CHAPTER - VIII

OBSERVATIONS AND CONCLUSIONS

8.0 Introduction
8.1 General Observations during Testing
8.2 Statistical Observations and Conclusions
8.3 Education Implications
8.4 Suggestions for further study
8.5 Resume
8.0 INTRODUCTION:

Creative ability consists of several distinct abilities to divergent thinking. According to Guilford and Marrified "Creativity is not one ability at all but a whole cluster of abilities". The first ability is called ideational fluency which measures a person's ability to come-out with a number of solution to a given problems. The second is called flexibility which provides large variety of solution to respond to a problem. The third creative ability is originality or the ability to come up with usual but appropriate responses.

Most work has been carried out in general ability i.e. I.Q. of the school going children but a few work have been conducted on creative ability of school going children. More over a good number of research studies have been done in the field of secondary education and some in primary education also. But the research studies have not been done in the field of Higher Secondary Education. Keeping in view of this need, the investigator had endeavour to take this study for different streams (Science, General and Technical) of Higher Secondary Education.

The study has been divided into three parts:

(1) Construction of creative ability test
(2) To study the creative ability in relation to main three independent variables under the main study:
(1) Different streams of Higher Secondary Schools
(2) I.Q. of students
(3) Students Environment
(4) Teacher's creative personality
There are four main specific studies pertaining to four environment
(1) Stream x I.Q. x Home Environment
(2) Stream x I.Q. x School Environment
(3) Stream x I.Q. x Social Environment
(4) Stream x I.Q. x Study Environment

(3) Effect of Teacher's Creative Personality on student's creativity.

Complete pictures of this investigation have been reviewed in this chapter. At the same time, the results obtained during the study and necessary comments regarding further researchs have been summed up in brief. Keeping in view the appropriate usages in education system, the implications of the findings have been inferred in this chapter.
8.1 GENERAL OBSERVATION DURING TESTING:

It was an essential and fundamental requirement to develop creativity ability test to measure creative level of the Higher Secondary School children. To provide a valid tool, a systematic procedure of tryout had been adopted. Thus the observations made during this research study are noted below:

Eventhough the observations made during this process of tryout and implementation of the final creative ability test are non-statistical, it is worth to note as general observations:

1. While administering CAT, it required a good deal of time, patience and perseverance on the part of the test administrators.

2. The task of test administration to a (different stream school children) of Higher Secondary grade with respect to discipline during some how time consuming test. But active and sincere higher secondary school teachers have given proper support with interest.

3. The students could give a good number of responses to a test items included in verbal creativity part - I, rather than those included in Figural Creativity Test Part - II.

4. The categories of the responses to a test in a verbal creative test are found more in number than in a figural creative test.
5. Numerical ability test is a new type of test based on some mathematical concept. It was found more interesting to decide the category of the responses to a test items included in numerical ability test part - III.

6. The young student of technical and non-technical streams of higher secondary school found eager to work with the new type of test and thus they had co-operated fairly in the testing programme.

7. The creative test was not strictly time-bound. But the freedom was given to the students to add a few responses to any test item which comes to their mind during the given extra minute allowed at the end of the test. This experience has shown that this is of great help to the testees.

8. The investigator's personal approaches to most of the primary school under study received healthy responses from the heads, teacher and pupils. Thus she had opportunities to observe and enjoy the higher secondary school climate during the research study.

8.2 STATISTICAL OBSERVATIONS AND CONCLUSIONS

The statistical observations and the conclusions are made according to the hypotheses formulated study-wise. They are discussed and listed hereunder:
Study: 1, 15 and 22: Streams of study V/s Creativity:

Observation:

The F value for different streams of study (Science and General) variable Vs creativity with reference to home environment is 21.30, for school environment is 23.48 at 0.01 level, for social environment is 14.54 and for study environment is 21.25 at 0.01 level, which is significant at 0.01 level. Hence the null hypothesis $H_0^1$, $H_0^8$, $H_{15}$ and $H_{22}$ are rejected for science and general streams ($A_1$).

Conclusion:

The students of science stream are significantly more creative in their ideas than the students of general stream (with reference to their creativity scores).

Observation:

The F value for different streams of study (science, general and technical) variables Vs creativity is 3.43 for home environment, 2.99 for school environment, 6.80 for social environment and 1.18 for study environment which is not significant. Hence the null hypothesis $H_0^1$, $H_0^8$, $H_{15}$ and $H_{22}$ are accepted for science, general and technical streams ($A_2$).

Conclusion:

The students of different streams non technical and technical do not differ significantly in their creative ability.
Study -2, 9, 16 and 23: I.Q. V/s Creativity:

Observation:

The F value for I.Q. Vs creativity with reference to home environment is 23.83, for school environment is 25.54, for social environment is 10.94 and for study environment is 11.03, which is significant at 0.01 level. So the null hypotheses $H_{02}$, $H_{09}$, $H_{016}$ and $H_{023}$ are rejected.

Conclusion:

When the home, school, social and study environment held constant the high I.Q. students are significantly more creative in their ideas than the low I.Q. students.

Study - 3; 10, 17 and 24: Environment V/s Creativity:

Observation:

F value for home environment Vs creativity is 310.09, for school environment Vs creativity is 247.00, for social environment Vs creativity is 326.79 and for study environment Vs creativity is 345.41, which is highly significant, so the null hypotheses $H_{03}$, $H_{010}$, $H_{017}$ and $H_{024}$ are rejected.

Conclusion:

The students having good home, social, school and study environment are significantly more creative in their ideas, than the students having poor home, school, social and study environment. They have also higher mean creativity score than other one.
Study - 4, 11, 18 and 25: Different streams of study and I.Q. V/s creativity:

Observation:

The F value for different streams of study (science, and general) and I.Q. V/s creativity with reference to home environment is 0.39, for school environment 3.67, for social environment 2.94 and for study environment 0.51, which is not significant, so the null hypotheses $H_{04}, H_{011}, H_{018}$ and $H_{025}$ are accepted.

Conclusion:

There is no significant interaction effect of different streams of study and I.Q. on creativity score for variable $A_1$.

Observation:

The F value for different streams of study (technical and non-technical) and I.Q. V/s creativity with reference to home environment is 2.75, which is not significant, so null hypothesis $H_{04}$ is accepted. School environment is 6.09, for social environment is 6.96 and for study environment is 12.34, which is significant, so the null hypotheses $H_{011}, H_{018}$ and $H_{025}$ are rejected.
Conclusion:

There is significant interaction effect of stream of study ($A_2$) and I.Q. on creativity scores.

Considering the means of the scores of the students relationship of creativity score of science, general and technical streams students as

\[ \text{SIH} > (\text{SIL} = \text{GIH} = \text{TIH}) > \text{TIL} > \text{GIL} \]
\[ \text{SIH} > (\text{SIL} = \text{GIH}) > \text{TIH} > \text{TIL} > \text{GIL} \]
\[ \text{SIH} > (\text{SIL} = \text{GIH}) > (\text{TIH} = \text{TIL}) > \text{GIL} \]
\[ \text{SIH} > (\text{SIL} = \text{GIH} = \text{TIL}) > \text{TIH} > \text{GIL} \]

Study - 5: Different streams of study and home environment V/s Creativity:

Observation:

F value for different streams ($A_1$) and home environment variable is 0.02, which is insignificant, so the null hypothesis $H_{05}$ is accepted.

F value for different stream ($A_2$) and home environment variable is 1.17 which is insignificant at any level, so the null hypothesis $H_{05}$ is accepted.

The mean score for different streams (science, general and technical) and good home environment are 363.2, 379.2 and 333.3 and with poor home environment mean scores are 229.2, 186.2 and 182.7.
Conclusion:

There is no significant interaction effect of different streams of study and home environment on creativity scores for $A_1$ and $A_2$ variables.

Students having good home environment have higher score as compared to poor home environment with reference to different streams like science, general and technical.

Consider mean of two scores the solution of creativity score with reference to good or poor home environment for the science and general streams is established as

$$\text{SEG} > \text{GEG} > \text{SEP} > \text{GEP}$$

and for technical and non-technical it is as

$$\text{NT}_{\text{EG}} > \text{T}_{\text{EG}} > \text{NT}_{\text{EP}} > \text{T}_{\text{EP}}$$

Study - 6: I.Q. and home environment V/s creativity:

Observation:

F value for I.Q. and home environment variables V/s creativity is 2.93. It is insignificant at any level, so $H_0$ is accepted.

Conclusion:

There is no significant interaction effect between I.Q. and home environment in creativity scores.
Observation:

The mean score interaction for high I.Q. with good home environment is 363.87, poor home environment 211.77, for low I.Q. with good home environment is 311.90 and with poor home environment is 186.93.

Conclusion:

The High I.Q. students having good home environment get higher score than those having low I.Q. having poor home environment.

Considering the mean of the scores with reference to high-low I.Q. and good-poor home environment it is

HIEG > LIEG > HIEP > LIEP

Study - 7: Different streams of study, I.Q. and home environment V/s Creativity:

Observation:

F value for second order interaction effect of different streams of study, I.Q., home environment on their creativity score is 11.67 for variable $A_1$ which is significant at 0.01 level. So $H_{07}$ is rejected, for science and general streams.

F value for second order interaction effect of different streams (science, general and technical) of study, I.Q., home environment on their creativity score is 0.41 for
variable $A_2$, which is not significant at 0.01 level, so $H_0$ for $A_2$ is accepted for technical and non-technical streams.

Conclusion:

There is significant interaction among science and general streams of study, I.Q., home environment on their creativity.

There is no significant interaction among technical and non-technical streams of study, I.Q., home environment on their creativity.

Considering the mean of the score for science stream to different I.Q. level and different environment level the relationship established is:

\[
\text{SIHEG} > \text{SILEG} > \text{SIHEP} > \text{SILEP}
\]

General stream

\[
\text{SIHEG} > \text{GILEG} > \text{GIHEP} > \text{GILEP}
\]

Non-Technical

\[
\text{T} \text{IHEG} > \text{TILEG} > \text{TILEP} > \text{TIHEP}
\]

Technical

\[
\text{TILEG} > \text{TILEG} > (\text{LT} \text{IHEP} - \text{TIHEP})
\]

Trend Analysis (Trend Test):

Observation:

The linear trend contributed to 63.21 per cent of variance while the quadruple trend contributed to merely 36.79 per cent.
Conclusion:

The trend lends towards linearity. Following relationship is established:

\[ S > T > G \]

Study - 12: Different streams of study and school environment V/s Creativity:

Observation:

F value for different streams for variable \( A_1 \) (science, and general) and school environment V/s creativity is 0.29, which is not significant, so the null hypothesis \( H_{01} \) is accepted for \( A_1 \).

F value for variable \( A_2 \) (science, general and technical) is 1.33, which is not significant, so the null hypothesis \( H_{02} \) is accepted for \( A_2 \).

Conclusion:

There is no significant interaction effect of different streams of study and school environment on creativity scores for science and general streams (\( A_1 \)) and also for technical and non-technical streams (\( A_2 \)).

For science, general and technical students having good school environment got higher scores as compared to poor school environment school's students as considering their mean scores.
Considering the mean of the scores the relationship of science, general, technical and non-technical students' creativity scores with reference to good or poor environment is

\[ \text{SEG} \succ \text{GEG} \succ \text{SEP} \succ \text{GEP} \]
\[ \text{NTEG} \succ \text{TEG} \succ \text{NTEP} \succ \text{TEP} \]

Study-13: I.Q. and school environment V/s creativity:

Observation:

F value for I.Q. and school environment V/s creativity is 1.79. It is not significant at any level, so \( H_{13} \) is accepted.

Conclusion:

There is no significant interaction effect between I.Q. and school environment in creativity scores.

Considering the mean of the score the relation of creativity score of high I.Q. and low I.Q. students with reference to good .. poor school environment is established as

\[ \text{HIEG} \succ \text{LIEG} \succ \text{HIEP} \succ \text{LIEP} \]

Study-14: Different streams of study: I.Q. and school environment V/s Creativity:

Observation:

F value for second order interaction effect of different streams of study, I.Q. and school environment on their creativity scores is 20.99 for variable \( A_i \) which is
significant at 0.01 level, so $H_{04}$ is rejected for science and general streams.

F value for variable $A_2$ is 0.77 which is not significant, so $H_{04}$ is accepted for variable $A_2$ means technical and non-technical streams.

Conclusion:

There is significant interaction among science and general streams of study, I.Q. school environment on their creativity score.

There is no significant interaction among technical and non-technical streams of study, I.Q., school environment on their creativity scores.

Considering the mean of the score the relationship of creativity score with reference to high-low I.Q. and good or bad school environment for science, general, technical and non-technical streams are established as

\[ SIHEG > SILEG > SIHEP > SI_LEP \]
\[ GI_{HE} > GI_{LE} > GI_{HEP} > GI_{LEP} \]
\[ N_{TI_{HE}} > N_{TI_{LE}} > N_{TI_{HEP}} > N_{TI_{LEP}} \]
\[ TI_{HE} > TI_{LE} > TI_{HEP} > TI_{LEP} \]

Trend Analysis (Trend Test):

Observation:

The linear trend contributed to 58.10 per cent of variable while the quadratic trend contributed to merely 41.90 per cent.
Conclusion:

The trends lends towards linearity. Following relationship is established:

\[ S > T > G \]

Study - 19: Different streams of study and social environment V/s Creativity:

Observation:

F value for different streams of variable \( A_1 \) and social environment is 4.35, which is significant at any level, so the null hypothesis \( H_{0,19} \) is rejected for \( A_1 \).

F value for different streams of variable \( A_2 \) and social environment is 0.94, which is not significant, so the null hypothesis \( H_{0,19} \) is accepted for \( A_2 \).

Conclusion:

There is significant interaction effect of different streams of study and social environment in creativity scores for science and general streams.

There is no significant interaction effect of different streams of study and social environment in creativity scores, for technical and non-technical streams.

Considering the mean of the scores the relationship of C.R. scores of science, general and technical, non-technical students with reference to good or poor social environment is established as:

\[ \text{SEG} > \text{GEC} > \text{SEP} > \text{GEP} \]
\[ \text{NTEG} > \text{TEG} > \text{NTEP} > \text{TEP} \]
Study - 20: I.Q. and Social Environment V/s Creativity:

Observation:

F value for I.Q. and social environment variable V/s creativity is 0.101, which is not significant, so $H_{020}$ is accepted.

Conclusion:

There is no significant interaction effect between I.Q. and home environment in creativity scores.

Considering the mean of the students it was noticed that the high I.Q. students having good social environment got higher score than those having poor social environment. The relation is established as following inequality:

$$H_{I \bar{E}G} \geq L_{I \bar{E}G} \geq H_{I \bar{E}P} \geq L_{I \bar{E}P}$$

Study - 21: Stream of study, I.Q. and social environment V/s Creativity:

Observation:

F value for second order interaction effect of different streams of study, I.Q., social environment on their creativity score is 10.52 for $A_1$ which is significant at 0.01 level. Hence the hypothesis $H_{021}$ is rejected.

F value for second order interaction effect at different streams of study, I.Q., social environment on their creativity score is 0.96 for $A_2$, which is not significant. So $H_{021}$ for $A_2$ variable is accepted.
Conclusion:

There is significant interaction among Science and General streams of study, I.Q., social environment as their creativity.

There is no significant interaction among technical and non-technical streams of study, I.Q., social environment on their creativity.

Considering the mean of the scores the relationship of the creativity scores with reference to high I.Q. and low I.Q. level, good and poor social environment is established for Science, General, Technical and Non-technical streams are:

\[
\text{SIH_EG} > \text{SI_L_EG} > \text{SI_H_EP} > \text{SI_L_EP} \\
\text{GI_H_EG} > \text{GI_L_EG} > \text{GI_H_EP} > \text{GI_L_EP} \\
\text{NTI_H_EG} > \text{NTI_L_EG} > \text{NTI_H_EP} > \text{NTI_L_EP} \\
\text{TIL_EG} > \text{TIL_H_EG} > \text{TIL_H_EP} > \text{TIL_L_EP}
\]

Trend Analysis (Trend Test):

Observation:

The linear trend contributed to 75.83 per cent of variance while the quadratic trend contributed to merely 24.17 per cent.

Conclusion:

The trends lends towards linearity and following relation is established:

\[ S > T > G \]
Study - 26: Streams of study, study environment V/s Creativity:

Observation:

F value for different streams A_1 and study environment in creativity is 2.92 which is significant, so the null hypothesis $H_0_{26}$ is rejected.

F value for different streams A_2 and study environment in creativity is 0.63, which is not significant, so $H_0_{26}$ is accepted for A_2.

Conclusion:

There is significant interaction effect of different streams of study and study environment in creativity scores for science and general streams.

There is no significant interaction effect at different streams of study and study environment in creativity scores for technical and non-technical streams.

Considering the mean of the score the relationship of creativity scores with reference to good and poor study environment and different streams like science, general, technical and non-technical is established as:

$\text{SEG} > \text{GEG} > \text{SEP} > \text{GEP}$

$N_{T_EG} > T_{EG} > N_{T_EP} > T_{EP}$
Study - 27: I.Q. and study environment V/s Creativity:

Observation:

\[ F \text{ value for I.Q. and study environment V/s creativity is } 4.94, \text{ which is significant at } 0.01 \text{ level, so the null hypothesis } H_{027} \text{ is rejected.} \]

Conclusion:

There is significant interaction effect between I.Q. and study environment in creativity scores.

Considering the mean of score, the relationship of the high I.Q. and low I.Q. students with reference to good or poor study environment is established as:

\[ H_{1G}^E > L_{1G}^E > H_{1P}^E > L_{1P}^E \]

Study - 28: Streams of study, I.Q. and study environment V/s Creativity:

Observation:

\[ F \text{ value for second order interaction effect of different streams of study, I.Q. and study environment on their creativity scores, is } 14.79 \text{ for } A_1, \text{ which is significant at } 0.01 \text{ level, so } H_{028} \text{ is rejected.} \]

\[ F \text{ value for second order interaction effect of different streams of study, I.Q. and study environment on their creativity score is } 0.70 \text{ for } A_2, \text{ which is not significant, so } H_{028} \text{ is accepted for variable } A_2. \]
Conclusion:

There is significant interaction among Science and General streams of study, I.Q. and study environment on their creativity.

There is no significant interaction among technical and non-technical streams of study, I.Q. and study environment on their creativity.

Considering the mean of the score in relation to creativity score with reference to high and low I.Q. and good - poor study environment is established for Science, General, Technical and non-technical streams as:

\[
\begin{align*}
SI_{HEG} &> SI_{LEG} > SI_{HEP} > SI_{LEP} \\
GI_{HEG} &> GI_{LEG} > GI_{HEP} > GI_{LEP} \\
NTI_{HEG} &> NTI_{LEG} > NTI_{HEP} > NTI_{LEP} \\
TI_{HEG} &> TI_{LEG} > TI_{LEP} > TI_{LEP}
\end{align*}
\]

Trend Analysis (Trend Tests):

Observation:

The linear trend contributed to 46.74 per cent of variance, while the quadratic trend contributed to merely 53.26 per cent.

Conclusion:

The trends lends towards linearity and following relation is established:

\[
S > T > G
\]
Correlation Study:

Mean score of Science and General stream teachers are 13.27 and 13.6.

The $r_{pbis}$ of creative teacher of Science stream and students A and B are 0.78 and 0.89, while $r_{pbis}$ of General stream teacher and student C and D are 0.72 and 0.81. These all the $r_{pbis}$ measures found significant at .01 level.

8.3 EDUCATIONAL IMPLICATIONS:

The implications of the research study are self-evident and self-explanatory. However, the following implications of this study are worth noting:

1. The students of the Science stream possess comparatively a high level of creative ability. As such the higher secondary science stream teacher should nurture the creativity of their students when they are going to be promoted to the further higher study.
2. All the higher achievers or high intelligent students not succeed the high creativity students. The minimum level of I.Q. is necessary to be creative. So the higher secondary teachers should know the level of the intelligence to predict the creativity level of the students. However, some students would get comparatively less academic achievement but they may be a good creative thinker. Such a student must be properly guided for the further study by knowing their I.Q. level and creativity level.

3. The important independent variable taken in this study is the ENVIRONMENT. It is constituted of four aspects: (1) Home, (2) School, (3) Social, (4) Study. These all the aspects of the Environment are found highly statistically significant. Hence it influences the creativity level of the students. So the higher secondary teachers should take care of the environment of the creative students studying under him.
4. The teachers can provide the good school environment to the students world or its sample by giving good materials or notes in a classroom or by providing the good books or by giving the students for further study. Thus the star students would be good at both achieving the higher goal and creating something new.

5. The study environment is also found an important aspect that effects the creative level of the students. So teacher can provide a good study facility or environment to those who have poor study environment and are diversified thinker.

6. The parents are advised to provide the good home environment. For this the school can have a parent meeting for the development of their children to discuss the pitfalls to maintain such an environment.

7. Man is a social creative. The society in which the child lives and shows effects his personality factors and thinking aspects. Thus the social environment also effects perfect for the creativity of the students. So such creative and high achiever child should be for the further study. He can feel a comparatively good social environment.

Anyhow, these four aspects of the environment should be made rich to enrich the growth and development of the creative and intelligent child of the new India.
8.4 **SUGGESTIONS FOR FURTHER RESEARCH:**

The present research work was merely explanatory effort based on ANOVA model of a minod type. Hence, the recommendations cannot be generalized beyond the sample. But more intensive and reliable research work is desired to be undertaken by the research workers in the directions suggested by the investigator. A far selected students are suggested for the further research on the following topics:

1. To establish the norms of Creative Ability Test on the higher secondary and graduate students of different districts in Gujarat State.

2. A validity study of the Creative Ability Test by developing the parallel form of this test (from Higher Secondary to Graduation).

3. A longitudinal study of the creativity of the students studying from primary to higher secondary education to view the trend analysis of creativity scores.

4. A trend analysis of creative ability of the students among the various categories of I.Q.

5. A case study of the creative students whose home environment is rich and poor.

6. A case study of the creative students whose school environment is highly motivated and poorly motivated.
7. A case study of the creative students studying in colleges whose social environment are fairly different.

8. A case study of the most creative person in various branches of services in real life.

9. To study the problems of the creative students but low academic achievers.

Thus the research on any subject has no end for further research. It starts when the previous research stops. These suggestions for further researches give a sight to those who want to undertake the research in future.

8.5 RESUME:

A study of the history of education shows that the formal systems of education in society has emphasized the maintenance of norms of culture. In order to develop the society, it has been considered necessary to provide new knowledge and skill through learning experiences. But with the rapid development of Science and Technology, creativity and its study has become important. It is now realised that any system of education in a society should encourage creativity so that creativity can be saved from stagnations.
Hence creativity should be included into the curriculum of a school as well as in its evaluation. Now National Education Policy has also put due weightage on the creativity, so it is the right time to have a valid tool of measuring creativity of the children, to make predictions about their creative behaviour, to know the formal and informal way of nurturing the creativity. More researches work and also on applicable ways should be done in this field of creativity and its development.

Creativity is not only inherent in all aspect of human activity, but it is present in all levels of intelligence and at all maturity levels. It is not limited to a few gifted persons, to the economically favoured, or to the socially elite. It is an aspect of everything we do. If we as a teacher accept this assumption it means creativity, original thinking, arriving at new answers is a characteristic of all human beings, the average person, the slow, as well as gifted. It is perhaps simply a matter of degree. One would not of course expect the so pupil to be as creative as original as the bright students, but he does nevertheless in his limited way have a contribution to make. If an important function of the school is to make life more fruitful and worthwhile, teacher must find the creative potential of each pupil whatever his level of ability and develop it to the fullest in all aspects of school activity.