CHAPTER VII
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CHAPTER VII

OBSERVATION, CONCLUSION AND SUGGESTIONS

7.0 INTRODUCTION

Education plays an important role in the all round development of a child. It provides the way of life to the child through the teaching of various school subjects. It is possible when the thinking and feeling behaviours are developed. The creative teaching model through the appropriate use of teaching strategies produced both thinking and feeling behaviours of the students. Thus, it has contributed to the cognitive and affective development of the students.

The creative teaching model encourages fluent thinking, flexible thinking, original thinking, elaborative thinking, curiosity, risk taking, complexity and imagination. The teacher can include more instructions through teaching this method. It is possible because under this approach students will become more productive, creative and self-reliant.
The creative teaching model of Williams and the ideas developed by him were tested in U.S. and were found to be more effective. This provided the theoretical support for the use of creative teaching model in teaching. Hence, the investigator took this study to study the impact of the creative teaching model on the academic achievement and the development of attitude towards science.

The main issues explored in the present study were:

(i) Whether the use of creative teaching model develops the achievement of the students in science.

(ii) Whether the creative teaching model develops the attitude of students towards science.

The study was pivoted around the following objectives.

1. To develop the creative teaching model in science of Std. VII which promote cognitive affective behaviours in students.

2. To implement the creative teaching Model in science on the students of Std. VII.

3. To study the effect of creative teaching model on students' achievement in science.
4. To study the effect of creative teaching model on students' attitude towards science.

5. To study the main effects of variables like treatment, sex, I.Q. and creative personality on the achievement and attitude of the students.

6. To study the interaction effect of treatment, sex, I.Q. and creative personality on the achievement and attitude of the students.

The summary of research work, observation, conclusions, educational implication and suggestions for further research are presented in this chapter.

7.1 SUMMARY OF RESEARCH WORK

This study consists of two parts: (i) development of creative teaching ideas and (ii) the study of its effects on the achievement and attitude of students. The content for the ideas was selected from the textbook of science of Std. VII of Gujarat State.

The creative teaching ideas were developed in Gujarati by the investigator on the basis of the Williams' Model. It is a three dimensional model.
Dimension one consisted science of Std. VII. It contained the five topics from the textbook of Std. VII. They are: (1) Elements, compounds and mixture, (2) Acid, Bases and Salts, (3) Light, (4) Reflection of light and (5) Physiological process. Thus, it contained topics from three branches of science, namely (1) Chemistry, (2) Physics and (3) Biology.

Dimension two consisted of teacher behaviours. Williams had developed eighteen strategies, out of these the investigator selected nine strategies. They are (1) Attributes, (2) Analogies, (3) Discrepancies, (4) Provocative Questions, (5) Organized Random Search, (6) Skill of search, (7) Intuitive Expression, (8) Evaluate situation and (9) Visualization skill.

Dimension three consisted of eight pupils behaviours. Four of them are cognitive and four are affective. The cognitive behaviours are (1) Fluent Thinking, (2) Flexible Thinking, (3) Original Thinking and (4) Elaborative Thinking. The affective behaviours are (1) Curiosity, (2) Risk taking, (3) Complexity and (4) Imagination.
The investigator developed sixteen ideas using three dimensions. The proper treatment was given to the experimental group from July to September of the academic year 1993-'94.

The investigator used the following tools to measure four independent variables and two dependent variables. They are (1) Creative Teaching Ideas: developed by the investigator, (2) Achievement Test: prepared by the investigator, (3) Attitude Scale: developed by Bhamubhai D. Patel, (4) Desai-Bhatt's Group Tests of Intelligence and (5) Creative Personality Inventory (Gujarati version) developed by Eugene Raudseep Gujarati version made by J.Z. Patel.

The factorial design was used as a research design to study the effects of four independent variables i.e. Treatment, Sex, I.Q. and Creative Personality on the achievement and the attitude of the students. All the independent variables were at two levels. The dependent variables were two. Hence, two separate factorial designs were prepared. Both the designs were $2^4$ factorial design. The F test was used to test the significance of the effect of the independent variables.
7.2 **GENERAL OBSERVATIONS**

The teacher plays an important role as the open classroom climate includes more students to think freely while teaching using the creative teaching model. The investigator herself gave treatment to the students during the whole experiment. Moreover, necessary instructions were imparted to students to maintain proper classroom climate.

During the whole study, the following observations were made:

1. Most of the students took keen interest in this type of teaching-learning process.

2. Warm two-way classroom interaction was found during the whole experiment.

3. The students of experimental group were found with more enthusiasm than the students of control group.

4. In course of time, students' thinking ability was developed. The students were able to think elaborately.

5. Students were found interested in giving new examples on the basis of given ideas. Thus, the students were seen thinking originally. Most of the students tried to answer the question promptly.
6. The creative classroom atmosphere was found during the experiment.

At the end of the experiment, the investigator was asked to provide more such ideas in science. This shows the great success of the creative teaching model. The statistical observations would give a clear and perfect picture of the effect of the creative teaching model on the achievement and attitude of students.

7.3 **STATISTICAL OBSERVATION**

On the basis of the data obtained in the previous chapter, the statistical observation and conclusions are discussed according to study wise.

**Study-1**: Treatment Vs Achievement

**Data**: \( F_{\text{obs}} = 30.62 \quad F_{\text{tab}} = 6.87 \) at 0.01 level
\[ M_{A_1} = 23.05 \quad M_{A_2} = 19.02 \]

**Observation**: The null hypothesis is rejected.

**Conclusion**: 1. The achievement of experimental group is better than the achievement of control group.
2. There is significant difference between the achievement of experimental group and control group.

3. The creative teaching model has improved the achievement of the students in science. The effect of creative teaching model is found on the achievement of students in science.

**Study-2 :** Sex Vs Achievement

**Data :**

\[ F_{obs} = 0.09 \quad F_{tab} = 3.23 \] at 0.05 level

\[ M_{B1} = 21.24 \quad M_{B2} = 20.93 \]

**Observation :**

The null hypothesis is accepted.

**Conclusion :**

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

2. The effect of sex is not found on the achievement of students in science.

**Study-3 :** I.Q. Vs Achievement

**Data :**

\[ F_{obs} = 43.08 \quad F_{tab} = 6.87 \] at 0.01 level

\[ M_{C1} = 23.43 \quad M_{C2} = 18.64 \]

**Observation :**

The null hypothesis is rejected.
Conclusion:

1. The achievement of high I.Q. group is better than the low I.Q. group.
2. There is significant difference between the achievement of high I.Q. group and low I.Q. group.
3. The effect of I.Q. is found on the achievement of students in science.

Study-4: Creative Personality Vs Achievement

Data:

\[
F_{\text{obs}} = 4.60 \quad F_{\text{tab}} = 3.67 \text{ at } 0.05 \text{ level} \\
F_{\text{tab}} = 6.37 \text{ at } 0.01 \text{ level} 
\]

\[
M_{D1} = 21.31 \quad M_{D2} = 20.35 
\]

Observation:

The null hypothesis is rejected.

Conclusion:

1. The achievement of high creative personality group is better than the low creative personality group.
2. There is significant difference between the achievement of high creative personality group and low creative personality group.
3. The effect of creative personality of the students is found on the achievement of the students in science.

Study-5 : Treatment x Sex Vs Achievement

Data : $F_{obs} = 0.00007 \quad F_{tab} = 3.93 \text{ at } 0.05 \text{ level.}$

Observation :

The null hypothesis is accepted.

Conclusion :

1. The effect of interaction of treatment and sex on the achievement is not significant.
2. The interaction effect of treatment and sex on the achievement is not found.

Study-6 : Treatment x I.Q. Vs Achievement.

Data : $F_{obs} = 18.40 \quad F_{tab} = 6.37 \text{ at } 0.01 \text{ level}$

Observation :

The null hypothesis is rejected.

Conclusion :

1. There is significant effect of interaction of treatment and I.Q. on the achievement of students.
2. The interaction effect of treatment and I.Q. on the achievement of the students in science is found.

**Study-7**: Treatment x Creative Personality Vs Achievement.

**Data**: $F_{obs} = 0.016$  $F_{tab} = 3.93$ at 0.05 level

**Observation**: The null hypothesis is accepted.

**Conclusion**:

1. There is no significant effect of interaction of treatment and creative personality on the achievement of students.
2. The interaction effect of treatment and creative personality on the achievement of the students in science is not found.

**Study-8**: Sex x I.Q. Vs Achievement

**Data**: $F_{obs} = 0.00007$  $F_{tab} = 3.93$ at 0.05 level.

**Observation**: The null hypothesis is accepted.

**Conclusion**:

1. There is no significant effect of interaction of sex and I.Q. on the achievement students.
2. The interaction effect of sex and I.Q. on the achievement of students in science is not found.

**Study-9**: Sex x creative Personality Vs Achievement

**Data**: \( F_{obs} = 0.045 \quad F_{tab} = 3.93 \) at 0.05 level

**Observation**: The null hypothesis is accepted.

**Conclusion**:  
1. There is no significant effect of interaction of sex and creative personality on the achievement of students.
2. The interaction effect of sex and creative personality on the achievement of students in science is not found.

**Study-10**: I.Q. x Creative Personality Vs Achievement.

**Data**: \( F_{obs} = 0.31 \quad F_{tab} = 3.93 \) at 0.05 level.

**Observation**: The null hypothesis is accepted.

**Conclusion**:  
1. There is no significant effect of interaction of I.Q. and creative personality on the achievement of students.
2. The interaction effect of I.Q. and creative personality on the achievement of students in science is not found.

**Study-11** : Treatment x Sex x I.Q. Vs Achievement.

**Data** : \( F_{\text{obs}} = 0.148 \quad F_{\text{tab}} = 3.93 \) at 0.05 level

**Observation**:

1. There is no significant effect of the interaction of treatment, sex and I.Q. on the achievement of students.

2. The second order interaction effect of treatment, sex and I.Q. on the achievement of students is not found.

**Study-12** : Treatment x Sex x Creative personality Vs Achievement.

**Data** : \( F_{\text{obs}} = 0 \quad F_{\text{tab}} = 3.93 \) at 0.05 level

**Observation** :

The null hypothesis was accepted.

**Conclusion** :

1. There is no significant effect of the interaction of treatment, sex and creative personality on the achievement of students.

2. The second order interaction effect of treatment, sex and creative personality on the achievement of students in science is not found.
Study 13: Treatment x I.Q. x Creative Personality Vs Achievement.

Data: \( F_{\text{obs}} = 0.265 \), \( F_{\text{tab}} = 3.93 \) at 0.05 level

Observation:
The null hypothesis is accepted.

Conclusion:
1. There is no significant effect of the interaction of treatment, I.Q. and creative personality on the achievement of students.

2. The second order interaction effect of treatment, I.Q. and creative personality on the achievement of students in science is not found.

Study 14: Sex x I.Q. x Creative Personality Vs Achievement.

Data: \( F_{\text{obs}} = 0.023 \), \( F_{\text{tab}} = 3.93 \) at 0.05 level.

Observation:
The null hypothesis is accepted.

Conclusion:
1. There is no significant effect of the interaction of sex, I.Q. and creative personality on the achievement of students.
2. The second order interaction effect of sex, I.Q., and creative personality on the achievement of students in science is not found.

Study-15: Treatment x Sex x I.Q. x Creative personality Vs Achievement

Data: $F_{obs} = 0.00001$ $F_{tab} = 3.93$ at 0.05 level

Observation:

The null hypothesis is accepted.

Conclusion:

1. There is no significant effect of the interaction of treatment, sex, I.Q., and creative personality on the achievement of students.

2. The third order interaction effect of treatment, sex, I.Q., and creative personality on the achievement of students in science is not found.

Study-16: Treatment Vs Attitude

Data:

$F_{obs} = 49.12$ $F_{tab} = 6.87$ at 0.01 level.

$M_{A1} = 7.14$ $M_{A2} = 6.03$

Observation:

The null hypothesis is rejected.
Conclusion:

1. There is significant difference between the attitude of the students of experimental group and control towards science.
2. Treatment has significant effect on the attitude of the students.
3. The creative teaching model has improved the attitude of students towards science.

**Study-17** : Sex Vs Attitude

**Data** :

- $F_{obs} = 32.05$  
- $F_{tab} = 6.87$ at 0.01 level
- $M_{B1} = 7.03$  
- $M_{B2} = 6.13$

**Observation**:

The null hypothesis is rejected.

**Conclusion**:

1. There is significant difference between the attitude of boys and girls towards science.
2. Sex has significant effect on the attitude of students towards science.

**Study-18** : I.Q. Vs Attitude

**Data** :

- $F_{obs} = 9.33$  
- $F_{tab} = 6.87$ at 0.01 level
- $M_{C1} = 6.83$  
- $M_{C2} = 6.33$

**Observation**:

The null hypothesis is rejected.
Conclusion:

1. There is significant difference between the attitude of the students of high I.Q. group and low I.Q. group.

2. The effect of I.Q. on the attitude of students towards science is found.

Study-19: Creative Personality Vs Attitude

Data: \( F_{\text{obs}} = 0.22 \quad F_{\text{tab}} = 3.93 \) at 0.05 level

\[ M_{D1} = 6.62 \quad M_{D2} = 6.54 \]

Observation:
The null hypothesis is accepted.

Conclusion:

1. There is no significant difference between the attitude of high creative personality group and low creative personality group towards science.

2. The effect of creative personality of the students is not found on the attitude of the students towards science.

Study-20: Treatment x Sex Vs Attitude

Data: \( F_{\text{obs}} = 3.66 \quad F_{\text{tab}} = 3.93 \) at 0.05 level

Observation:
The null hypothesis is rejected.
Conclusion:
1. There is no significant effect of interaction of treatment and sex on the attitude of students.
2. The effect of interaction of treatment and sex on the attitude of students towards science is not found.

Study-21: Treatment x I.Q. Vs Attitude.

Data: \[ F_{obs} = 4.74 \quad F_{tab} = 3.93 \text{ at } 0.05 \text{ level} \]
\[ F_{tab} = 6.87 \text{ at } 0.01 \text{ level} \]

Observation:
The null hypothesis is rejected.

Conclusion:
1. There is significant effect of interaction of treatment and I.Q. on the attitude of students.
2. The interaction effect of treatment and I.Q. on the attitude of the students towards science is found.

Study-22: Treatment x Creative Personality Vs Attitude.

Data: \[ F_{obs} = 0.03 \quad F_{tab} = 3.93 \text{ at } 0.05 \text{ level} \]

Observation:
The null hypothesis is accepted.
Conclusion:

1. There is no significant effect of interaction of treatment and creative personality on the attitude of students.
2. The interaction effect of treatment and creative personality on the attitude of the students towards science is not found.

Study-23: Sex x I.Q. Vs Attitude

Data: $F_{\text{obs}} = 1.04$  $F_{\text{tab}} = 3.93$ at 0.05 level

Observation:
The null hypothesis is accepted.

Conclusion:

1. There is no significant effect of interaction of sex and I.Q. on the attitude of the students.
2. The interaction effect of sex and I.Q. on the attitude of the students towards science is not found.

Study-24: Sex x Creative Personality Vs Attitude

Data: $F_{\text{obs}} = 0.00$  $F_{\text{tab}} = 3.93$ at 0.05 level.

Observation:
The null hypothesis is accepted.

Conclusion:

1. There is no significant effect of interaction of sex and creative Personality on the attitude of the students.
2. The interaction effect of sex and creative personality on the attitude of the students towards science is not found.

**Study-25**: I.Q. x Creative Personality Vs Attitude

**Data**: \( F_{obs} = 0.00 \) \( F_{tab} = 3.93 \) at 0.05 level

**Observation**: The null hypothesis is accepted.

**Conclusion**:  
1. There is no significant effect of interaction of I.Q. and creative personality on the attitude of the students.
2. The interaction effect of I.Q. and creative personality on the attitude of the students towards science is not found.

**Study-26**: Treatment x Sex x I.Q. Vs Attitude

**Data**: \( F_{obs} = 1.78 \) \( F_{tab} = 3.93 \) at 0.05 level

**Observation**: The null hypothesis is accepted.

**Conclusion**:  
1. There is no significant effect of interaction of treatment, sex and I.Q. on the attitude of the students.
2. The second order interaction effect of treatment, sex and I.Q. on the attitude of the students towards science is not found.

Study 27: Treatment x Sex x Creative personality V/s Attitude.

Data: $F_{\text{obs}} = 0.07$ $F_{\text{tab}} = 3.93$ at $0.05$ level.

Observation:

The null hypothesis is accepted.

Conclusion:

1. There is no significant effect of interaction of treatment, sex and creative personality on the attitude of students.

2. The second order interaction effect of treatment, sex and creative personality on the attitude of the students towards science is not found.

Study 28: Treatment x I.Q. Creative Personality V/s Attitude.

Data: $F_{\text{obs}} = 0.02$ $F_{\text{tab}} = 3.93$ at $0.05$ level.

Observation:

The null hypothesis is accepted.
Conclusion:

1. There is no significant effect of interaction of treatment, I.Q. and creative personality on the attitude of the students.

2. The second order interaction effect of treatment, I.Q. and Creative personality on the attitude of the students towards science is not found.

Study-29: Sex x I.Q. x Creative Personality Vs Attitude,

Data: $F_{obs} = 0.05$ $F_{tab} = 3.93$ at 0.05 level.

Observation:

The null hypothesis is accepted.

Conclusion:

1. There is no significant effect of interaction of Sex, I.Q. and Creative Personality on the attitude of the students.

2. The second order interaction effect of sex, I.Q. and creative personality on the attitude of the students towards science is not found.

Study-30: Treatment x Sex x I.Q. x Creative Personality Vs Attitude
Data: \( F_{obs} = 0.13 \quad F_{tab} = 3.93 \) at 0.05 level

Observation:

The null hypothesis is accepted.

Conclusion:

1. There is no significant effect of interaction of Treatment, Sex, I.Q. and Creative Personality on the attitude of the students.

2. The third order interaction effect of treatment, sex, I.Q. and creative personality on the attitude of the students towards science is not found.

7.4 CONCLUSIONS

A brief summary of the conclusions drawn from the present study are mentioned below.

1. The creative teaching model had significant effect on the achievement of students in science and the attitude of students towards science. The experimental group showed considerable improvement in achievement and attitude of the students.

2. The sex has no significant effect on the achievement of students in science while the effect of sex is found on the attitude of students towards science.
3. The effect of I.Q. is found on the achievement of students in science and the attitude of students towards science.

4. The creative personality has significant effect on the achievement of students in science while the effect of creative personality is not found on the attitude of students towards science.

5. The first order interaction effect of treatment and I.Q. on both the achievement and attitude is significant. Other first order interaction effects are not significant.

6. All the second order interaction effects and the third order interaction effects on achievement and attitude are not significant.

7. The classroom observation of the investigator indicates the use of creative teaching model is successful.

7.5 IMPLICATIONS OF THE STUDY.

The implications of the study are self-evident and self-explanatory. But there is a little impact of research in education on classroom teaching. There are many reasons of this. Lack of communication and the
reluctance of teachers to change their ways of teaching are the main reasons. Though there is no scope for teacher initiation in the present system of education, the creative teaching model could be profitably used by teachers with a little effort.

1. The traditional methods of teaching science can be partly replaced by the teacher using the strategies of teaching shown in the creative teaching model.

2. The teaching through using the creative teaching model can bring the change into the outlook of the teacher and makes him more creative.

3. The creative teaching model does not require any costly or elaborate equipments. The usual teaching aids can be used in this model of teaching.

4. It does not disturb the working of the classroom. It also does not require additional time.

7.6 SUGGESTIONS FOR THE FURTHER RESEARCH

The present research was merely an exploratory effort based on a step-wise analysis of variance and ANOVA
Model. Hence, the recommendation can not be generalized beyond the sample. But more intensive and reliable research work is desired to be undertaken by the research worker in the direction suggested by the investigator. A few related aspects are suggested for the further research.

1. The creative teaching ideas could be prepared for other standards.

2. The creative teaching ideas could be prepared for other school subjects.

3. The creative teaching model could be implemented in the schools other than the Gujarati medium schools.

4. The study could be undertaken to measure the effect of creative personality of the teachers on the achievement of the students.

5. The study could be undertaken using remaining strategies.

A few problems are suggested for further research.

1. A study of the effect of creative teaching model in science on the achievement of the students of secondary schools.

2. A study of the effect of creative teaching model on the creativity of the students.
3. An investigation into the development of creative teaching ideas in science using all the strategies developed by Williams.

4. A study of the effect of creative teaching model in science on the creativity of the students.

5. A study of the effect of creative teaching model in science on the cognitive-affective behaviours of the students.

These suggestions for further research work only mean that research on any subject has no end. Further research starts where the previous research stops.