CHAPTER I
INTRODUCTION

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1.0 Introduction:

The question why do we teach mathematics is important from more than one point of view. The answer to this question depends upon what we should teach in the subject and how should we teach it. It is known that the 'WHAT' and 'HOW' have always been governed by 'WHY'. 'WHAT' concerns with the curriculum, 'HOW' concerns with the method, while 'WHY' concerns with the objectives and the process of thinking. Human brain is very important part of the body because it is used for thinking. The ability to think and reason is the most precious possession of the human brain. Therefore, one should develop the capacity to think, reason and understand. It is a fact that most of the new ideas have been discovered only by reasoning. But to reason correctly, one needs information and ideas. Moreover, one must know how to use these ideas and information to discover the new truth.

The classroom activities involve four components.
The teacher, the pupils, the instructional materials and the method of instruction. The final outcome is the resultant of the interaction of these four components. Therefore, for the qualitative improvement of education, these four components are to be improved.

In the present study, investigator had adopted Williams' Model. The Williams' Model is three dimensional and structures learning as an interaction between subject areas of the curriculum (dimension one), strategies employed by the teacher (dimension two) and the eight thinking-feeling behaviours as pupil responses, outcomes or objectives (dimension three).

Twenty five lesson idea programmes were designed in reference to the content area in the subject of mathematics of Std. Seventh of Gujarat state. To bring out pupils creativity, lesson ideas were provided to purposely develop four divergent thinking and four divergent feeling abilities of pupils. These are: Fluency, Flexibility, Originality and Elaboration, along with Curiosity, Risk taking, Imagination and Complexity as spelled out the Williams' Model.1

Strategies or styles of teaching were used by the teacher in the classroom. Such strategies provides teachers

with a wide repertoire of modes for teaching, extending
great latitude and flexibility in the manner in which sub-
ject content is presented.

1.1 Goals of Teaching of Mathematics:

Proper practice of education and of teaching starts
with an understanding of the purpose of the whole educational
system, and what it aims at. These aims of course, are
always subject to change. To quote Jerome S. Bruner:

"I shall take it as self-evident that each generation must define a fresh nature, direction and aims of
education to assure such freedom and rationality as can be attained for further generation."

The goals of education are Utilitarian, Social,
Cultural and Personal. These goals of education are related
to the objectives of teaching mathematics. Every pupil, on
leaving school, should be able to use correctly, accurately
and with understanding the four fundamental operations ap-
plied to both number and to measurement. Pupil should be able
to apply his knowledge of mathematics to a wide range of
problems that frequently occur in their everyday life. Mathe-
ematics is useful in specialized fields such as science.

2. J.S. Bruner, Towards theory of instruction,
(Cambridge : Mass Hardware University Press,
1966), P. 22.
engineering, commerce, economics, etc. and also in every walk of life. Then it is considered as essential background for basic algebra, calculus, trigonometry, statistics etc. Schools must provide provision for students to learn such aspects whilst ensuring that every pupil has a basic course in mathematics. Objectives of mathematics teaching is shown in Fig. 1.

Pupils also need to understand how mathematical methods are used to investigate and to make decisions in human affairs. Moreover, mathematics contributes to one's understanding of natural phenomena. Mathematical methods may be summarised as follows:

(i) Scientific (ii) Intuitive (iii) Deductive and (iv) Inventive. Ideally each should be present in any overall system of mathematics teaching.

(i) Scientific:

The scientific method in which one seeks to discover order, pattern and relations, not only in the man-made world, but in the natural world as well.

(ii) Intuitive:

The intuitive method is not so much a method as a recognition that frequently advances are made, not deliberately, consciously, step by step, but by a flash of insight, a sudden illumination of a concept, the jumping of a hurdle which brings understanding where none existed before.
Figure 1: OBJECTIVES OF MATHEMATICS TEACHING
However, 'intuition' can be dangerous as mistakes can be made, and 'insights' can rest on misconceptions.

(iii) Deduction:

In deduction method, by working backwards as well as forward, a whole chain of reasoning is established to link in a logically convincing way the results of one's insight or intuition to a framework that is mathematically acceptable.

(iv) Inventive:

The inventive method is one which can relate to the defining of 'ideal' elements that have no physical reality but as a mathematical model represent the real world in all essential features. Inventiveness arises whenever one has a situation in which one feels intuitively there ought to be a solution, but where one cannot find it within one's present frame of reference. However, by extending this frame of reference, one may find solutions.

Thus, the objectives of teaching mathematics are not confined to the learning of figures and sums, but through the process of learning mathematics, the learner must acquire the abovementioned methods and learn how to apply these methods to the understanding and solution of human problems.
1.2 Todays Classroom

Education in this country is too easy to get, but it does not effectively carried out to adulthood. The people of India are proud of quantitative aspect of their education and rightly so, but they are after accelerated production to order educational conformists and mediocres. Therefore, national anxieties are about the quality. Many nations are in need of the creative intelligent inventive people. It is needed to take into account urgently in the present time of crisis.

Each classroom has its own distinct atmosphere and climate which may help or mitigate this development. This climate depends upon the classroom interaction which is in turn the classroom practices and conditions created thereby this lands considerable. Significance to the study of critical issue of classroom teaching.

But cursory glance into the present classroom will reveal that most of the classroom practices and conditions are of such a nature that they mostly impede or drive off the course, the free flow of creative thinking of pupil. This is because we still emphasis on drill and grill in teaching both in the acquisition of new data and in their utilization.

This may be assumed as precise description of our classroom today. Individual ideas are submerged by concern
for a poorly justified conformity. In the classroom the pupil is perceived as an object for intellectual and social nourishment rather than a thinker. The non significant status of the pupil in the classroom and the imposed passively on him are the most dangerous pitfalls in contemporary education. The whole teacher education programme itself is such that it produces teachers who develop rigidity and authoritarianism as a part of their image of the teacher.

The ultimate result can be seen in the rigorous implementation of these policies by the teachers in their classroom where to promote ordinariness rather than creativeness, become the main concern. The plain fact is that there is an urgent need for nurturing creativity in every classroom.

1.3 Significance of the Present Study:

Creative pupils consist one of the nation's most valuable assets. The future of any nation depends upon the creative pupil. A birth of creative man-power is now felt in every branch of national life in developing countries is practicable one of the highest bottle neck to its progress. Hence, national education policy now demanded increased emphasize on creativity of all branches of science, technology, literature and art.

Pupils are creative by nature for that they have
innate ability to see new relationship and produce new combination result in progress, but it is said to note that in a long run they loose their ability due to lack of proper guidance and treatment of teachers as well as the parents. So home and school should need more clarity to distinguish between planting knowledge and training the mind. Knowledge is not the power it made up merely of 'inert face' instead of active fuel for the mind. They should provide such situation, ideas and imaginations flow and grow in mind.

Torrance E.P. and Myers R.E. stated,

"Each teacher's way of teaching is a unique invention that takes place just like any other invention or creative production. All inventions however, are built upon failures, imperfection and little successes and the insights that come from them. It is our hope that from our own experiences those of our students and existing theory and research. We will be able to provide some guides and clues that can be used in your own invention."

Creativity cannot be taught as a process, but by developing situations that demand imagination, originality and problem solving. After due research works, some technique for developing creativity like Brainstorming, Attribute

listing, Checklists and Synetics have been evolved and some special programmes like Purdue Creative Thinking Programmes, Productive Thinking Programme have been developed. But, yet there is a lack of programmes that based on the school subjects to develop creativity of children.

To nurture the creative thinking through school subjects, the investigator has ventured to undertake the study to develop cognitive and affective behaviour through the teaching of one of the school subjects.

The present study is concerned with the development and implementation of the lesson idea programme which can produce cognitive and affective development of the pupil. The content of the programme is mathematics for Std. VII of Gujarat state. It was further proposed to study the effect of programmes on pupils' achievement in mathematics. Investigator had also tried to see the effect of this programme on affective behaviour and attitudes towards mathematics. The teaching strategies were adopted from the second dimension of Williams' Model.4

The programme was designed to be used in an ordinary classroom under existing conditions. The regular class schedule or the class structure was not disturbed. While using the programme, the teacher has to teach only one or

two periods in a week. If the teacher wants, he could adjust the period allotted to him for teaching mathematics or if possible he could arrange an additional period within the school time.

The programme did not require any elaborate equipment or costly materials. The ordinary classroom materials are enough. The problem for the study is stated as below.

1.4 **Title of the Study**:

"A Study of the impact of modes of teaching to develop cognitive-affective behaviour of the pupils of Std. VII on their achievement in Mathematics"

1.5 **Key words and their meaning**:

(i) **Modes of Teaching**:

According to F.E. Williams modes of teaching are the sequence of moves or strategies adopted by the teacher to bring the predetermined behaviour changes in the pupils. They are:

(a) Organized Random Search:
- Using a familiar structure to go at random to build another structure.
- An example from which new approaches occur at random.

(b) Skill of Search:
- Search for ways something has been done before (historical search).
- Search for the current status of something (descriptive search).
- Set up an experimental situation and search for what happens (experimental search).

(c) Visualization skill:
- Express ideas in visual forms.
- Illustrating thoughts and feelings.
- Describing experiences through illustrations.

(d) Evaluates Situations:
- Deciding upon possibilities by their consequences and implications.
- Check or verify ideas and guesses against the facts.

(e) Provocative Questions:
- Inquiry to bring forth meaning.
- Incite knowledge exploration.
- Summons to discovering new knowledge.
(f) Examples of change:
-Demonstrate the dynamics of things, provide opportunities for making alterations, modifications or substitutions.

(g) Attributes:
-Inherent properties.
-Conventional symbols or ideas.
-Ascribing qualities.

(h) Discrepancies:
-Gaps or limitations in knowledge.
-Missing links in information.
-What is not known.

(i) Analogies:
-Situations of likeness.
-Similarities between things.
-Comparing one thing to another.

(j) Examples of Habit:
-Effects of habit bound thinking.
-Building sensitivity against rigidity in ideas and well-tried ways.

(k) Tolerance for Ambiguity:
-Challenge thinking.
-Pose open-ended situations which do not force closure.
According to Benjamin S. Bloom\(^\text{10}\), the affective behaviour includes objectives which describe changes in interest, attitude, values, the development of appreciations and adequate adjustment.

According to F.E. Williams\(^\text{11}\), the affective behaviour includes Risk taking, Complexity, Curiosity and Imagination.

(a) Risk Taking:
- Expose oneself to failure or criticisms.
- Take a guess.
- Defend own ideas.
- Function under conditions devoid of structure.

(b) Complexity:
- Seek many alternatives.
- See gaps between how things are and how they could be.
- Bring order out of chaos.

(c) Curiosity:
- Be inquisitive and wonder.
- Toy with an idea.
- Be open to puzzling situations.
- Ponder the mystery of things.

\(^{10}\) Bloom, Op.Cit. P.7
(d) **Imagination**:
- Visualize and build mental images.
- Dream about things that have never happened.
- Feel intuitively.
- Reach beyond sensual or real boundaries.

(iv) **Achievement**:

"Achievement is generally used in the sense of acquired ability to do, capacity to do or tendency to do."\(^{12}\)

According to International Dictionary of Education.\(^ {13}\)

"Performance in school or college in a standardized series of educational tests. The term is used more generally to describe performance in the subject of the curriculum."

(v) **Mathematics**:

"Science of magnitude and number"

-International Dictionary of Education.\(^ {14}\)

Mathematics is such a school subject through which the

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followed by References and Appendices.

The first chapter includes the need, importance and significance of the study. It provides a setting for the whole thesis. The key words used in the statement of the problem are defined. The objectives of the study are explained and the limitations are stated.

The second chapter deals with the theoretical perspective. F.E. Williams' Model is described in detail.

The third chapter describes the reviews of some research works in the area of creativity and correlates with achievement.

The fourth chapter describes the study undertaken from the following points of view: The planning, construction and the tryout of lesson idea programme in Mathematics.

The fifth chapter deals with the Experimental design and Execution of the programme. How the design and samples are chosen is explained. The hypotheses were precisely stated. The tools used to measure the dependent and independent variables were described. It includes the observations of the investigator during the experiment.

The sixth chapter contains the data and its analysis using ANOVA. The hypotheses for main effects and interaction effects were tested.
The seventh chapter contains the summary of research work, observations, conclusions, educational implications and suggestions for further study.

At the end of the report books and references consulted with the present study have been listed. The appendices include the programme and the tools used for measuring the dependent and independent variables.