, goes beyond given informations to achieve generalities, finds out unusual uses for old appliances and techniques, accepts or demonstrates unusual patterns of action, develops new tools or contrivances, possesses extreme fluency with words etc.

Since the teacher cannot get all the information about individuals from the observational data collected by him, he will definitely have to depend upon secondary sources of data which he can either confirm or elaborate on the basis of his own observation. Secondary data regarding creative behaviour could be obtained from sources like the following:

(i) Peer reports of unusual abilities (of having produced an attractive painting, useful contrivances etc.);

(ii) recorded information of unusual abilities (very high proficiency in mathematics or drawing);

(iii) records established in open competitions (standing first in a national competition say in classical music); and

(iv) high originality scores obtained through sources other than creativity tests (e.g., high originality scores in the T.A.T. test).

The best method of identifying creative performers, of course, is to combine information from all or as many of the above sources as possible.
(b) Methods of fostering creativity

There is substantial amount of literature available on the theme which should be of use to class-room teachers and parents. An important drawback with the present day system of education in India is its total neglect of the claims of the individual pupils for development. It remains a sad truism that the creative individual in the Indian class-room is not accepted or encouraged. There is, on the other hand, a general tendency to fit him into a stereotyped behaviour pattern. Social conformity, rather than originality, is looked upon as a virtue which the educational system is expected to develop. This is not unexpected in a traditional educational system where education is often identified by the teacher and the community with the acquiring of certain accepted patterns of intellectual skills and behaviour.

If creativity is looked upon as the manifestation of a number of unique personality variables, it should be possible to evolve a special programme of education which will foster the growth of these traits. A number of practical steps that can be effectively used to foster the growth of creative individuals in Indian schools are suggested below:

(i) Identify the creative individuals using any or all the methods suggested earlier, taking particular care to see that no single highly creative individual has escaped notice.

(ii) When once a creative individual is identified, take particular care to see that he is treated with full consideration for his abilities without
giving him or the others in the class the idea that he is atypical.

(iii) Respect the 'irrational' in him because he himself accepts and respects the 'irrational' in him and courts it as the most promising source of novelty in him.

(iv) Encourage the creative students to aspire towards novelty by 'rewarding' creative behaviour with positive reinforcements, even when the creative performance conflicts with prevailing standards and practices.

(v) Provide uninhibited freedom to experiment and argue along new and unconventional lines even when such procedures would come into conflict with existing organizational patterns and institutional practices.

(vi) Adopt open-ended problem-solving approaches in dealing with creative children in the place of a complete design for problem-solving, thus providing opportunities for adopting varied and apparently irrational approaches.

(vii) Develop a code of special teachers for various school levels with special competence and expertise in the area (usually referred to as the Creative-Teacher-Educator Model) who can be used to help the ordinary teacher in dealing with the creative pupils.

(viii) Educate the parents of creative children in the implications of creativity and the role of parents as primary agents for fostering creative growth.
(ix) Use special methods for evaluating the creative thinkers using as far as possible divergent-thinking tests, and in so far as they will not clash with existing evaluation procedures.

Other procedures useful in dealing with creative individuals are:

(i) individualized teaching in select schools with the help of specialized teachers with the profuse use of techniques like special grouping, acceleration etc., supplemented by out-of-class experiences like 'School Creativity Clubs' etc.

(ii) special enrichment programmes for the specially talented students so that unique or outstanding performance is not only identified, but developed.

(iii) Summer classes and workshops for the creative students in different areas (mostly on the lines of Youth Pioneer camps etc.), conducted by specialists in different areas (scientists, poets, sculpturors etc.).

The methods of teaching should also be suitably modified to encourage creative performance. Teaching should be centred round the following principles:

(i) Be respectful of the unusual questions of children;

(ii) Be respectful of the unusual ideas children present;

(iii) Show pupils that they have value
(iv) Encourage and give credit for self-initiated learning
(v) Give opportunities for practice, for experimentation without immediate evaluation.

(c) Special treatment for high intelligence-high creative children

Among the creative children, probably the most important group is the high intelligence-high creative children. The study provides certain broad guidelines for identifying their creative behaviour. The special treatment for this group can be taken up under the following heads:

(i) The identification of high intelligence-high creative subjects using informal techniques also needs special mention in this context. One method of locating high-intelligence subjects (when suitable measures of intelligence are not available) will be to use school performance as a crude index of intelligence. Consistent high performance in most of the subject areas could be taken as an indicator of high-intelligence. The creative individuals within this group could be identified (using the informal procedures suggested for identifying the creative subjects) as the high intelligence-high creative group. When once this group is identified, it should be possible to workout special educational experiences for this group.

(ii) The personality factors associated with this group of high intelligence-high creative subjects have been identified in a broad way. The knowledge of the personality variables (however meagre) throws some light on the types of educational experiences that would be most conducive to
creative behaviour. As noted in earlier sections of the present chapter, we have to evolve teaching procedures suitable for maximising the effect of positive factors associated with creativity and minimise the effect of negative factors. Some procedures suitable for this type of maximisation (especially personality, environmental and instructional variables) have been suggested earlier.

SUGGESTIONS FOR FURTHER RESEARCH

The present study also provides some insight into the areas for further research within the main field of investigation. A more comprehensive perspective of the area under investigation could be obtained if a number of new studies are conducted on the lines suggested by the present study. Some of the areas that need further investigation are indicated below:

(i) The present study has been confined to an investigation of the causal role of certain adjustment variables in the differentiation of high-intelligence subjects into high-creative and low-creative subjects. Practical limitations of time and available tests forced the investigator to confine his study to fourteen personality variables, which could be broadly labelled as adjustment variables of personality. However, a number of attitudinal, temperamental and motivational dimensions of personality which could be related to creative performances have not been covered by the study. The role of personality variables like achievement-motivation, masculinity-femininity, and introversion-extraversion will have to be investigated if a more adequate theory of creative
performance has to be developed. The present study should be treated only as a first-level exploratory study making use of a wide range of adjustment variables of personality.

(ii) The effect of special instructional-stimulation programmes for developing creativity in different types of creative performance (artistic creativity, linguistic creativity, scientific creativity etc.) needs to be investigated in greater depth. This points to the need for developing special tests for measuring these types of creative behaviours, and on the one hand, and the evolution of special methods, on the other. The question of developing special types of creative behaviour should necessarily be taken up against a broad theoretical model of known interrelationships of creative behaviour and different types of programmes. Knowledge of different categories of variables associated with different types of creative performance would definitely go a long way towards evolving special instructional procedures for developing the special creative abilities.

(iii) A detailed investigation of the interrelationships of special forms of achievement (e.g., art appreciation, concept mastery, literary appreciation, spatial reasoning) with creativity and intelligence needs to be explored in greater detail if the nature of creativity has to be adequately understood. The relationships with these variables should be studied separately for different types of divergent performance (fluency, flexibility etc.) if a comprehensive picture of creative behaviour is to be obtained. Factor analytic studies of different forms of creativity scores with special types of achievement are, therefore, suggested as problems for
further study.

(iv) The comparison attempted in the study indicates the need for parallel studies for comparing similar groups at different levels of intelligence. One such study would be to compare personality variables associated with high-creative subjects belonging to three levels of intelligence (high-intelligence, average-intelligence and low-intelligence).

(v) The most basic question relating to creativity that has not fully answered as yet concerns its nature - whether creativity is a cognitive or affective trait. Studies indicate the overlap of creativity with both these dimensions of behaviour. It is quite possible that different forms of creativity are caused by different degrees of overlap of different forms of cognitive and affective variables. It is therefore suggested that a very comprehensive study be conducted to assess the overlap of different forms of creativity measures with a wide variety of cognitive and affective variables. A study of this kind would definitely be of immense help in understanding the nature of creativity. The theoretical model provided by the study should be of help in evolving better methods of dealing with creative children both inside and outside the classrooms.