Chapter VI

Observations, Conclusion and Suggestions

6.0 Introduction:

The creative teaching programme through the appropriate use of teaching strategies produced both thinking and feeling behaviors. Thus, it has contributed to the cognitive and affective development of the students.

Creative Teaching Programme encourages fluent thinking, flexible thinking, original thinking, elaborative thinking, curiosity, risk taking, complexity and imagination. Through this method teacher can include more instruction. This is possible because under this approach students will become more productive, creative and self-reliant.

The cognitive-affective model of Williams and the ideas developed by him were tested in US and were found to be effective. This provided the theoretical support for creative teaching programme. This research study is taken by the investigator to investigate the impact of creative teaching programme in academic subject mathematics.

This chapter contains the summary, finding, Educational Implication and suggestions for further research. The brief summary of the research work is stated in 6.1.

6.1 Summary of the research work:

This study consists of three parts.

1. The development of creative teaching programme for standard VII in Mathematics.
2. Implementation of creative teaching programme.

3. To study the effect of creative teaching programme on achievement in Mathematics.

The content for creative teaching programme was selected from the topics of mathematics of standard VII of Gujarat State. Creative teaching programme was developed by investigator on the basis of Williams’ three dimensional models for implementing cognitive-affective behavior in the classroom.

Dimension one consisted curriculum of mathematics of std. VII. i.e. subject matter content. It contained the topics Power and index, Law of Multiplication of powers, Law of Division of Powers, Law of Power of Power, Law of Power of a Product, Law of Power of a quotient, Profit and Loss, Compound Interest, Area of Cylinder, Volume of Cylinder, Linear Equation, Solution of Problems, Parallel lines and Quadrilateral. Thus, it contained topics from three branches of mathematics namely (i) Algebra (ii) Arithmetic (iii) Geometry.

Dimension two consisted of teacher behavior. This was a series of strategies or modes of teaching. Williams had developed a set of eighteen strategies, out of them the following twelve were selected as they were found to be appropriate for the content.

1. Organized random search.
2. Skill of search.
3. Examples of change.
4. Examples of Habits.
5. Visualization Skill.
6. Analogies.
7. Provocative questions.
8. Evaluate Situations.
10. Attributes.
11. Tolerance and Ambiguity.
12. Adjustment to development.

Dimension three consisted of eight students behaviors. Four are cognitive and four are affective. The cognitive behaviors are Fluent thinking, Flexible thinking, Original thinking and Elaborative thinking. The affective behaviors are Curiosity, Risk taking, complexity and imagination.

A set of Fifteen creative teaching programmes were developed by investigator using the three dimensions describe as above. They were subjected to a preliminary tryout and in the light of experience, suitable modifications were made. The final form (Appendix 1) was used in the experiment. The proper treatment was given to the experimental group from June to February months of academic year 2009-2010.

The following tools were used for measuring the two independent variables and one dependent variable: (i) Intelligence scores obtained from I.Q. test developed by Dr. Jyoti Dave (ii) Parental Education - Scores from a bio-data sheet developed by the investigator (iii) Achievement Scores obtained from Achievement test developed by the investigator. Also creative teaching programme developed by the investigator.

The research design was chosen a 2^4 Factorial Design. There were four independent variables namely treatment, sex, intelligence and Parental Education each of level two. Achievement of students in mathematics was considered as dependent variable.

A total of 174 students were selected from standard seventh of Two Schools Kalyan Primary School, Ahmedabad And Sunflower School, Ahmedabad for the experiment. They were divided into two equal groups on basis of their I.Q. One of these two groups was randomly selected as experimental group and other as control group. The creative teaching programme was given to experimental group. The control group had normal instruction, i.e. those students were taught by traditional classroom teaching method.
After the completion of the whole programme execution, the achievement test was administrated to the students of both the groups under study. These achievement scores were subjected to the statistical technique of Analysis of Variance (ANOVA). The F test and t-test were used to check the significance of the effects of various factors. The data and procedure of analysis were explained in chapter V.

6.2 Statistical observation and conclusion:

On the basis of the data obtained in the previous chapter V the statistical observation and conclusion are discussed according to study wise. They are briefed bellow.

Study 1: Treatment v/s Achievement

Observation:

F value for treatment is found to be 58.3829. This is greater than the table value 6.91. It is significant at 0.01 level. Also $M_{A1} = 27.86$ and $M_{A2} = 24.27$ thus $M_{A1} > M_{A2}$ holds.

Conclusion:

1. The substantive hypothesis is accepted.
2. The mean shows that achievement of experimental group is better than the control group.
3. The creative teaching programme had improved the achievement of students in mathematics.

Study 2: Sex v/s Achievement

Observation:

F value for sex is found to be 1.5736. This is not significant at both levels.
Conclusion:

There is no significant difference between the achievement of boys and girls in mathematics.

Study 3: Intelligence v/s Achievement

Observation:

F value for intelligence is found to be 261.0187. This is greater than the table value 6.91. It is significant at 0.01 level. Also $M_{C1} = 29.86$ and $M_{C2} = 22.27$ thus $M_{C1} > M_{C2}$ holds.

Conclusion:

1. The substantive hypothesis is accepted.
2. The mean shows that achievement of high I.Q. group is better than the low I.Q. group.

Study 4: P.E. v/s Achievement

Observation:

F value for P.E. is found to be 15.78947. This value is greater than the table value 6.91. It is significant at 0.01 level. Also $M_{D1} = 27.16$ and $M_{D2} = 24.96$ thus $M_{D1} > M_{D2}$ holds.

Conclusion:

1. The substantive hypothesis is accepted.
2. The mean shows that achievement of high P.E. group is better than the low P.E. group.

Study 5: Interaction of Treatment and Sex v/s achievement:

Observation:

F value for interaction effect of treatment and sex on achievement is found to be 0.07080. This is not significant at both levels.
Conclusion:

There is no significant interaction effect of treatment and sex on achievement of the students in mathematics.

Study 6: Interaction of Treatment and I.Q v/s achievement:

Observation:

F value for interaction effect of treatment and I.Q. on achievement is found to be 31.2268. This value is greater than the table value 6.91. It is significant at 0.01 level.

Conclusion:

There is significant interaction effect of treatment and I.Q. on achievement of the students in mathematics.

Study 7: Interaction of Treatment and P.E. v/s achievement:

Observation:

F value for interaction effect of treatment and P.E. on achievement is found to be 0.03612. This is not significant at both levels.

Conclusion:

There is no significant interaction effect of treatment and P.E. on achievement of the students in mathematics.

Study 8: Interaction of sex and I.Q v/s achievement:

Observation:

F value for interaction effect of sex and I.Q. on achievement is found to be 6.8800 this value is greater than the table value 6.91. It is significant at 0.01 level.
Conclusion:

There is significant interaction effect of sex and I.Q. on achievement of the students in mathematics.

Study 9: Interaction of Sex and P.E. v/s achievement:

Observation:

F value for interaction effect of sex and P.E. on achievement is found to be 0.07080. This is not significant at both levels.

Conclusion:

There is no significant interaction effect of sex and P.E. on achievement of the students in mathematics.

Study 10: Interaction of I.Q and P.E. v/s achievement:

Observation:

F value for interaction effect of I.Q. and P.E. on achievement is found to be 1.9783. This is not significant at both levels.

Conclusion:

There is no significant interaction effect of I.Q. and P.E. on achievement of the students in mathematics.

Study 11: Interaction of Treatment, sex and I.Q v/s achievement:

Observation:

F value for interaction effect of treatment, sex and I.Q. on achievement is found to be 0.9031. This is not significant at both levels.

Conclusion:

There is no significant interaction effect of treatment, sex and I.Q. on achievement of the students in mathematics.
Study 12: Interaction of Treatment, sex and P.E. v/s achievement:

Observation:

F value for interaction effect of treatment, sex and P.E. on achievement is found to be 0.7644. This is not significant at both levels.

Conclusion:

There is no significant interaction effect of treatment, sex and P.E. on achievement of the students in mathematics.

Study 13: Interaction of Treatment, I.Q and P.E. v/s achievement:

Observation:

F value for interaction effect of treatment, I.Q. and P.E.on achievement is found to be 0.3251. This is not significant at both levels.

Conclusion:

There is no significant interaction effect of treatment, I.Q. and P.E. on achievement of the students in mathematics.

Study 14: Interaction of sex, I.Q and P.E. v/s achievement:

Observation:

F value for interaction effect of sex, I.Q. and P.E. on achievement is found to be 0.1748. This is not significant at both levels.

Conclusion:

There is no significant interaction effect of sex, I.Q. and P.E. on achievement of the students in mathematics.
Study 15: Interaction of treatment, sex, I.Q and P.E. v/s achievement:

Observation:

F value for interaction effect of treatment, sex, I.Q. and P.E. on achievement is found to be 2.4291. This is not significant at both levels.

Conclusion:

There is no significant interaction effect of treatment, sex, I.Q. and P.E. on achievement of the students in mathematics.

Study 16: Effect of Treatment on Boys

Observation:

\[ t\text{-score for effect of treatment on boys achievement is 2.442. This is greater than the table value 2.006. It is significant at 0.05 level. Also the mean for boys of experimental group and mean for boys of control group are 27.50 and 24.04 respectively. That is } M_{B,\text{Exp}} > M_{B,\text{Cont}}. \]

Conclusion:

1. The substantive hypothesis is accepted.
2. The mean shows that achievement of boys of experimental group is better than the boys of control group.
3. The creative teaching programme had improved the achievement of boys in mathematics.

Study 17: Effect of Treatment on Girls

Observation:

\[ t\text{-score for effect of treatment on girls achievement is 3.08523. This is greater than the table value 2.672. It is significant at 0.01 level. Also the mean for girls of experimental group and mean for girls of control group are 28.21 and 24.50 respectively. That is } M_{G,\text{Exp}} > M_{G,\text{Cont}}. \]
Conclusion:

1. The substantive hypothesis is accepted.

2. The mean shows that achievement of girls of experimental group is better than the girls of control group.

3. The creative teaching programme had improved the achievement of girls in mathematics

Study 18: Effect of Treatment on High I.Q. students

Observation:

t-score for effect of treatment on high I.Q. students achievement is 8.315. This is greater than the table value 2.672. It is significant at 0.01 level. Also the mean for high I.Q. students of experimental group and mean for high I.Q. students of control group are 32.96 and 26.75 respectively. That is \( M_{hl.Q.,Exp} > M_{hl.Q.,Cont} \).

Conclusion:

1. The substantive hypothesis is accepted.

2. The mean shows that achievement of high I.Q. students of experimental group is better than the high I.Q. students of control group.

3. The creative teaching programme had improved the achievement of high I.Q. students in mathematics.

Study 19: Effect of Treatment on Low I.Q. students

Observation:

t-score for effect of treatment on low I.Q. students achievement is 1.3257. This is less than the table value 2.006. This is not significant at both levels.

Conclusion:

There is no significant effect of treatment on achievement of low I.Q. students.
Study 20: Effect of Treatment on High P.E. students

Observation:

t-score for effect of treatment on high P.E. students achievement is 2.748613. This is greater than the table value 2.672. It is significant at 0.01 level. Also the mean for high P.E. students of experimental group and mean for high P.E. students of control group are 29.00 and 25.32 respectively. That is $M_{n,P.E.\text{Exp}} > M_{n,P.E.\text{Cont}}$.

Conclusion:

1. The substantive hypothesis is accepted.
2. The mean shows that achievement of high P.E. students of experimental group is better than the high P.E. students of control group.
3. The creative teaching programme had improved the achievement of high P.E. students in mathematics.

Study 21: Effect of Treatment on Low P.E. students

Observation:

t-score for effect of treatment on low P.E. students achievement is 2.852174. This is greater than the table value 2.672. It is significant at 0.01 level. Also the mean for low P.E. students of experimental group and mean for low P.E. students of control group are 26.71 and 23.21 respectively. That is $M_{l,P.E.\text{Exp}} > M_{l,P.E.\text{Cont}}$.

Conclusion:

1. The substantive hypothesis is accepted.
2. The mean shows that achievement of low P.E. students of experimental group is better than the low P.E. students of control group.
3. The creative teaching programme had improved the achievement of low P.E. students in mathematics.
Study 22: Effect of Treatment on High I.Q. boys

Observation:

t-score for effect of treatment on high I.Q. boys achievement is 4.74665. This is greater than the table value 2.78. It is significant at 0.01 level. Also the mean for high I.Q. boys of experimental group and mean for high I.Q. boys of control group are 33.00 and 27.36 respectively. That is $M_{hI,Q,B,Exp} > M_{hI,Q,B,Cont}$.

Conclusion:

1. The substantive hypothesis is accepted.
2. The mean shows that achievement of high I.Q. boys of experimental group is better than the high I.Q. boys of control group.
3. The creative teaching programme had improved the achievement of high I.Q. boys in mathematics.

Study 23: Effect of Treatment on High I.Q. girls

Observation:

t-score for effect of treatment on high I.Q. girls achievement is 7.3615. This is greater than the table value 2.672. It is significant at 0.01 level. Also the mean for high I.Q. girls of experimental group and mean for high I.Q. girls of control group are 32.93 and 26.14 respectively. That is $M_{hI,Q,G,Exp} > M_{hI,Q,G,Cont}$.

Conclusion:

1. The substantive hypothesis is accepted.
2. The mean shows that achievement of high I.Q. girls of experimental group is better than the high I.Q. girls of control group.
3. The creative teaching programme had improved the achievement of high I.Q. girls in mathematics.
Study 24: Effect of Treatment on Low I.Q. boys

Observation:

\[ t\text{-score for effect of treatment on low I.Q. boys achievement is 1.662462. This is less than the table value 2.06. It is not significant at both levels.} \]

Conclusion:

There is no significant effect of treatment on achievement of low I.Q. boys.

Study 25: Effect of Treatment on Low I.Q. girls

Observation:

\[ t\text{-score for effect of treatment on low I.Q. girls achievement is 0.5561. This is less than the table value 2.06. This is not significant at both levels.} \]

Conclusion:

There is no significant effect of treatment on achievement of low I.Q. girls.

Study 26: Effect of Treatment on High P.E. boys

Observation:

\[ t\text{-score for effect of treatment on high P.E. boys achievement is 1.5815. This is less than the table value 2.06. It is not significant at both the levels.} \]

Conclusion:

There is no significant effect of treatment on achievement of high P.E. boys.

Study 27: Effect of Treatment on High P.E. girls

Observation:

\[ t\text{-score for effect of treatment on high P.E. girls achievement is 2.2680. This is greater than the table value 2.06. It is significant at 0.05 level. Also the mean for high} \]
P.E. girls of experimental group and control group are 29.50 and 25.29 respectively. That is $M_{P.E.G.Exp} > M_{P.E.G.Cont}$.

**Conclusion:**

1. The substantive hypothesis is accepted.
2. The mean shows that achievement of high P.E. girls of experimental group is better than the high P.E. girls of control group.
3. The creative teaching programme had improved the achievement of high P.E. girls in mathematics.

**Study 28: Effect of Treatment on Low P.E. boys**

**Observation:**

The t-score for effect of treatment on low P.E. boys achievement is 1.8949. This is not greater than the table value 2.06. It is not significant at both levels.

**Conclusion:**

There is no significant effect of treatment on achievement of low P.E. boys.

**Study 29: Effect of Treatment on Low P.E. girls**

**Observation:**

The t-score for effect of treatment on low P.E. girls achievement is 2.1579. This is greater than the table value 2.06. It is significant at 0.05 level. Also the mean for low P.E. girls of experimental group and control group are 26.93 and 23.71 respectively. That is $M_{P.E.G.Exp} > M_{P.E.G.Cont}$

**Conclusion:**

1. The substantive hypothesis is accepted.
2. The mean shows that achievement of low P.E. girls of experimental group is better than the low P.E. girls of control group.
3. The creative teaching programme had improved the achievement of low P.E. girls in mathematics.
6.3 Conclusions of the study:

A brief summary of the conclusions are listed below.

1. The creative teaching programme had significant effect on achievement of students in mathematics.

2. The main effect of I.Q. and Parental Education on achievement of student in mathematics was significant.

3. Boys and girls did not differed significantly in their achievement.

4. The first order, second order and third order interactive effect of these four variables on achievement were not significant.

5. The creative teaching programme had significant effect on achievement of boys, girls, high I.Q. students, high P.E. students, low P.E. students, high I.Q. boys, high I.Q. girls, high P.E. girls in mathematics. The creative teaching programme had improved the achievement of above groups in mathematics.

6. There is no significant effect of treatment on achievement of low I.Q. students, low I.Q. boys, low I.Q. girls, high P.E. boys, low P.E. boys, and low P.E. girls.

The above findings are in general agreement with the trends in research in mathematics education. The Creative Teaching Programme (CTP) was based on Williams’ model. It was found to be effective in improving the achievement of the students. The purpose of the implementation of the model was to improve the four cognitive behaviours and four affective behaviours. It is concluded that, it had positive effect on achievement of the students.
6.4 Educational Implication:

There is a little impact of research in education on classroom teaching. The reasons are many. Lack of communication is one. The reluctance of teachers to change their way is another. Since the system of education in India is highly centralized, there is no scope for teacher initiation. Programmes like Creative Teaching Programme (CTP) could be profitably used by teachers with a little additional efforts.

The educational implications are as follows.

1. It does not need any costly or elaborate equipment. The usual teaching aids are enough.

2. It does not disturb the official plan or not require additional time.

3. The teacher can build these programmes into his daily lesson plans wherever appropriate.

4. The traditionally used method of teaching mathematics can be partly replaced by the teacher modes of teaching like skills of search, provocative questions and others.

5. This type of work can bring a change in the outlook of the teacher and makes him more creative.

The ultimate result of the study revealed that, Creative Teaching Programme is more effective instructional paradigm for teaching mathematics as compared to traditional method of teaching.

6.5 Recommendations:

The following recommendation were made base on the finding on the study.

1. Mathematics teacher should use creative teaching programme in teaching of mathematics.
2. Seminars and workshops should be organized for mathematics teachers in secondary school on use and development of creative teaching programme.

3. The teacher of the schools should be provided training for use and development of such programme on different units.

4. The creative teaching programme should be made according to the level of the students age criteria should be taken into consideration.

6.6 Suggestion for further research:

More intensive and valuable research work is desired by the research workers in the directions opened up by this investigation. A few related aspects are suggested for the further research on the following areas.

1. CTP could be prepared for other subjects and other standards.

2. CTP could be implemented in the state other than Gujarat.

3. CTP could be developed for English medium school also.

4. Remaining strategies could be put in to experiment.

Following few problems are indicated for further research.

1. To check the effect of CTP in mathematics on the achievement of student of secondary schools.

2. Similar study may be conducted by including additional variable.
3. An investigation into development of CTP in various standards to study its effect on school performance.

4. A study of CTP in mathematics in relation to the students’ general creativity.

5. To develop CTP keeping in view all the Williams’ learning strategies and to study its effect on cognitive behavior.

6. To develop CTP on different school subjects.


8. A study of the effectiveness of CTP on the achievement of the English medium students in mathematics of standard IX.