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CHAPTER VIII
OBSERVATIONS AND SUGGESTIONS

8.0.0 INTRODUCTION

The research report must contain the problem investigated, procedures used for the study, the details of tools developed, the statistical procedures adopted, the result observed and conclusions formed by the researcher.

The introductory part of the thesis contains the theoretical aspects of creativity, the significant role of creativity in the development of the personality of child and the role of teachers in fostering creativity in the class-room has also been discussed in details.

Guilford in his S.I. Model described two types of thinking as follows:

1. CONVERGENT THINKING

In this the conclusions is determined by the given information or atleast there is a recognized best or conventional conclusions already known, or in general it has fixed responses. It is thus a closed system thinking as the retrieval of information from memory storage occurs under severe restrictions.
2. DIVERGENT THINKING

This produces varieties of ideas, all of which are logically possible in view of given information. Since there are number of ideas or solutions, there are number of responses to the same stimulus and one has to select the appropriate one. This divergent thinking gives a better picture of creative thinking abilities.

Creativity, a multidimensional complex process is of two kinds. (1) Non-verbal and (2) Verbal. Testing of nonverbal creativity is more appropriate and called for in the early stages of pre-primary education whereas sensory education is predominates. But at the stage where the children have a clear understanding of verbal interpretation of his levels, verbal creativity can be measured easily. This includes more aspects both of verbal and non-verbal creativity. Here the child has to select and opine on items in his own styles language while responding to the questions and drawing the pictures raised before him.

As the period of adolescence is that of stresses and strains, it is likely to effect creativity during the transition period. So the investigator thought it proper to study this group. He chose the +2 higher secondary stage (i.e. XI and XII standards) of education (10+2+3) pattern and take non-verbal and verbal creativity testing through the construction of test items in Gujarati for Gujarat State.
As there was no such tool available in Gujarati for the age-group 16 to 18 which could measure creativity of the higher secondary students, the investigator felt a pressing need to construct and standardize a creativity test in Gujarati for the higher secondary school students of the said age group.

In order to construct a valid verbal and non-verbal tests of creativity it was first necessary to define very precisely the term 'creativity' that was proposed to be measured through the said tests. These have been done by the reviewing, the various theoretical explanation of creativity, a few definitions of the concept given by experts and test constructors. Besides studying a few tests of creativity constructed by some experts in the field, consultations with some experts in the field helped the investigator to come a definite understanding of the concept of creativity and the components for the creative thinking ability test.

The selection of the test items which are considered to be the crux of the process of standardization was made by carefully applying various statistical methods. This was done with a view to obtaining the internal consistency of the test. The test has been standardized by strictly following the principles of the test, constructions and standardization. The process of standardization has been fully described in the foregone chapters.
The reliability of the test has been established by various methods such as test-retest, split-half, rational equivalence etc., with an objective of overcoming the limitations of any particular method. The validity has also been established by following the general principles of test-validation. The content, concept and concurrent validaties have been established and reported in the chapter on reliability and validity.

In short the test has been standardized on a sufficient large representative and adequate sample. The percentile age norms have been established to help the user to interpret the test scores.

To point out the usability of the test to the teacher's and research workers, the investigator has also attempted to study a few related factor of creativity. This clearly indicates that the test can be used with ease by other researchers in the field of creativity.

The findings of these researches may be helpful to run in-service programmes for the school teachers. It also provides a guide line for necessary changes to be made in the teachers training programme of teachers training institute, so that they might contribute to the cause of creativity in schools.
The investigator has kept in mind the need to construct and standardize such a tool as can measure creativity with precision. He has observed therefore all the principles and adopted procedures that can make the test an efficient tool.

8.1.0 OBSERVATIONS

Observations made by the researcher during the standardization and correlated studies are reported hereunder.

The researcher got help from the experts and the guide in respect of the following:

1. Model selection
2. Item construction and selection
3. Interpretation of responses
4. The way of scoring
and
5. The proper use of correlates

The investigator's colleagues helped him in preparing the items and in scoring and interpretation of responses.

The principals and the teacher-friends extended their fullest co-operation in providing facilities for smooth administration of the tests. On the whole, right from the collection of items
to the final administration of the tests, co-operation from different corners was found forthcoming in abundance.

The students of higher secondary stage, on whom the programme was based were very co-operative. Some of the teachers also were found eager to answer some of the items as they found them interesting. Thus the entire process of research was a matter of great joy and satisfaction.

8.2.0 CONCLUSIONS

The conclusions that are drawn on the basis of the results of the test have been categorised into two broad headings namely:

1. the results of the test and
2. the findings of the related studies

The results of the test are reported in the following paragraphs:

8.2.1 AREA DIFFERENCES

There is no significant difference between the mean performance of male and female children of rural and urban area. The mean difference between urban and rural area is just 1.63 which is not significant. Hence it can be concluded without hesitation that there is no area difference in creative thinking ability of the higher secondary students.
8.2.2 SEX DIFFERENCE

There is no significant difference between the mean performance of male and female pupils. The difference between two mean scores of sexes is 5.5. The summary of analysis of variance indicates that the F-ratio is not significant. Hence it could be concluded without any hesitation that there is no sex difference with regard to creative thinking ability of higher secondary students of both the sexes.

8.2.3 STREAM DIFFERENCE

There is no marked difference between the mean differences of Science and Comm^m stream students. The mean difference is just 1.35 in favour of Comm^m students. However the difference is not significant. It is also observed from the summary of analysis of variance that the F-ratio between the group is .26 which does not reach the level of significance. Hence it can be concluded that there is no stream differences with regard to creative thinking ability of higher secondary students.
8.2.4 **SUITABILITY OF THE TEST**

The justification of sampling and the Kurtosis also revealed that the test was quite suitable to the group chosen. The creative thinking ability is normally distributed in the population tested.

8.2.5 **RELIABILITY OF THE TEST**

The reliability of the test has been studied by different methods like test-retest and split-half over and above that different formulas like Spearman-Brown formula, Rulon formula and Flanagan formula were also applied for the study of reliability. The reliability co-efficients as found out by the above methods are ranging between .82 to .96. All these reliability co-efficient are very high. The comparison of the reliability co-efficient of the present test with some other creative thinking ability tests also shows that the present test has a high reliability as compared to other C.T.A. tests. For this it has been concluded that the test is highly reliable for pupils of higher secondary.

8.2.6 **VALIDITY OF THE TEST**

Establishing the validity of the test is the *culmination* of the process of standardization. Therefore the test was validated
with care and caution using external criteria. The content validity, congruent validity, concurrent validity and construct validity have been established.

The content validity has been established against the criteria decided by the experts. The construct validity has been established with the help of the right type of evaluation process for analysing the items of the test according to the behaviour components. Each item was thoroughly examined by the experts, in terms of behaviour component. The congruent validity of the test has been established by validating the test scores with Torrance Creative Thinking Ability Test scores. The obtained validity co-efficient is 0.71 which is quite good. Concurrent validity of the test has been established by validating the test scores with the teacher's rating score. The obtained validity co-efficient is 0.698 which is quite good. Thus the test aiming to measure the creative thinking ability of pupils is indeed a highly valid tool.

8.2.7 NORMS OF THE TEST

The separate norms for urban and rural area are not given because the groups based on area are not differing significantly with each other.

The separate norms for male and female groups are also not given because the groups based on sex do not differ significantly with each other.
The separate norms for Science and Common stream students are also not given because the groups of students are not differing significantly. Hence the percentile norms are prepared.

8.3.0 RELATED STUDIES TO CREATIVE THINKING ABILITY

8.3.1 SOCIO-ECONOMIC STATUS AND CREATIVE THINKING ABILITY

This variable was one of the variables in the study. The sample was of 608. The S.E.S. variable was divided into two levels. The obtained F-ratio between the levels of S.E.S. was 1.92 which does not exceed the table value of F-ratio at .05 level of significance. Hence there is no significant difference in the means of high S.E.S. group and low S.E.S. group. Consequently, it could be concluded that S.E.S. variable has no effect on C.T.A. of higher secondary students.

8.3.2 SEX AND CREATIVE THINKING ABILITY

The sex is one of the variables in the study. The entire sample of 608 students consisted of 394 boys and 214 girls. The variable was divided into two groups namely boys and girls. The obtained F-ratio between the levels of sex is 3.78 which does not exceed the table value of F-ratio at .05 of significance. Hence it could be concluded that sex variable has no effect on C.T.A. of higher secondary students.
8.3.3 AREA AND CREATIVE THINKING ABILITY

This was one of the variables in the study. The entire sample (N=608) was divided into two groups (Urban and Rural). The obtained F-ratio between the levels is below the significance value at .05 level. Hence it could be concluded safely that this variable has no effect on C.T.A.

8.3.4 SELECTION OF DISCIPLINE AND CREATIVE THINKING ABILITY

This was one of the variables selected for the study. The sample was of 608 students consisted of 359 Science students and 249 common stream students. The sample was divided into same two groups i.e. Science and Common stream. The obtained F-ratio between the levels does not exceed the table value of F-ratio at .05 level. Hence it can be said that there is no effect of stream on C.T.A.

8.3.5 ANXIETY AND CREATIVITY THINKING ABILITY

Anxiety was one of the variable in the study. The sample was of 361. The sample was divided into two groups namely high anxiety and low anxiety. The obtained F-ratio between the two levels is 6.005 which exceeds the table value at .01 level of significance. The mean difference between two groups differ significantly. So it could be safely concluded that anxiety variable has positive effect on C.T.A.
8.3.6 RADICALISM VS CONVENTIONALISM AND CREATIVE THINKING ABILITY

This variable was one of the variables of the study. The radicalism Vs conventionalism variable was divided into two levels namely radicalism and conventionalism. The sample was of 354. The obtained F-ratio between the levels of Radicalism and Conventionalism is 486 which exceeds the table value of F-ratio at 0.05 level of significance. Hence it can be concluded that this variable has significant effect on C.T.A. The students with radical personality trait are prone to C.T.A.

8.3.7 NEUROTICISM AND CREATIVE THINKING ABILITY

This is one of variables in the study. The sample for the study was 354 students. The neuroticism variable was divided into two levels namely high neuroticism and low neuroticism. The obtained F-ratio between the levels of neuroticism is 32.68 which exceeds the table value of .01% level of significance. Hence the students with two different levels of neuroticism significantly differ in their creative thinking ability. Consequently it could be concluded that this variable significantly functions on the C.T.A. The students of low neuroticism level are more prone to C.T.A.
8.3.8 EMOTIONAL STABILITY AND CREATIVE THINKING ABILITY

This variable was one of the variables of the study. The emotional stability variables was divided into two groups namely good emotional stability and poor emotional stability. The sample was of 354 students. The obtained F-ratio between the levels of emotional stability is 5.63, which exceeds the table value of 0.05 percent level of significance. The obtained mean on C.T.A. of students belonging to good emotional stability group is higher than that of the students belonging to the poor emotional stability group. Hence it could be concluded that the students with a good emotional stability have more C.T.A. than that of the students with a low emotional stability. It could be safely concluded that the higher the emotional stability, the higher the C.T.A. of the students.

8.3.9 REASONING AND CREATIVE THINKING ABILITY

Reasoning ability was one variable in the study. The variable was divided into two groups namely high reasoning group and low reasoning group. The sample was of 362 students. The obtained F-ratio between the levels of reasoning ability is 17.68 which exceeds the table value at 0.01 percent level of significance. The obtained mean on C.T.A. of the students belonging to high reasoning ability group. Hence it could be concluded that higher the reasoning ability higher the C.T.A. of the students.
8.3.10 SCHOLASTIC ACHIEVEMENT AND CREATIVE THINKING ABILITY

This variable was one of the variables of the study. The scores of students in their S.S.C.f examination was considered as their achievement scores. The variable was divided into two levels namely high Sc. Achievement and low Sch. Achievement. The obtained F-ratio between the levels is 14.88 which exceeds the table value at .01 level of significance. The obtained mean on C.T.A. of the students belonging to higher Sch. Achievement group is higher than that of low Sch. Achievement group. Thus it could be concluded that higher the Sch. Achievement more the C.T.A. of students.

8.4.0 EDUCATIONAL IMPLICATIONS AND SUGGESTIONS

In the history of mankind education has formed a continuum and a basis for the development of human society. Through development of attitudes, values, capabilities both of knowledge and skills, education provides strength and resolution to people to respond to changing situations and enables them to cause and contribute to social development. History has established beyond doubt the crucial role played by human resources in the development of nations. And the development of human resources is the main function of education. Only education can equip people with the knowledge, the sense of purpose and the confidence essential for building a dynamic, vibrant and cohesive nation capable of providing its people with the means for creating better, fuller and more
purposeful life. Creative children constitute one of the nation's most valuable asset. A dearth of creative manpower is now felt in every branch of our national life and is probably one of the highest bottlenecks of our progress. Poor as we are financially, the poverty of creative talent is still greater. Hence the national interest now demands increased emphasis on creativity in all branches of Science, Technology, Art and Literature. Although the amount of research work done on creativity within last 30 years and the information accumulated is astounding, theoretical formulations in this realm, have not advanced very much. Maslow has observed rightly that '... the thinking and the research in the field of creativeness tends to be too automatic organistic or systematic as it could be and should be ......

Taylor and Barron (1963) in their editorial comments said, "We are perhaps more in the dark about the environmental conditions which facilitate creativity than we are about any other aspects of the problem. There are many other instances where difficulties have been observed, experienced and reported by researchers in the context of such fundamental questions".

At this stage, it can be only said that the researches in creativity have not attained sufficient maturity to the extent that categorial answers to the questions raised by Trowbridge (1966) as follows:
a. Can creative talent be measured in advance?

b. Is it capable of modification to a desired direction and to what extent?

c. Are the efforts put in to increase the creative talent, sufficiently rewarding? and

d. Are researchers aware of the socio-psychological methods and techniques which would surely contribute to increase in creative thinking?

Before making any specific recommendations the researcher further submits that the generalization based on these studies are dependent upon the efficiency of the sample and tools used and are applicable to similar population. Nevertheless keeping in view the available resources of money, personal and attitudes of the administrators the researcher would recommend formulation and execution of new policies based on the findings of the study. The following few suggestions are in the form of implications.

For Gujarat no such test was available for higher secondary studies. Now with this it is possible to measure the creative thinking ability of our children in their mother tongue that is Gujarati. Kothari Commission (1966, p. 240) has rightly reported "even the talent enter schools and succeeds in climbing the educational ladder does not flower fully because it is not discovered sufficiently early and studying in poor schools. For obtaining best results in quality, talent has to be located early and allowed
to grow in the best atmosphere under the best teachers". Thus for early identification and regular evaluation this type of test can be used. For this it is also desirable that teachers will have to adopt some of the creative teaching practice so as to suit their teaching, to the needs of fuller development of a child's mental abilities. In our class-room teaching modifications are necessary to make it effective. The climate of the school should be such that in which students are free to ask questions, guess, opine and express themselves without fear of any criticism or punishment. Due encouragement should be given to the students creative response. This will also help to increase their respect for the self. Healthy creative climate will only possible if the teachers are made aware of the creative teaching process and its effect on pupils development. They will have to be made aware of the relationship between the teacher's behaviour and students creativity.

In the national system of education and in the teacher's training centres adequate provision should be made for the training of teachers in the various fields of creativity. This will not only make education effective but it will also meet the needs of ever changing technology and rapid Industrialization which are the results of new inventions. Broadly speaking new inventions take place only when there is creative thinking. The teacher education programme may includes the ways of motivating children, of building and sustain their interest, tolerating and encouraging
the unusual thinking. To stimulate the ideas of creative learning and teaching it will be necessary to rearrange or restructure the existing text books. A pre-nature structured knowledge as provided in text books today lends to make learning formalistic. The text book will have to make provisions for more opportunities for creative learning. Text book written should keep in view the changing society and lay more emphasis on divergent thinking while preparing the text books.

To enhance creativity in the school learning situation those activities can be undertaken which are most likely to cultivate imagination. Some of them are as follows:

* Allow the students to initiate, carry out and evaluate their own research projects. This will provide them a new direction of thinking which will be mainly divergent one, for this provide a rich variety of material, experiences and opportunities.

* Student's creative performance should be appreciated positively.

* Creative pupils should be imparted instructions in the different areas of creativity by specially trained teachers.

* Students should be made aware of the multi-disciplinary approaches.

* More opportunities for co-curricular activities like role-playing, puzzle-solving, reading, writing, travelling etc., should be organized.
Climates of flexibility and openness may increase the students thinking.

The following general suggestions are offered for the promotion and preservation of creativity in educational institutes.

1. The policy of education should be academic oriented rather than other like politics, social .... etc.

2. The creative process should not be blocked because of external or internal factors.

3. The creative products should be dully rewarded in the societies.

4. Creators should be encouragingly reinforced for their creative contributions.

5. Creative thinking environment should be promoted in the programme and equipping the class-room teaching with stimulating teaching aids.

5. Creative talent should be given full freedom for the expression of their creativity in school, home and society.

7. The intellectual and creative aristocracy should be honoured encouraged, promoted and preserved.

8. A scheme of extension service centres for creativity should be lunched in every states. Pupils and teachers should
be given for opportunity to attend these centres and to refine their creative process and products.

9. Creative pupils should be given full freedom for thinking, feeling and doing; their novel ideas should be welcomed, promoted and preserved.

10. For promoting divergent, unusual, original thinking social values should be effectively taught in the schools, three dimensional way of teaching should be emphasized.

11. Creative products should not be thought by the teachers as objects of challenge, risk and danger, but should be considered as objects of honour, of reputation and of glory.

12. Opportunities should be made available to the talented pupils for the insightful observation and rich experience by organizing visits to the places of scientific exploration and technological excellence or by meeting the persons of eminence in various fields of creativity.

8.5.0 SUGGESTIONS FOR FUTURE RESEARCHES ON CREATIVE THINKING ABILITY

From the findings of the study, those of related studies as well as the review of past studies, it could be deduced that the study of creativity is not well advanced enough to predict or predetermine specific behavioural reaction by stressing the
principles of creative thinking. In foreign countries like U.S.A., considerable work has been done on the subject. In our country much more work remains to be done in the area. Hence few suggestions for future researchers are made here.

1. Investigation of factors promoting C.T.A. in performance of academic studies at school.

2. Child rearing practices and creative development across various cultures.

3. Comparative studies of creativity in Central schools and state aided schools.

4. Studying the effect of different background conditions on abilities listed in the structure of intellect (S-O-I model).

5. Inquiry into the impact of home environment and C.T.A. of students in rural and urban areas.


7. An exploratory study of the present position of the classroom teaching-learning process in development of C.T.A.

8. A comprehensive creative teaching programme can be developed using multimedia approach and tested in Indian conditions.
9. Construction and standardization of tests in different subjects evolving Divergent Achievement Quotients.

10. To investigate the transfer effect of creative teaching in other areas.

It has been observed that the C.T.A. is composed of different aspects of divergent thinking. As a behaviour component, a close look at the relationship between performance and C.T.A. would definitely reveal some facts which might be useful to teachers, pupils and educationists at large. There is an urgent need of C.T.A. test for different grade groups.

Thus this field is vast and promising enough for further research. The present study is but a small step, and that to a humble one in the direction. The study of C.T.A. would become fruitful, only when the students, teachers, parents or guardians and the text book writers try to implement the suggestions given by the researcher. In addition some programmes for developing more and more creative thinking ability should be developed and be introduced in educational system.