Chapter VI

Case Study and Remedial Programme

CHAPTER - VI

CASE STUDY AND REMEDIAL PROGRAMME

6.1 Introduction

This chapter gives description about the case study and remedial programme. The sample selection, interviews of cases, remedial programme schedule, individual cases. The cases are described separately, along with the interview excerpts, profiles (diagnostic test scores, intelligence test scores, academic records).

6.2 Purpose

The case study was conducted to understand the mathematically backward student in depth. To find out the reasons leading to negative attitude towards mathematics and ultimately low achievement. The remedial programme was conducted to evolve a strategy to reduce mathematical backwardness.

6.3 Sample

From the sample selected for diagnosis, nine students were finally selected for case study and remedial programme. They were chosen on the basis of their scores on the diagnostic test. These students were from two different schools. Three from one school, six from the other school. Feasibility with respect to place of stay of the students was also considered while selecting the sample.

6.4 Plan for Case Study

The plan for the case study consisted of conducting interviews & intelligence tests, interviewing parents, identifying errors from notebooks and diagnostic test, evaluating maintenance of the remedial programme file, analysing responses to the home background and other details questionnaire.

6.5 Plan for Remedial Programme

The plan for the remedial programme consisted of creating positive attitude towards mathematics handling the errors identified, allow the cases to proceed at their own pace.

The remedial programme was conducted simultaneously for the two groups. The groups were named as A3 (consisting of 3) and AJA (consisting of 6). Both the groups were very regular and enthusiastic from the start to the end of the remedial programme. The programme began with A3 group. The sessions used to be at one of the students' house. The AJA group, met at one of the group member's house. The schedule of the remedial programme was three days in a week, for each school, for five weeks. The atmosphere was maintained warm and friendly. The daywise schedule of the remedial programme is given next.

6.5.1 Daywise Schedule

Day One

a. Introduction of group members
b. Introduction of investigator
c. Briefing about the nature of Remedial programme
d. Begin remedial programme with motivating statements
e. Give a list of questions to be discussed variable, constant, power, base.
f. Discuss some of the questions of give self-study exercises.

Day Two

a. Checking of self-study exercises
b. Revise previous topics
c. Discuss remaining questions
d. Discuss about monomial, binomial
e. Self-study exercises

Day Three

a. Multiplication of monomials with same base.

b. Multiplication of monomials with different base

c. Addition of monomials with some base

d. Difference between addition and multiplication of monomials

e. Self-study exercises

Day Four

a. Laws of indices

b. Monomial-binomial expansion

c. Self-study exercise

Day Five

a. Binomial-binomial expansion

b. Self-study exercise

Day Six

a. Identity $(x + a)(x + b)$

b. Self-study exercise

Day Seven

a. Identity $(a + b)^2$

b. Self-study exercise

Day Eight (Taking Common)

a. From among the numbers added

b. From among the numbers with coefficients, added

c. Self-study exercise

Day Nine

a. Taking common from among numbers in rational form

b. Self-study exercise

Day Ten

a. Substitution

b. Self-study exercise

Day Eleven

a. Adding rational numbers or fractions with same denominations

b. Adding rational numbers with different denominations

c. Self-study exercise

Day Twelve

a. Additive identity

b. Multiplicative identity

c. Property of zero

Day Thirteen

a. What is an equation ?

b. What is linear equation ?

c. Solving linear equation

d. Self-study exercises

Day Fourteen

a. Solving linear equation

b. One line word problem into algebraic expression

c. Self-study exercises

Day Fifteen

a. More complex word problem into algebraic expression

b. Solving linear equations to solve word problems

c. Self-study exercise

Day Sixteen

a. Verifying solution of linear equation

b. Self-study exercises.

6.5.2 Sample of One Session

(Inv. denotes investigator, R denotes response of the student)

Inv: What are constants and variables

R: a, b, or something

Inv: (gave a clue) That which does not change (No responses)

Inv: Have you heard 1, 2, 3 .....

R: Yes they are numbers

Inv: What is six equal to ?

R: 2 x 3

Inv: Yes, they are the factors. But 6 = ?
What can you write in the blank ?

R: No response

Inv: If I write 6 = 4.5 or 6.1, is it correct ?

R: No, no

Inv: Why

R: Because 4.5 and 6.1 are not equal to 6

Inv: So we can say value of 6 does not change. So value of numbers do not change. Give other examples of somethings whose value does not change.

R: Can we call God, something that does not change ?

Inv: Yes. All the things whose value does not change are called constants. Write examples of constants in your note books. Also write what is a constant.
(Students write: God, 1, 2, 3, ½, -5, $1/\sqrt{6}$, 3.2 and so on and show it to the investigator to check)

Inv: Let us move on. We have seen constants, whose values do not change. Give examples of things that always change.

R: Our learning

Inv: How does learning change ? What you learnt in standard seventh, has not changed.

R: Out height, out intelligence, morning-evening, seasons

Inv: Yes. In all this we can see changes. They are not same always. They 'vary' – means they change. Therefore, they are called variables. They have no fixed value. Which things have fixed value ?

R: Constants

Inv: Does the value of constant change after sometime ?

R: No

Inv: Today value of 6 is 6, tomorrow it will be 6.1. Is it true ?

R: No

Inv: How about your height ? Will it remain same ?

R: No, it will change

Inv: So, value of variables will change. Variables are written using alphabets, like a, b, x, y

R: Can we use capital letters ?

Inv: Yes, you can. Let us say, we use 'a' to show height. So a = 150 cm, for Purva, today. But after 6 months it may be a = 155 cms. Is the value of 'a' same ?

R: No. It has increased.

Inv: So when we are showing something that goes on changing, we use variables. Now you write what are variables and the examples. (Students write in their files and show it for correction)

Inv: Let us take up power and base. In 2^3, which is the power and base. (Each student write individually).

R: 2 is the base and 3 is the power

Inv: What are the other names for power

R: Raised to

Inv: No. We read 2 raised to 3. But it is the other name of power. It is called exponent or index. Identify power and base in $(2/3)^4$, P^m, $(2a)^5$.

R: 2/3 → base, 4 → Power, P → base, m → power.

Inv: Write expressions using power and base. (Students write examples)

Inv: Now let us see about monomials. Give one example of monomial.

R: a, 2

Inv: Are xy, 12, monomials ?

R: No

Inv: Why ?

R: Because there are two terms

Inv: xy = ?

R: (No Response)

Inv: XY = X x Y. What will be ab, 5x ?

R: ab = a x b, 5x = 5 x X.

Inv: How about a b c d, 1200 ?

R: They are monomials

Inv: Monomial have one term only. There may be several variables or numbers, multiplied to give a monomial.

Mono → means one, nomial means number (Students write examples of monomial, and what is monomial)

Inv: Let us see binomial. a + b, ab. Which of these is a monomial ?

R: ab

Inv: So a + b is a binomial a + b = a + b. There are two terms added together.

In a monomial they are multiplied. How about 12x + 3y, 28 + 3y ?

(Not very sure)

Inv: How you identify a binomial ?

R: The two terms will be added.

Inv: Which are terms in 12x + 3y ?

R: 12 x and 3y (doubtful)

Inv: Yes. Here each of the terms 12x and 13y are monomials. Why ?

R: 12x = 12 x X, 13y = 13 x y

Inv: So, two monomials have been added to give a binomial. 'Bi' means two.

R: Is 28 + 3y is also a binomial ?

Inv: Yes. So you can write some examples of binomials, and what are binomials (Students write in their books).

6.5.3 Structure and Nature of the Remedial Programme

The remedial programme was particularly pre-planned. The sequence of the topics was decided in advance. The method adopted was not pre-planned, however, the plan was to make it different from regular school teaching. Rather than sitting in rows, seating arrangement was circular with the investigator facing all. The sessions were arranged in the homes of the group members and also at the investigator's home. It used to mostly end with light refreshments. The students felt very intimate with each other and with the investigator within two sessions. The sessions were arranged from three 'O clock in the afternoon to five or six 'O clock in the evening. There were two groups for the remedial programme. The A3 group and AJA group.

The sessions were taken on alternate days. The programme always began with positive thinking. The atmosphere was maintained warm and friendly. Students were allowed to work at their own pace and given time to find the correct answers themselves. The problems were arranged from easy to difficult. The students were always given chance to construct their own problem and solve them. The common errors were kept in mind by the investigator. While planning and teaching. Topics, were introduced in a casual, conversational manner rather than formal, conventional manner. The students' who managed to understand were asked to explain to their peers. Concepts which arose incidently during the sessions, were also dealt with. The problems solved during the sessions were documented in individual files. Homework was given based on the topics dealt in the session and other incidental topics. Exercise books to revise basics of mathematics were also provided to refer at home. Homework based on these books also given.

The schedule of the remedial programme has been already discussed. Here the structure and nature of the programme is given topic wise to show the variations from regular teaching. It was followed to suit to the needs of the backward students. Some of the topics have been presented below.

Topic: Word Problems

The session began with, "If two numbers are added". The questions that followed, "What is the meaning of the statement" "How many numbers", "Are the numbers given", "Are the numbers added."

After all these questions were verified by the students, then they wrote in a box.

Here the numbers are not given. Therefore let x and y be the two unknown numbers.

This was followed by (a) A number is added to one, (b) If seven is added to a number. (c) Sum of two numbers is ten. (d) If a numbers is divided by four. (e) If four is divided by a numbers. (f) Product of two numbers is seventy. (g) A number is equal to twice the other number. (h) If six is added to a number gives nine. (i) A number is divided by twice the number. (j) Sum of a number and ten gives thirty. (k) Sum of a number and itself gives four.

These, one statement word problems, helped students to get familiar with the different language usage. They were asked to attack the word problems with certain questions. After the algebraic expression was formed, students were asked to verify the given statement and the expression. They were asked to identify the unknown number in the expression. The word problem were arranged in the increasing order of difficulty in terms of the language used. A variation that could have been done was to ask the students to write the word problem of a given algebraic expression.

Topic: Linear Equations

The students were asked to think about "What is an equation", "What is meant by solving", "What is linear equation".

According to the responses, they were not able to distinguish between algebraic expression, identities, equation. Solving, according to them, was

finding the answer. They did not known about verification of the solution. The session began with (a) a + 1 = 2, (b) b + 10 = 5, (c) 21 = 11 + c, as examples of linear equation. The students were asked to identify the unknown number, the power/ index of the unknown number, what was common among the three expressions.

They were asked to write in separate boxes the following:

In a linear equation power/ index of the unknown number is one

An equation has a LHS and a RHS and an equal to sign. The value of LHS is always equal to the value of RHS

Solving an equation means finding the value of the unknown number in the equation. The value, when put in the place of the unknown number/ variable, in the equation, the LHS must be equal to RHS. Any operation on one side of the equation must be done on the other side.

For eg: b + 5 = - 4

b + 5 – 5 = - 4 – 5

b + 0 = - 9

Put b = - 9 in the linear equation

LHS – b + 5 = - 4 RHS

∴ LHS = - 9 + 5 RHS = - 4

= - 4

LHS = RHS

∴ b = - 9 is the solution of the linear equation b + 5 = - 4

This was the methodology followed by the students. However, they used to commit some errors like:

i. Put b = - 9 in the linear equation b + 5 = - 4. ∴ 5 = - 9 – 4 or put s = 3 in s + 2 = 5. ∴ 2 = 3 + 5.

ii. $b + 5 = -4$

$b + 5 - 5 = -4 - 5$

$= b + 0 = -9$

iii. $4b = 3$

$= 4 \times b = 3$

$= 4 \times b \times \frac{1}{4} = 3 \times \frac{1}{4}$

$= b = \frac{3}{4}$

Topic: Laws of Indices

In x^1, x is the base, 1 is the power/ index. The students were asked to write a few such algebraic expressions and identify the index and base. Later the following expressions were given.

$a^2 \times a^2$

$y^3 \times y^3$

$B^2 \times B^2$

$P^4 \times P^4 \times P^4 \times P^4$

The students were asked to identify the bases, the operation involved and the indices. After they had identified all the three, than RHS of each expression was given.

$a^2 \times a^2 = a^4$

$y^3 \times y^3 = y^3$

$B^2 \times B^2 = B^4$

$P^4 \times P^4 \times P^4 \times P^4 = P^{16}$

Then the entire procedure was written in a box as given below:

Same base, mathematical operation, multiplication, same power, ∴ add the powers, keep base same.

After this was written a few more examples were given, to the use of conditions.

The following expressions were given, later.

$a^2 \times a^3$; $x^3 \times x^6$; $b^4 \times b^5$

The students were asked to write the conditions as in the previous box. They did. Here only difference is power is different. To practice these conditions few more examples were given.

Similarly, $x^2 \times y^2 = (xy)^2$; $b^3 \times a^3 = (ba)^3$

$c^2 \times d^2 = (cd)^2$

Base is different, operation multiplication, power is same. ∴ take power common, multiply bases

Similarly, $a + a = 2 \times a$

$x^2 + x^2 = 2 \times x^2$

$2a + 2a + 2a = 3 \times 2a$

Base is same, power is same, operation addition, multiply base by the number of times it is added.

Topic: Rational numbers with different denominations

ADDITION: $\frac{3}{4} + \frac{1}{5}$; $\frac{2}{3} + \frac{1}{4}$; $\frac{4}{5} + \frac{2}{7}$

Two rational numbers with different denominations, added, ∴ take lcm of the denominations.

SUBTRACTION: $\frac{3}{4} - \frac{1}{5}$; $\frac{2}{3} - \frac{1}{4}$; $\frac{4}{5} - \frac{2}{7}$

Two rational numbers with different denominations, subtracted, ∴ take lem of denominators.

Topic: Rational numbers with same denominators

ADDITION: $\frac{1}{3}+\frac{1}{3}$; $\frac{1}{2}+\frac{1}{2}$; $\frac{2}{5}+\frac{3}{5}$

Two rational numbers with same denominations, added, ∴ take denominator common and add numerators.

SUBTRACT: $\frac{6}{7}-\frac{2}{7}$; $\frac{5}{9}-\frac{1}{9}$; $\frac{2}{3}-\frac{5}{3}$

Two rational numbers with same denominators, subtracted, ∴ take denominator common and subtract numerators.

Topic: Cancellation of common terms

$$\frac{2a}{3ab} \quad ; \quad \frac{7\,abc}{14\,bcd}$$

All the terms in numerator and denomination are multiplied, there is no addition or subtraction. ∴ cancel common terms.

$$\frac{2a + cd}{abc + b} \quad ; \quad \frac{3b + 2bc - cab}{25b + 2c}$$

Terms in the numerator and denominator are added and subtracted. ∴ direct cancellation of terms not possible.

6.6 Case Studies

The case studies of all the cases are described below. It includes the academic records, intelligence test scores, interview excerpts of the case and their parents, diagnostic test scores, errors on diagnostic test. The cases have been arranged alphabetically. The interview schedules are given in Appendix-I.

CASE ONE

Ashwin Sail

An apparently shy but lively thin and lanky person belonging to, a middle class family of four members, whose father worked in a factory and mother, a primary school teacher. Though his parents encouraged him in studying mathematics, he did not get any help from them. He was not required to give a helping hand in domestic chores except watering plants and run for small errands. He claimed to get sufficient time to study mathematics and spent one hour at home per day. He studied mathematics by writing or reading and writing and sometimes with TV on and sometimes by reading. Sometimes he used textbook to check his method and generally felt happy while studying mathematics. He did attend tuition and rote memorized definitions. Brackets, exponents, linear equation and word problems, he found as easy, while identities, negative numbers, fraction were his difficult topics. He suggested that positive and negative numbers must be revised before teaching new topics. In order to help weak students he felt teacher should explain more. He reiterated that explanation given by mathematics teacher was not sufficient, though he understood the explanation given in the class. In order to help weak students he suggested, solving of difficult problems. He opined that more time should be given for weak students during examination. He did not feel the need of Konkani in explanation.

A brief account of his interview is given here:

He likes his school because he studies there. Further he goes onto say that it is because of the various activities, games, sports, functions, computer class, music class, that he likes his school. He is still only planning to take up music class next year. About teachers of the school, he denied to be very satisfied. Opined that they

teach well, help students by clearing doubts during interval, giving more ideas. When asked about the principal, he opined she is good because she arranges for extra classes and appointed good teachers. He went on to say that she informs us of all educational exhibitions. While gathering his thoughts you can see his eyes switching left to right back and forth, pursuing his lips and rubbing his chin. About his most favorite teacher, he had to say about his maths teacher. What made him special, was his philanthropy to some students and defending students faults. In his opinion the investigator was helpful, humorous, friendly, took special attention for low scorers. He approved of the test taken before remedial programme. What moved him was that the investigator came from a distant place every day and didn't charge. The intension was their improvement ultimately he felt. With maths he felt that, it is tough in the beginning but after, the teacher explains it become okay. Enlisting the subjects in order of preference he said, Hindi and Marathi, Maths and English, Geography, History and Science. Though he liked Hindi and Marathi, he had no activities in particular. Recently in had taken part in a Hindi drama, so to say. Maths was liked from standard Five. The hitch was in the initial step. Failed for the first time in eighth. This role according to him is more attention towards weak students, give more examples. He found area, proof of theorem to be difficult. Formulas and positive, negative signs created confusion for him.

Intelligence Test Scores

a.	SPM	39	(definitely below average in intellectual capacity)
b.	Cattell's culture-fair	83	14 (PR)

Diagnostic Test Error

Pretest	83
Post-test	38

Academic Records

	VI	VII	VIII
English	48*	30*	34 (+1)*
Science	43*	32*	43 (+9)**
Social Studies	55*	37*	44 (+8)**
Mathematics	36*	39*	46 (+6)**

* Out of 100

** Out of 150

The errors on pre-test were found in the following areas:

Basics in Algebra, Rational Numbers, Indices, Monomial Binomial Multiplication, Binomial-Binomial Multiplication, Bracket Expansion, Linear Equation.

Improvements were found in post-test in the following areas:

Add from and simplification in Algebra, Addition of fractions, Division of fraction. Multiplication using Indices with integers, variable and rational number as base. Recognizing pases and powers, Monomial – Binomial multiplication Bracket Expansion and Linear Equations.

CASE TWO

Chetana Swar

A very cheerful, nature, medium height, thin person, belonging to a lower middle class family. Including her, there are five members in the family, which runs on the income generated by both parents. They earn by making sweetmeats and savouries, in a small thatched kitchen. The parents can hardly spare any time to attend to her studies, due to continuous large scale demands. Her mother, however, academically thorough, used to look into the studies of all children upto seventh standard. The house being old and dingy does not have separate room for her to study. She has to help her parents, in making of the savouries sometimes. Still she finds sufficient time to study. She studies mathematics always by writing and sometimes by reading and writing. She never kept TV on while studying. She

preferred to study mathematics alone and feels happy or boring at times while studying mathematics. She goes for tuition but also asks doubts in mathematics to her friend or teacher. She does not read the textbook but uses it to check whether method is correct. According to her the teacher encourages to score high, by asking to solve the problem again and again and score good marks. Before teaching new topics she feels positive and negative numbers must be revised. She finds mathematics textbook difficult due to difficult problems and very few problems are solved. In order to help the weak students, she feels, mathematics teacher should teach slowly and explain more. Topics she finds difficult are exponents, fractions, linear equation, word. Problem, while brackets, identities, negative numbers are easy topics. She would like to find the correct answer herself but does not prefer to use her own methods. Mathematics teaching should undergo change, she opines. To make examination suitable for the student weak in mathematics she suggests that they should be given more time and easy questions. Use of Konkani in explaining mathematics was another suggestion.

A brief account of her interview is given here:

She was relaxed and in a sound frame of mind when she was being interviewed. She was all praise for her school where she studied from kindergarten to eighth standard. She liked the school because of all the facilities and activities in the school. She used to get many prizes for singing and drama, throughout. Now, she is excited about computer. She mentions with excitement and pride about winning competition at inter-school level for singing and drama. She shifted to an open school after her ninth standard. The reason through very thought-provoking. She wanted to get rid of mathematics because of proofs. The irony is, she likes mathematics even now, if it has no proofs. She used to score well till eighth standard. She shifted to the open school on the suggestion of her P.T. sir and her neighbor's influence. She seems to be very happy with the change. She will be studying English, Marathi, Home Science, Social Science and Word Processing. All the teachers in her old school were good except one who insults and scolds. Among her favourite teachers was her Hindi teacher. She used to explain well, teach grammar well, reported explanation, humorous while teaching. She liked her

Marathi teacher also because she taught slowly and gave good explanation. Other teachers whom she liked were Guide and Scout Sir, Science teacher, P.T. sir. They all had a common quality of explaining with patience and a sense of humor. Her only favourite mathematics teacher was her seventh standard mathematics sir. He used to encourage all students to study well, he would explain again and again without getting upset. She felt be genuinely was interested in the well-being of the students. He was strict and used to scold, but she approved it. He used to help them. Among all headmasters she remembers only two; one of them used to listen to all their complains and never used to scold them. The other headmaster used to communicate well, encouraged students to see exhibitions, gave good speeches. As far as the Remedial programme was concerned, she liked learning in a group. She enjoyed studying mathematics. She recollects the humorous way in which learning took place. In tuition all keep talking. In Remedial Programme there was sharing of ideas. About the investigator she liked the style of teaching. She appreciated the investigator's sense of humor and giving individual attention. She says, she could never forget the sessions at different places. Other than school study she loves to collect stamps, coins. She did show her collection to the investigator. Also she is proficient in sports, drama and singing.

Intelligence Test Score

SPM	45	(intellectually average)
Cattell's culture-fair	96	40 (PR)

Diagnostic Test Error

Pretest	65
Post-test	46

Academic records

	V	VI	VII	VIII
English	35*	42*	44*	30 (+5)*
Science	43*	41*	33*	56**
Social Studies	45*	45*	36*	49 (+3)**
Mathematics	42*	31*	39*	50 (+2)**

* Out of 100

** Out of 150

The errors on pre-test were found in the following areas:

Basics in Algebra, Rational Numbers, Indices, Monomial – Binomial Multiplication, Binomial-Binomial Multiplication, Linear Equations. Addition of variables, Rational numbers.

Improvements in the post-test were found in the following areas

Addition of fractions with same denominator, Multiplication using indices (with integer as base). Monomial-Binomial Multiplication, Bracket Expansion, a few items on Linear Equations.

CASE THREE

Deepak Pujari

A boy seemed to be with lot of energy, unchannelised, indulging into mischief. Though he was found deficient on the diagnostic test he was found to have content clarity during Remedial Programme sessions. He belonged to a upper middle class family of five members whose father was an engineer while mother was a homemaker, and resided in a decent residential locality. Both parents encouraged him to study mathematics. He used to be obedient until he came to eight standard. His mother expressed her helplessness and anxiety about him. She was sad about his carelessness and mischievous behavior. He was summoned several times by his headmistress. However, he never posed any problem in the Remedial Programme sessions though, there was no high handedness from the investigator. He was slightly naughty which could be accounted to his age and

nature. He felt that mathematics teacher should explain more for the sake of weak students. He did not ask the teacher about his doubts nor did he understand the explanation given in the class. He did not get any encouragement to score high from his teachers. He spend only half an hour a day to study mathematics. He studied by writing sometimes but always by writing and reading, and would never keep TV on while studying. He did not have to help his parents for earning livelihood but he helped his mother by running for errands. This was a surprising element, knowing his especially mischievous behavior. He referred studying mathematics alone and felt happy, nervous, and sleepy sometimes but never boring. He never liked to study mathematics with friends but asked doubts to his friends and not to his teacher. He rote memorized formulas and read mathematics text-book except to check his method. According to him more time should be given for weak students during examination. He did not approve the mathematics homework given and suggested use of Konkani to explain mathematics.

A brief account of his interview is given below:

A boy with robust look intelligence, always looking for something new, restless a bit, with a smiling face. He opined that his school was good, teachers teach properly and students were friendly. He liked the school for its playground, decorated and hall-like classroom. Some teachers were strict, some give punishment, sometimes but generally all are kind. Principal according to him was strict even for small events she punishes. (seemed to have had many such treatments). The previous Principal used to give an more chance to correct. He could recollect only one of his primary school teachers who were concerned about his studies, used to come and sit with him. Of late he has no favorite teacher except for a new school teacher owing to herself attending to weak students by checking their notebooks. As far as maths is concerned, no maths teacher was referred as good but he liked maths as a subject very much. The views about the investigator were impressive teaching method, comfortable sequence and effective explanation. In the school school-teachers shout and nothing is understood while the, investigator's explanation going inside the head. The visits by the investigator to his home and exchange visit to the investigator's home both visits for remedial

programme session was liked. He felt they were weak in maths and maths for lower classes was useful. Maths was a nile, interesting subject like a game. He feels he is weak in maths due to big formulas, methods, steps. The order of preference of subjects was Konkani, History and Geography then Science, Maths, English and Konkani. Konkani is mother tongue, therefore he feels he is at ease to use it correctly. Also all class teachers are good. However, he has no activity involving Konkani. He plans to take up maths in future. Since it is useful in daily life and necessary to become an engineer.

Intelligence Test Score

SPM	41	(intellectually average)
Cattell's culture-fair	91	28 (PR)

Diagnostic Test Error

Pretest	70
Post-test	42

Academic records

	V	VI	VII	VIII
English	44*	35*	30*	32 (+3)*
Science	43*	44*	42*	37 (+15)**
Social Studies	50*	53*	49*	56**
Mathematics	44*	48*	46*	70**

* Out of 100

** Out of 150

The errors in the pre-test were found in the following areas:

Basic in Algebra, Rational Numbers, Fractions Indices, Binomial-Binomial Multiplication, Linear Equations.

Improvements in the post-test were found in the following areas:

Basic in Algebra, Rational Numbers, Multiplication of Indices (with variable as base) Recognizing bases and powers, Binomial – Binomial Multiplication, Majority of items on Linear Equations.

CASE FOUR

Gayatri Shetye

A girl with a positive note in her voice, and a desire to co-operate, belonged to a upper middle class family of four members, whose father did hardware business and mother was a homemaker. She lived in a very busy residential area. However, she had to share her study room with her younger brother and elder sister. She got encouragement and help from her parents. She spent an hour and a half to study mathematics. She always studied by reading and writing and never kept TV on while studying. She asked her doubts to her mathematics teacher or friends but claimed that she never rote memorized. Text book was not referred by her to check her methods but her classwork and she did not feel textbook should undergo any change. She found text book difficult due to difficult problem. In order to help the weak students she suggested that the teacher should see what the students were doing. Also, more time should be given during examination, to weak students. She expressed her desire to find correct answer herself and equally liked to study with her friends and alone. She always felt happy while studying mathematics.

She did attend tuition, never felt the need for Konkani in explanation of mathematics. She opined that though teacher solved the difficult problems in the class, explanation, in the class was not sufficient. She did not get any encouragement from her mathematics teacher and she felt that no extra help was given by the mathematics teacher to the students weak in mathematics. She found, brackets, identities, fractions, linear equations, word problems to be easy and identities and negative numbers to be difficult. In the form of extra help for students weak, she suggested teachers should teach slowly.

A brief account of her interview is given below:

A girl with a brilliant smile, innocence of her age, determination of purpose flexible. She had the following things to say: About the school she had many aspects which enticed her. Competitions, National Days, sports. However liked to participate only in sports especially cricket, badminton, kabaddi. Teachers in her school of whom she approved were those who had an ear to listen to her problems. While there were those who did not commit to even repeat their explanations. Her favorite teachers were English, Hindi, maths teacher. The English and Hindi teachers of secondary section while maths teacher of the primary section. Among the outstanding qualities of her far teachers was good explanation. Enquiring about homework with all students, what they taught was "directly going in the mind". Her favourite maths teacher used to give examples., use real life example to explain. While other maths teachers use the same text book language to explain. The maths teacher used to stroll around the class to keep vigil over the students. He used to call students to work out problems on the chalk board and even ask them to give reasons for their mistakes. He used to check their homework and what she reiterated was he even looked into what they have done rather than what have not done. Many of the teachers, she felt, more only interested in what students didn't do. What she liked about maths, spontaneous, response 'no by hearting, not same things again'. The questions itself gave a relief to her referring to her past experiences with maths.

Intelligence Test Score

SPM	36 (definitely below average in intellectual capacity)
Cattell's culture-fair	78 8 (PR)

Diagnostic Test Error

Pretest	51
Post-test	31

Academic records

	V	VI	VII	VIII
English	30*	46*	41*	34 (+1)*
Science	25*	44*	34*	61**
Social Studies	33*	52*	41*	52**
Mathematics	25*	42*	55*	74**

* Out of 100

** Out of 150

The errors on pre-test were found in the following areas:

Basic skills in arithmetic, Basic in Algebra, Rational Numbers, Multiplication using Indices (with integer as base and with national base), Monomial – Binomial Multiplication, Binomial – Binomial Multiplication, Bracket Expansion, Linear Equations.

Improvement in post-test were found in the following areas:

Basic skills in arithmetic, Addition using variables, Multiplication using indices (with variable as base), Bracket Expansion a few items of Linear Equations.

CASE FIVE

Jatin Ramaiya

A boy well built with determination and enthusiasm, bellowing to a middle class family of six. His parents were running a readymade garments shop. He resided in the outskirts of the town in a quite surroundings. He got help for mathematics from the family. Sometimes but not much of encouragement. He did not get sufficient time sine he had to spared sometime in the shop. In addition, he also helped his mother in household chores and hence felt tired. He spend only half an hour for studying mathematics at home. He preferred studying mathematics by reading always and only sometimes by reading and writing. He suggested that mathematics teacher should teach slowly and repeat explanation for the benefit of students weak in mathematics. He felt that previous topics like positive and negative numbers should be revised before beginning new topics. He found

mathematics text book difficult due to difficult problems. He used to discuss doubts with his friends and teacher, however preferred to study mathematics done. He did attend tuition. Textbook he used sometimes to check his methods only and felt that the text book should have some more solved problems. He expressed his desire to solve problems by his own method and find the correct answers himself. He did resort to rote memorization of mathematics formulae and definition. In his suggestion for changes in teacher of mathematics; he mentioned "teaching should not feel like a burden, play different educational games which help in maths, some we should also revise methods of few years back". Extra help for students weak in mathematics, according to him, "the programme which is conducted in present movement (moment)." Though the mathematics teacher solved difficult problems in the class, he felt explanation given was not sufficient. "She first gives us the courage to solve at the board and then call in separate and encourages us", this was his response to how teacher encourages to score high. The topics he found easy were brackets, exponents, identities, linear equations, while negative numbers, fractions and word problems were his difficult topics.

A brief account of his interview is given below:

The interview began with a bit of anxiety on his part. However, he gave his responses with all gusto. The school, where he was studying from standard six, was liked by him very much. He gave many reasons for it. The teachers were well trained and attended seminars frequently, the young teachers had novel techniques of teaching, during free periods they trained students for elocution, cleaning the school premises, good manners, playing games. He was bubbling with excitement to tell about the activities and facilities in his school like competitions, likes camps, vacation camps, wall-paper making, hobby collection competition. The mention of science laboratory and computers brought the broadest smile on his face. He reiterated about his teachers who explained in all details, in the science and computer lab. They gave freedom to follow one's own method. He rated his school as the best because it had everything – "from education to sports". Among the teachers whom he liked were English, Marathi, History-Geography. They don't directly jump to the topic. "They test what we know about the topic and if me do

not know they explain in detail". He elaborated that the teachers introduced the topics by playing games, they made sure if the students understood. They even used vernacular words to explain. History teacher mentioned stories linked to the topic. English teacher used innovative ideas. Marathi teacher explained number of times. However, mathematics teacher in the sixth standard was not good. "Therefore we had to by heart", "He made partiality in the class, gave bad words, completely careless except the favourite students". "In seventh standard, it was wonderful we got the best teacher of the school". According to him, the teacher made sure whether all students understood, he would invite students to the staff room during free periods to explain even previous topics. The eighth standard teacher was "OK Sir". When asked whether he liked mathematics, he responded that it depended on the teacher. The way of teaching. Because of teaching method even a dumb can get first rank" . Compared to other subjects mathematics was risky. In other subjects, we have to recall the explanation, but in mathematics we have to understand the problem first. These were his observations about mathematics and other subjects. Giving his opinion about the headmasters, he found all of them co-operative. He was all appreciation for the headmaster for allowing the Remedial Programme. He allowing the Remedial Programme. He gave his preference for subjects as History, Marathi, English, Hindi, Geography, Science and Mathematics. "Best teachers in history, therefore there is an inside feeling, like it is in my blood". In science and mathematics, there is no own way, according to him. About the investigator, he appreciated the way of teaching. He felt they were made self dependent by not giving answers. The humour interspersed sessions were highly appreciated by him because he felt the subject was "made light and we didn't feel the burden". No bakwas. We didn't speak anything and everything. Mathematics was lighter through it was for three hours, unlike school. What he found different was no student was kept apart, all were included in the Remedial Programme.

Intelligence Test Score

SPM	39 (definitely below average in intellectual capacity)
Cattell's culture-fair	94 35 (PR)

Diagnostic Test Error

Pretest	33
Post-test	18

Academic Records

	VI	VII	VIII
English	52*	57*	47*
Science	34*	38*	70**
Social Studies	58*	50*	70**
Mathematics	35*	34*	49 (+3)**

* Out of 100

** Out of 150

The errors on pre-test were found in the following areas:

Rational Numbers, Fractions, Binomial – Binomial expansion.

Improvement in post-test were found in the following areas:

Addition of fractions (with same denominator), Binomial – Binomial Multiplication, Bracket Expansion.

CASE SIX

Manthan Naik

A pleasant, alert, mature looking girl of good height slim built, with a queer but clear voice. She began and ended the statements with 'teacher', while talking to the investigator. She belonged to a lower middle class family of five members, whose father worked in a private firm and mother was a home maker. She lived in a slum-like locality, though her house was of concrete and electrified. She did not

have a separate room not table to study. She got encouragement from her parents to study but did not get any help. She did help her mother in domestic chores and still managed to find sufficient time to study. She claimed spending two hours a day for studying mathematics. She studied mathematics by either writing or by reading and writing and never kept the TV on. She preferred to study mathematics above and checked her methods with the text-book sometimes. She felt sometimes happy, sometimes bored, sometimes nervous, while studying mathematics. She asked doubts in mathematics to her friend but not to her teacher. She rote memorized methods in mathematics and did not attend tuition.

She had no suggestions to change in the mathematics textbook. However, she opined teachers should repeat explanation in mathematics for students weak in mathematics. She found, brackets, exponents, negative numbers, fractions, linear equations to be easy and word problems difficult. She did not feel the need for any change in examination to suit the students weak in mathematics. She opined that Konkani should be used to explain mathematics.

A brief account of her interview is given below:

She has been in the present school since std. fifth. Having switched from marathi medium, in std. first to fourth, she failed to adapt to the new medium of institution. Hence she repeated standard fifth. What she liked about her school was the large number of classes, good looks of the school and that she studied there some teachers she felt are good. She appreciated the action taken against students indulging in malpractices. Responses to the questions were coming after a brief pause for thinking. She went to say she liked library where she goes sometimes to study or read story book. The teachers she liked were of Hindi, Marathi, Science II, English, because students could understand their teaching. These teachers were giving the meaning clearly and in Science II teacher give the questions and asked students to find the answer. In Science I however, only points were given and she was unable to write the answers. Difficulty in maths was with proofs and construction. One quality in the teachers she liked was they punish those who did not do homework. Therefore teacher teaching Hindi was friendly, smiling while

teaching and explained every line. Maths teachers did not impress her much except for one sir in middle school. He taught well and gave more problems to solve. She had great difficulty in gathering thoughts and expressing. This was surprising since she was a person with clear, spontaneous responses. She was surprisingly tongue-tied and lost. The interview had the abruptly stopped and the retake was next day. Her opinion about all the mathematics teachers was good. Their main quality was they were strict. They gave warning first and then punishment. But they also provided with assistance to the poor students. She liked maths due to reasons like adding gives us some understanding about numbers. In English, however, learn by heart is possible. In maths only formula can be learn by heart. She said she liked both type of subjects, but she did not seem very convincing. She felt maths because more difficult as she move from standard fifth to eighth. She discussed marathi, with her 'scholar class' mates. Of all topics she liked variables, mathematical operations, linear equations, log and disliked proofs, construction. What confused her was positive, negative signs. About the investigator she was impressed by the looks. She appreciated the teaching method of explaining once and expecting as to find their own responses. She like the friendly approach, humour in between testing in the beginning, smiling, not so strict. The advantage of having less number of students was the positive point of the remedial programme. She found the investigator to be friendly. Unlike school teachers she felt that the revision done during remedial programme was fruitful.

Intelligence Test Score

SPM	46	(intellectually average)
Cattell's culture-fair	83	14 (PR)

Diagnostic Test Error

Pretest	65
Post-test	45

Academic records

	V	VI	VII	VIII
English	40*	40*	47*	39*
Science	39*	31*	28*	74**
Social Studies	37*	38*	36*	55**
Mathematics	19*	26*	24*	54**

* Out of 100

** Out of 150

The errors on pre-test were found in the following areas:

Basic skills in Algebra, Rational Numbers, Fractions, Indices, Monomial – Binomial Multiplication, Binomial – Binomial Multiplication, Bracket Expansion, Linear Equations.

Improvement in post-test were found in the following areas:

Addition using variable, Multiplication using Indices (with variable as base), Bracket Expansion a few items of Linear Equations.

CASE SEVEN

Nilesh Naik

A slightly shy and slow but pleasant person, lanky and tall, resided in the forest colony. He belonged to a lower middle class family of four, whose gather worked a s a class four employee and mother was a home maker. Though he lived in a concrete hose he did not have a separate room to study. Though his family members do not give any help in studying mathematics, they certainly encourage him. He got sufficient time to study mathematics at home even though he has to manage his washing and cleaning. He spent one hour for studying mathematics at home and claimed to the always happy and sometimes nervous or happy, surprisingly, while studying mathematics he did not rote memorize mathematics. He preferred to study mathematics alone and did not attend tuition in mathematics. He kept the TV on sometimes while studying mathematics. He used the textbook only for verifying his method. He expressed

desire to solve mathematics problem by his own method and find correct answer himself. He did not have any suggestion for changing in the textbook. In order to give extra help to students weak in mathematics he suggested, teachers should explain more. He felt students weak in mathematics should be given more time, easy questions and less number of questions, in the examination. Brackets, exponents, identities, negative numbers, fractions, linear equations were the topics he found as easy and word problems was his difficult topic. He felt mathematics teacher should repeat explanation to help students weak in mathematics. He never discussed his doubts with his teacher but felt the explanation given in the class by the mathematics teacher as sufficient and claimed that the teacher gave extra help to students weak in mathematics.

A brief account of his interview is given below:

A slightly shy and slow but pleasant person, lanky and tall, resided in the forest colony. He belonged to a lower middle class family of four, whose gather worked a s a class four employee and mother was a home maker. Though he lived in a concrete hose he did not have a separate room to study. Though his family members do not give any help in studying mathematics, they certainly encourage him. He got sufficient time to study mathematics at home even though he has to manage his washing and cleaning. He spent one hour for studying mathematics at home and claimed to the always happy and sometimes nervous or happy, surprisingly, while studying mathematics he did not rote memorize mathematics. He preferred to study mathematics alone and did not attend tuition in mathematics. He kept the TV on sometimes while studying mathematics. He used the textbook only for verifying his method. He expressed desire to solve mathematics problem by his own method and find correct answer himself. He did not have any suggestion for changing in the textbook. In order to give extra help to students weak in mathematics he suggested, teachers should explain more. He felt students weak in mathematics should be given more time, easy questions and less number of questions, in the examination. Brackets, exponents, identities, negative numbers, fractions, linear equations were the topics he found as easy and word problems was his difficult topic. He felt mathematics teacher should repeat explanation to help

students weak in mathematics. He never discussed his doubts with his teacher but felt the explanation given in the class by the mathematics teacher as sufficient and claimed that the teacher gave extra help to students weak in mathematics.

Intelligence Test Score

SPM	43	(intellectually average)
Cattell's culture-fair	76	7 (PR)

Diagnostic Test Error

Pretest	78
Post-test	55

Academic records

	V	VI	VII	VIII
English	36*	25*	22*	21*
Science	21*	19*	31*	28**
Social Studies	31*	22*	34*	35**
Mathematics	28*	18*	35*	30**

The errors on pre-test were found in the following areas:

Basic skills in Algebra, Rational Numbers, Fractions, Indices, Multiplication, Binomial – Binomial Multiplication, Bracket Expansion, Linear Equations.

Improvement in post-test were found in the following areas:

Basic in Algebra, Multiplication using Indices (with rational and variable as base), Monomial – Binomial Multiplication, a few items of Linear Equations.

CASE EIGHT

Purva Pawar

A short girl with a bright smile and lively eyes, lived with her parents in a residential area tucked away, from the town. Her father was a officer worker and mother a housewife. Her house was a cozy little home but she did not have separate room to study. Her family members did encourage her in studying mathematics. She claimed that she got sufficient time to study in spite of washing clothes, cooking, at home. She spent 2 hours for studying mathematics and always studied by either reading or reading and writing. She never kept TV on while studying mathematics. She felt always happy while studying mathematics. She did attend tuition and rote memorize solved problems. She preferred to study mathematics alone. She expressed her desire to solve the mathematics problems by her own method and find correct answer herself. She did not find the homework given in the class as appropriate. To make the examination suitable for the weak students, she suggested, more time easy questions, less number of questions. However she did not feel the need for Konkani to explain mathematics. Topics that she found easy were brackets, exponents, identities, linear equations, word problems while negative numbers and fractions were her difficult topics. In order to help students weak in mathematics she opined teacher should explain by the mathematics teacher as insufficient. According to her, teacher gave extra help to the students weak in mathematics and solved difficult problems in the class.

A brief account of her interview is given below:

She studied in the present school since standard fifty. She was in the same school from standard first to fourth, but in the Marathi medium. She liked her school very much because the teachers taught well. She meant they repeated explanations and solved many problems. She liked the school because of the students who helped her to study, explained to her. She enjoyed chitchating, playing with her friends. She liked the school for many more reasons like school ground where she played with ring and badminton, laboratory where she was fascinated to do experiments and view through the microscope, library to read

newspapers and magazines. Her favourite teachers were previous science teacher, english teacher of fifth, six, seventh standard. The science teacher gave extra explanation during free periods, in the staff room. She played quiz sometimes and was very friendly and humorous. She did not like mathematics teachers, except the one in eighth standard. This teacher repeated explanation and asked questions to all students while explaining. She did not like the headmasters because they scold moreover they never came in the class to observe the students. Mathematics was not scoring anymore. It was easy till seventh standard. In mathematics she felt 'by hearting' is not possible. In other subjects one can learn by heart the question and answers. She liked Polynomials, trignometry, statistics. She was confused with proofs, positive and negative number. She was very much impressed by the looks of investigator. That was not the only reason though. The features of the remedial programme that she liked were taking to pre-test, asking students to solve the problems, giving easy and hard problems, in-between fun, insisting on finding answers themselves. Her favourite subjects were, in the order of preference, Marathi, Hindi, English, Science, Geography, History, Mathematics. She has an ambition to become a teacher, doctor or any professional.

Intelligence Test Score

SPM	38 (definitely below average in intellectual capacity)
Cattell's culture-fair	73 4 (PR)

Diagnostic Test Error

Pretest	70
Post-test	55

Academic records

	V	VI	VII	VIII
English	33*	33*	28*	39*
Science	34*	25*	34*	64**
Social Studies	31*	25*	38*	41 (+11)**
Mathematics	29*	31*	42*	75**

* Out of 100

** Out of 150

The errors on pre-test were found in the following areas:

Basic skills in Algebra, Rational Numbers, Fractions, Indices, Multiplication, Binomial – Binomial Multiplication, Bracket Expansion, Linear Equations.

Improvement in post-test were found in the following areas:

Basic in Algebra, Multiplication using Indices (with rational and variable as base), Monomial – Binomial Multiplication, a few items of Linear Equations.

CASE NINE

Samrudhi Shetye

A pleasant looking, medium built girl belonged to a middle class family, whose both parents were teachers. She resided in a decent residential area, in a family of five members. She did have a separate room for herself to study. She got help and encouragement from her family in studying mathematics and claimed to get sufficient time to study mathematics. She spent two hours to study mathematics and always studied by reading and writing. She liked to study mathematics with friends and felt nervous sometimes while studying mathematics. She found brackets, exponents, negative numbers, linear equations as easy topics while identities and fractions as difficult topics. She did attend tuitions in mathematics but never rote memorized mathematics. She claimed that she read mathematics text-book and also used it for verifying her methods. She preferred to find the correct answer herself but not by using one's own

method. She did not have any suggestion for change in text-book, teaching methods or examination.

A brief account of her interview is given below:

She was in the present school from standard fifth onwards. She was in the Amrathi medium from standard one to four. The present school was liked by her due to the friends, classrooms, teachers. She was not very sure about her responses. Sometimes, questions had to be repeated several times she liked the various activities, events conducted in her school, though she participated in them in standard fifth. She preferred to be the spectator. She liked meeting friends, playing with them exchanging books, clarifying difficulties. She used to spend vacations at her friends place. She liked all her teachers because they taught well. Her favourite teachers were of Hindi, History, English, Mathematics. What she like about them was they helped them with their difficulty during free time in the staff room. Especially her mathematics teacher would call the student on his own and clarify, explain properly. He would also asks students to come and solve problems on the board. She liked all headmasters of the school, because they maintained discipline and conducted cleaning in the school. Unlike other subjects by hearting was not possible. She was confused with problems with large number of steps. Forgetting was her main problem. She liked the investigator because of the explanations given and showing concern for the group. She liked the sessions since each individual was given attention. The discipline maintained in the remedial programme was liked by her. Her favourite subjects in the order of preference were Marathi, Hindi, English, Science, Histroy, Geography, Mathematics. In Marathi more scoring is possible because 'by hearting', but in Mathematics if some steps are wrong marks are lost. She would like to avoid taking up Mathematics in future.

Intelligence test scores

SPM	36	(definitely below average in intellectual capacity)
Cattell's culture-fair	81	12 (PR)

Diagnostic test errors

Pretest	70
Post-test	44

Academic records

	V	VI	VII	VIII
English	27*	53*	43*	33 (+2)*
Science	33*	39*	30*	66**
Social Studies	32*	41*	30*	55**
Mathematics	26*	25*	24*	42 (+10)**

* Out of 100

** Out of 150

The errors in the pre-test were found in the following areas:

Basic in Algebra, Rational Numbers, Fractions Indices, Binomial-Binomial Multiplication, Linear Equations.

Improvements in the post-test were found in the following areas:

Basic in Algebra, Rational Numbers, Multiplication of Indices (with variable as base) Recognizing bases and powers, Binomial – Binomial Multiplication, Majority of items on Linear Equations.

6.6.1 Parents' Interviews

Purva's Mother

In her opinion, Purva used to study very well during standard fifth, sixth, seventh. She scored very well. She never failed. However, she had gone down in studies in eighth standard. She was interested in playing more than in studies. She spends most of her time with friends, roaming and wasting time. She failed in four subjects in eighth standard and now she was going for tuitions. Her mother was much anxious about her peer group influence. She did not have major complaint about the school. She was more worried about Purva'' rebel like behaviour. She refused to obey and got angry very soon. Her mother found her

to be more interested in playing and having fun always. She requested the investigator to save Purva.

Samruddhi's Mother

The most reluctant parent to give the interview. However, the investigator roped her into the interview. She was found to be obviously unaware of Samrudhi's low achievement. She found the question itself very strange and responded haphazardly. According to her Samrudhi was very regular in studies and hardworking. She found her doing her work regularly and going for tuitions religiously. Hence she was of the opinion that her daughter was doing well. She was on the defensive about her daughter throughout.

Gayatri's Mother

Gayatri's mother was very considerate about her since she was a premature child. According to her, Gayatri was a obedient, balanced person. Inspite of her ill health she performed well. As she grew she developed resistance. She gets angry sometimes. She said Gayatri makes her own timetable and studys at certain period of the day. She needs to play and she enjoyed it as well. Her mother found her to be less hardworking in eighth standard. She had no bad remark or complain from the school. She requested the investigator to conduct such programmes in English and Science as well. In her opinion the schools were not taking much interest in the students. All students were, hence, compelled to take up tuitions. She was anxious about Gayatri's future.

Jatin's Mother

Jatin's mother was very positive about her son. She gave very sincere unbiased responses. She found him to be more mature and responsible after entering high school. He was found to be very much interested in the affairs of their cloth store. She merely monitored his preparations before exams. Otherwise he managed his studies himself. He was more inteersted in languagfes, history. He was not very serious about his studies till seventh standard. He plans to take commerce in future. He likes to take up group work

and desired to become the leader of the group. He felt others should follow his ideas, which led to arguments. He used to come crying to his mother on such occassions. He did not pose any problem at home or at school. She was very enthusiastic about his future.

Ashwin's Mother

Ashwin's mother was visibly upset with the decline in his scholastic performance. She was concerned about his lack of concentration and playfulness. He was more childlike than his ten year old sister. He was interested in the new car, watching TV and picking up fights with his sister. His mother requested the investigator to do similar programme for other subjects. She said he had high regard for the investigator. She was a primary school teacher at a distant place and hence did not have time to attend to his studies. However, she used to be alert about his schedule. She was confident about him and had a soft corner for him, though she did not pamper him.

Deepak's Mother

Deepak's mother was anxious and disillusioned about his boisterous behaviour. He refused to be obedient at all. He fought with his younger brother. She was upset about his underachievement and knowingly neglecting his studies. His disruptive behavior at school, frequent complaints added to her misery. She had great expectations form the investigator. She begged to save her son. She knew he was intelligent and did score will in lower classes. She found the drastic changes when he came to eighth standard. She was worried about his future.

Chetana's Mother

Chetana's mother was initially reluctant to give the interview, but later opened up. She began by saying that Chetana was not a very brilliant student. She was an average student. Chetana's mother used to take keen interest in both her daughter's studies while they were in primary. When they came into secondary she could not do much. She used to give tuitions after she passed SSC. She was annoyed at the lack of care at school. She felt the need for parents' intervention in

children's study. She was still enthusiastic about learning and teaching good study habits, hence they did not need tuitions. She was very proud about Chetana's achievements in sports and cultural activities. She expressed her disappointment about her daughter going into bad friendship. She felt that children should know the result of bad friendship. She was largely unhappy about the practice in the school.

Nilesh's Father

His father – a government service in Forest Department was visibly upset and tensed about his son. Particularly because he failed for three years. His father narrated about his own childhood which was very disciplined unlike his own son. He said he gave his son all facilities that he asked for in order to avoid their distraction he even disconnected cable connection. He had plans to admit him in the army but now he has doubts as time is running out. According to him sending him for tuition was also not of much benefits. He even requested teachers to counsel his son. He treated him softly. His major worry was 'how long will I support him." He expressed his pride as a son of an army personnel. He was very happy with his younger brother doing well in the army. His strongly feels education should begin at a very early age. Hence he admitted Nilesh than he was three years of age.

6.7 Summary Based on Case Study and Remedial Programme

The case study method aided in getting closer to the students, elicit their pent up feelings, unfulfilled needs. It also brought forth issues hardly addressed, instead conveniently accounted to lack of interest, laziness on the part of students. What are the expectations of the students and what are the ill-effects of the teaching methods, how students begin to dislike mathematics, could be thought of from the responses. This method was more useful than mere questionnaire filling. The personal rapport gave access to real reasons. They gave very critical analysis about the practices in the schools and classrooms. How they perceived mathematics and class room teaching and their preferences for subjects, gave clear indications about the errors in the system. The cases were very open and real, with the investigator and confided about their apprehensions. The students with disruptive behavior in

the school, exhibited amicable behavior with the investigator in the remedial programmes. One probable reason could be the friendly and non-judgemental approach of the investigator. Also being a person not related to school or examination, they may have felt relaxed and at ease.

The cases felt accepted, unconditionally. All the cases felt that the approach of asking them to find the correct answers themselves, allowing them to commit errors and making realize themselves, was very effective. The investigator felt that the discussion about the methods being followed and the description of the methods in a box (refer 6.5.3) was very helpful. It was going one step further than giving mere formulas or solved examples. The sessions on word problems were enjoyed the most, according to the investigator. The desire on the part of all the cases to come regularly without any compulsion was surprising. They felt committed to the programme and believed that it was useful for them. They were given the freedom to fix the timing and the venue. They showed promptness in doing homework and were eager to get it corrected. Sometimes they suggested to give less homework. There were occasions when they had to explain the method to other fellow mates. All these would features of the remedial programme made it refreshing for the cases. At times the investigator challenged them and they were all the more willing for it. All those experiences kept the investigator in a puzzle. The cases were all found to be backward in mathematics. Teachers did not have much expectation from them. However, in the Remedial Programme they exhibited lot of eagerness and showed improvement in attitude and performance. It was found that, more reliable and authentic information was obtained from the interview than from the questionnaire. They voiced their opinions vociferously during the interview. It must have been due to their lack of language fluency in writing. The academic records showed low achievement or failure in mathematics in some cases while sudden drop in achievement in mathematics of some others, particularly in standard eighth. The general observation of the investigator was the inability of the cases to understand the method due deficiency in basic concepts. This has been cited by Bhirud (1975) and Sharma (1978). Another important factor that played a vital role was the promotion policy which did not exert pressure on students to master basic

arithmetic skills as also cited by Sashidharan (1992). This unfortunately helped the cases to be promoted. The cases definitely showed desire to learn but did not show dramatic conceptual improvement.

The eye-ball test if used on the academic records of all the students in the case study, show poor academic performance, especially in eighth standard. Ashwin, Chetana, Deepak, Gayatri, Purva, Samrudhi, have all been given grace marks to be promoted in eighth standard. Nilesh failed and Manthan managed to pass. The academic records of these students in standards fifth, sixth, seventh in mathematics were found to be far below even the passing marks of thirty five. The advantage of the liberal promotion policy has seen these through, from fifth to seventh standards. The mathematics achievement of all the students in the case study has been low. Even one with as low as eighteen out of hundred has been promoted. The scores in mathematics from standard five to eight is given in Table 6.7.1.

Table 6.7.1

Mathematics Achievements of the Cases

	V	VI	VII	VIII
Ashwin	NA	36*	39*	46 (+ 6)**
Chetana	42*	31*	39*	50 (+ 2)**
Deepak	44*	48*	46*	70**
Gayatri	25*	42*	55*	74**
Jatin	NA	35*	34*	49 (+ 3)**
Manthan	19*	26*	24*	54**
Nilesh	28*	18*	35*	30**
Purva	29*	31*	42*	75**
Samrudhi	26*	25*	24*	42 (+10)**

NA – Not Available
* Out of 100
** Out of 150

Except Deepak, Gayatri, Purva, all others have scored very low in eighth standard. The achievement in mathematics was found to be very low in standards fifth, sixth, seventh. This habitual low achievement must have paved way for neglect of errors leading to mathematical backwardness. It was found that there was

a link between the teacher's behaviour, teaching and the attitude of the students towards mathematics. Ashwin liked his mathematics teacher while Chetana and Deepak did not like their mathematics teacher but liked mathematics. Chetana disliked proofs. She had some bad times with her recent mathematics teacher. Deepak had rough time with teachers and had no favourite mathematics teacher but liked mathematics very much, Gayatri had some good experience with mathematics teachers. Her mathematics teacher asked students to work out problems on the board. Checked their homework, gave real life examples, kept vigil over the students. Jatin was very clear about the link between mathematics and the mathematics teacher. He selectively liked mathematics according to the teacher. Manthan was not much impressed by her mathematics, teachers except one middle school teacher. Nilesh was not very sure about his opinions. Purva did not like mathematics teachers except one in the eighth standard.

The remedial programme was tuned towards improving the attitude towards mathematics. The programme was not based on any tried out strategy or method. It was not completely planned in advance. The main emphasis by the investigator was to develop a positive attitude towards mathematics learning and to make students construct, understand rather than rote memorize. Discussion of error was given importance rather than, mere giving of correct method. Investigator insisted on finding the correct responses and method by the cases themselves. The investigator had sequenced the topics from very basics of algebra, linear equations and word problems. Studies by Kalamaros (1991), Karen (1988), Tzeng, Shwu-Rong (1987), Rajya guru (1991), Rosaly (1992), Thampurati (1994), Wangu and Thomas (1995), found the influence of arithmetic towards mathematics as a vital factor. Smith (1999), Bellisio (1999), found children's learning of mathematics, involve their decisions and representations.

Studies by Bhirud (1975), Sharma (1978), Sarangapani (1990) pointed out the lack of basic knowledge, specific deficiencies. These above mentioned studies also helped the investigator in comprehending the phenomena of mathematics learning and associated backwardness.

Their experience with mathematics was linked with their experience with the mathematics teacher. They sometimes had good experiences due to good teachers.

6.8 Excerpts of Mathematics Teacher Responses

The interview schedule is given in Appendix-I.

The below given responses are questionwise:

I. How do you perceive the ability of the backward students to understand your explanation ?

Responses:

Yes. But explanation has to be repeated. Explanation with day-to-day examples.

'Students get barely familiar to English standard, everything is explained in English. This becomes a problem to understand word problems. They need lot of drill for this.

'They do not understand when the whole class is being taught. They have to be explained individually.

'Explanations they understand. They even given response, but they forget later'.

'They pretend to understand. If you ask them the next day, they won't know.

'They understand perhaps. But I have to repeat in the next period.

'They have the ability but they have language problem. If all weak students are put in one class then teacher can do better. Personal attention and care must be given.'

'Weak students require more time to understand the problem, to think, still they would not be able to give the answer. They want to try. There is more

need in geometry for explaining. A little Konkani explanation makes everything clear. The need for Konkani gradually reduces from std. fifth to eighth

II. **Are Backward students regular in doing homework ? What is your experience ?**

Responses:

'Yes. But they copy from bright students, or get help from tution. This they do inspite of telling them not to do homework, if they don't know.'

'No, I do not give homework, because they copy. I ask them to do in the class itself.'

'Homework is completed in the class itself. I check the notebook of one or two students. One bright student is given responsibility to check of five other students. In this way I manage to check the note-books'.

'They do homework regularly, by copying from others. They are afraid of the teacher. They do not maintain their notebooks. At the end of the year they gear up for marks. In order to check the notebooks I ask the partners to check each others book. I ask one student to do the problem on the board for everyone to verify. At the end of every unit I go through the note-books.'

'No. I do not give homework because I cannot check. Backward students copy and maintain their notebooks because of marks.'

'Students are forced to. Otherwise they don't. I insist for homework from backward students. I ask questions based on the homework. Some students are irregular in doing homework. They have to repeat the homework in the class. Some students do show some improvement.'

'Every day three or four problems. Next day I solve the problems on the board and students verify. I take a round in the class and since only fourty six students all can be checked. They maintain books properly because of marks.'

'They do not do homework on their own. They copy homework. They are caught by the mistakes while copying. Homework is solving all exercise\s done in the class. Solve examples repeated in homework'.

'They are regular in doing homework. I check homework everyday, especially backward students. They have been warned not to copy. I verify by asking them to explain. If they don't know, they need not do it. They maintain their books very well because of my persuasion, not for marks but to develop a habit.'

'Homework must be given daily. Problems must be graded. Easy problems to create interest. They are counselled not to copy homework. Students are asked to solve the problems on the board. The attitude, of the students is, not to do homework'.

'They copy from others. When I ask questions they verify. Each row has a leader. The leader maintains a diary, with roll numbers and dates. I take note of the students from their diaries every week end. Homework book is neatly maintained by girls.'

'Homework is not given everyday. When $(a + b)^2$ is taught, it is repeated with different variables and similar work is given for homework. Similar questions are given, so students initiate classwork. For word problems they need help to think. For correcting homework , I ask backward students to do the problems on the board. I feel writing a note in the book does not make any sense, I do mass correction and give personal explanation.'

'They are not regular. However, backward students will do only if there is punishment or fear of teacher. They copy from others. For them to remember something they need to write. Hence homework is given. Rowwise, monitors check homework. Those who have not done get punishment. Backward students copy because they are bored of homework. They do not get anything out of it. They get money, by selling things, fieldwork. They are not left with any time or energy. The situation at home, school is not conducive. Extra time is devoted only for tenth standard. I ask backward students to do problems on the board and ask another backward student to correct. If you encourage even backward students change.'

'They are not systematic in the beginning. By eighth standard they become very irregular in doing homework. I show them the notebooks of bright students. For first few days I try to identify backward students. I check their homework books in the class itself. Backward students are not able to do even the same example solved on board. Some of the confess that they copy. I check homework everyday in the class itself. Once the backward students are identified, I appoint a bright student as a leader for each row. More of copying homework is found in fifth and sixth standard in especially the division with more failures.'

'Only under threat and punishment they do homework. Even if less homework is given they don't do. They copy from the board. The habit of sitting and doing by oneself is lost. Homework is all constructed problems. So answer is not available anywhere. If teacher is very strict then outcome is zero.'

'I give homework everyday. There are leaders for every row. I check their books and they check others' books. One of the leaders does the problem on the board. If maximum students have not done then I do it on the board.'

'Only fifty percent will do homework. Backward students never bring homework. Then punishment. Ask them to do it in the class.'

III. Do backward students ask doubts or make any attempt to improve ?

Responses:

'Rarely. Generally they hesitate. They feel it is an insult to exhibit that they are poor in learning. Most of them go for tution. There they get all answers easily and they take it blindly.

'No. Because of tution tendency. They imitate from neighbouring students and misguide the teacher. It is not possible to give individual attention, due to large number of students and time constraint. I don't think it is due to syllabus.'

'No. They go for tutions. The tution teacher explains so they don't come. They keep changing their tution teacher. The students believe that they will manage to pass. All those who fail go for tution. The very reason for students not bothered is due to tution'.

'Some of them contact. They take help and improve. Some go for tution. Tution is essential for weaker students for repetition. Some weak students show improvement after tution, Mathematics makes your mind should be prepared. Unless they prepare their mind.... Rote memorising is not possible, they have to apply their mind.'

'They are not interested upto the seventh standard, because of promotion policy, to ask any doubts. However, the weak students develop the habit of asking questions and prepare them, in the ninth and tenth class.'

'They don't come. They feel (i) they do not have any difficulty, (ii) how they can ask difficulty. They don't want to do hard work.'

'They do not come voluntarily, I approach them. I try to be friendly, fondle them like a parent, ask them softly their doubts. They have language problems. If I could speak in Marathi, then I could explain better and get closer to them.'

'They don't come on their own. They feel shy, to ask because of lack of basics.'

'They do not come. They feel shy. They do not have the previous knowledge. Even at tenth standard they are not thorough with fundamental operations.'

'Backwards students feel shy. But, if called by teacher they come. They dislike the subject, therefore need support of the teacher to create interest.'

'They have a complex about the teacher. But average and above average students come. I am doubtful about the reason. May be my looks. I have taken pains to be perfect. I give example of my teacher'.

IV. What is the parent's contribution towards improving backward students peformance ?

Responses:

'They are satisfied, by sending their children for tution. They say, the maths we studied was different, hence we can't help them'.

'Parents have more eagerness for tution. Even if I discourage, parents do not listen. For eg: The parent of a repeater in eighth standard was asked to stop the students going for tutions. The student failed in the first term. Then tutions were discontinued the student passed, because she paid attention in the class.'

'Parents say that their children are studying at home but don't know why they fail. Parents are co-operating and participating with the teachers'.

'Parents don't take any interest, not even to collect results. Some of them come. But all of them fully rely on the teachers'.

Generally, parents of weak students are not educated. The elder siblings come as a substitute.'

'Parents don't come because they are ashamed of coming. They complain about their children. They don't believe what their children say.'

'Some of them are literate but they expect teacher to do everything. Some of them say their child is studying at home but still not passing.'

'They do not listen to their parents. Many of them have bad habits of chewing tobacco. For want of money they, gamble. Their parents encourage them.'

'Some parents say 'you decide how he should improve'. They also confess that even though their children go for tution they are failing. Some parents listen to the teacher and stop sending to tutions. Parents prefer to send to famous tution teacher when they have miserably failed. They would not send their children for remedial classes but for tutions'.

'Parents do not claim responsibility because they say they don't know anything. They feel sending for tution is everything. Some of them are illiterate. But some are educated. They do not sit with their children to study.'

'Parents say 'you do whatever you want. You take any step'. They are illiterate. Child is not willing to bring the parent.'

'Parents contribution is nil. They do not even come for results. Even if they come entire responsibility is put on the teachers'.

'Mostly I did not find any response from them. Ultimate thing they feel is tution. They may even vile away time and say 'no time'. Some of them do come'.

V. What is your experience of trying to improve the backward students ?

Responses:

'If the number of students is less and grouping is done according to ability, justice can be done.

'After first exam, I begin with remedial teaching for one hour after school hours. This continues till second exam. I stop after observing their performance. Generally they don't slip back. I feel no child is weak for learning mathematics.'

'Those who obey the teacher, full guidance is given and they succeed'.

'Weak students don't find mathematics difficult and don't dislike it. Teachers should make it interesting. Weak students should not be neglected.'

'I have tried to improve the weak students but now I have given up. I'am happy with the bright students. Now, I neglect the weak students, partially.'

'They fear mathematics, lack interest. They remain neglected for a long time, hence lose interest'.

'Response is very less in spite of going out of my way. There is some response from girls. I try to be approachable, friendly, intimate. In 1983 teachers' did not put so much efforts, but results were good. Now so much study materials are available. Students do not even bother to look.'

'Make them love mathematics and the teacher. Start with what they know. Even a dull student can write a thesis if he/she likes mathematics.'

'When I ask the weak students to come in the evening, they do not come, regularly because, their interest is in other business.'

'I have one example of a repeater. I made him sit in the front row, gave more attention. He started asking doubts and now he gets second class.'

'They don't come to ask doubts, but after remedial teaching they come.'

'They dislike the subject and so need support of teacher to create interest.'

'Concept based teaching, so that they will come up.'

VI. What method do you adopt for Algebra ?

Responses:

'If it is linear equation, start with what is an equation, variable, constant. Spend about five minutes on it. Next solving of linear equations in detail. No short cuts. After one or two periods, first step of giving standard form of linear equation. Second step, numbering the equation, third step multiply equation one with some number and equation two with another number fourth step if same sign, then, subtract, if different sign, then add.'

'If it is algebra, (x + a) (x + b), first step, begin by multiplying the brackets then formula is derived, second step, learning the formula by writing number of times, third step, using formula to solve new examples.'

'For example in solving quadratic equations, first-polynomial, second – type of polynomial, third – linear equation, fourth – quadratic equation, fifth – definition, sixth – general form of quadratic equation.'

'For example, in order to teach algebraic expression, first – natural numbers, 1, 2, 3, 4, second – algebraic expressions 2a, 3a, 2x, third – algebraic expressions, 2xy, 3abc, fourth – 2a + 3b, then ask students to give examples.'

'For example, in teaching of factorization first factors of numbers, second – examples with positive signs, third – examples with negative signs. Always refer to basics before beginning any topic.'

'For example, to teach sets first – maintain silence, second – make them at ease, third – if no aid is used look for classroom situation. I give maximum time to adjust with the students. They should be comfortable with the teacher. In sets I use phrases like,

a _____ of students

a _____ of cattle

a _____ of players.

Students fill in the blanks. Students give the meaning then I give definition. Humour is an essential element in teaching.

'For example, to teach linear equations first – concrete example like 5 + 3 = 8, second – replace one number by x, third – make examples more difficult, fourth – word problems. Generally I do not give lengthy examples. When explanation tends to infinity understanding tends to zero.'

'For example, to teach factorisation, first – common factor in $x^2y + 3x$, second – 2x + 2y, 2 is common, third – with three terms, find common, fourth – revise identities, fifty – factorisation.'

'For example, to teach linear equation – first – find technical difficulty, like LHS, RHS, transformation, substitution, second – linear equation with one variable explain variable, constant, value of x to be found. 'I keep' sign convention in the box on the board.'

'To teach $(a + b)^2 = (a + b)(a + b)$, first – problem of (x + 3) (x + 3), then relate a to x and b to 3 and middle term is ab related to 6x. Again another problem (a + 4) (a + 4), compare. Then generalization solving (a + 5) (a + 5) with formula.'

'To teach factorisation, first what we mean by factorisation, give examples from arithmetic like factors of 20 and 30, i.e., divisors showing by

division to get the factors then multiplying to get the expression again. Second – the methods of factorisation. This method is essential for all, algebra evolved from number system.'

VII. Do you have any special approach for the backward students ?

Responses:

'Individual attention. Then the chances of errors are drastically reduced. Emphasis is not on giving knowledge but getting more marks.'

'Begin with easy problems. Increase difficulty level gradually. Sometimes basics have to be taught again. I concentrate only on easy topics for the weak students, so that they will pass.'

'No extra work is given, only repeating of the classwork.'

'Simple problems are given to solve on their own. Response was good. All students attended. Individual attention was given. It is very interesting to coach weak students. About ninety percent showed improvement.'

'I give a chance for them to speak on non-academic topics. Being humorous come to get closer to them. Then they come to ask doubts and the fear is gone.'

'Personally I visit their homes. Help them in their studies. Enquire about their health, home background. Place the content in an interesting manner, using teaching aids and being friendly.'

'I arrange special classes only in tenth standard. I do not cover all topics for backward students. Very simple problems.'

'Each student has to be dealt with individually. Teacher has to be friendly. If they are encouraged they will score high. Special treatment makes them feel responsible, then they change attitude.'

VIII. Are the text-books satisfactorily made ?

Responses:

'Generally backward students find it difficult. I use it only for reference. I solve more problems than the ones given in the text-book. I give new situations to solve.'

'The NCERT text-books are good without omissions. The board had to do it since some teachers did not want to study. Dilution brings down the standard. Teachers have lost the study tendency. Many teachers do not solve the last questions. They are the difficult ones. I am of the opinion that the backward students will also learn something from difficult topics. Moreover, text-books, do not have sufficient examples.'

'I use text-books of other boards'.

'I use it as a reference book. Students do not find it useful. Number of problems are less, in the text-book. Hence, I use other books. Topics in standard eighth and ninth have no link, except for some topics like trignometry and factorisation.'

'Textbook is only a reference book. It is of no use to the students. The number of problems are not sufficient. The topics in seventh and eighth are not liked. Students cannot comprehend because of language problem.'

'Generally students find it difficult to follow. In sixth and seventh standard I give simple problems of my own. In eighth standard students surely feel difficult. Hence results go down. Only few topics of standard eighth and ninth are related, i.e., factorisation and linear equation. All other topics are not related.'

'It is used only as a reference book. The topics are not, placed properly. There is no link.'

'The text books are not graded. There is no continuity in the topics in standard eighth and ninth but eighth is linked with tenth.'

If text-books are for students, then the NCERT text-books are not suitable. Students may not be upto the mark. They should be encouraged to refer other books. Pictorial books for standard fifth. Teachers have to be careful about errors in the textbook.'

'The text-books are not fit for the students. It is not student-oriented but exam-oriented. There is no proper link between topics. They are haphazardly arranged. Text-book is useful for teachers.'

'Some topics in fifth and sixth standard are tough for the students, like decimal and fraction. Very big numbers, pose a problem. For these classes work book is essential. Weak students do not read text-books because of language problem. It is used only for homework. Weak students have to be given more examples.'

'While writing text-book continuity must be maintained. When I was asked to write text-book for standard third and fourth, I asked to give freedom to streamline standard first and second. Terminology is not taken care of. Pythagoras theorem is introduced using square root even before student learns about square root. What is required in eighth, ninth and tenth the basics should be given in fifth, sixth and seventh. We are preparing for tenth. Efforts were taken to streamline from fifth to tenth but with the coming of the NCERT text-book in nineteen ninety four everything changed.'

IX. What are the special characteristics of backward students ?

Responses:

'They have an urge for learning. However, they are not able to handle mathematics. Their talent seems to be lying somewhere else.'

'They are lazy, not ready to improve on their own. When motivated, then some of them have improved.'

'They feel it is not possible for them. Hence they do not take interest. From, the beginning they are neglected.'

'They are sincere and behave well. But they are shy. They actively participate in co-curricular activities.'

'Seventy five percent of the weak students are not interested. They do not like maths.'

'They are good in everything else. Good behaviour. Some of them have bad habits. However, they feel relaxed with teachers and express their problems. If teacher is intimate to them, they remain dedicated to the teacher.'

'They are found to be dull only in academics, in all other things they are bright. I feel all do not need higher education. The education system is spoiling lives. When a teacher retires he/she will repent.'

'They are bright in doing manual work or playing. If they are taken into confidence, you get respect from dull students, more than bright students.'

'Compared to bright students they give respect to teachers. They are attentive if you give individual attention.'

'I feel bad when they fail. They are good volunteers. They are obedient and responsible. They are good at other works. Study comes only if insisted upon.'

'They are interested in any activity other than learning. If you give them measurement, they use their creativity to prepare models. However they would not be able to explain. Expression power is weak. This you can make out when you ask them to explain any problem they have understood.'

'Those who are weak in studies are good in sports and other activities. They are very good volunteers. I had persuaded some parents to send the students to specialised schools. Few of them responded.'

'If a stage is to be erected, they can do unique things on their own, with little guidance and supervision. Even in cultural activities they are fantastic. Each child has got uniqueness. They can choreograph and practice it even fifteen times in a day, and present it. They go to any extent out of joy, and appreciation they get. They voluntarily come up with their programme. They do not miss sports and games.'

X. Which are the topics that backward students find difficult ?

Responses:

'Decimals, fractions and even place values are not known in eighth standard.'

'Mensuration – II in eighth, ninth. Riders because of language, double-angle sums in trignometry, cyclic, factorization indentities in trignometry.'

'Examples in algebra and geometry, application problems, area of circle, triangle, linear equation, word problems.'

'Cyclic expression, banking, taxation, ratio and proportion.'

'Square roots, positive and negative signs. Anything to do with language.'

'No topics need to be avoided for th weak students. They can score from the few steps. Word problems are difficult due to language.

'Topics like linear equation. Too many examples in lower classes should be avoided, for weak students.'

'In eighth, cubes and cuboid, in seventh surface area: use of positive and negative signs. Division of algebraic expressions. Word problems, are difficult due to language.'

'In eighth, cube root, exponents, radicals, word problems, adding like terms, multiplying brackets, horizontal addition, linear equation, division of decimals. In ninth, surds, real numbers, number line, factorisation. In tenth, ratio and proportion. In mensuration II, problems based on parallel lines, volume and surface area problems, angle relations, trignometry, riders on circles, similar triangles.

'Proofs, linear equation-framing.'

'Directed numbers, word problems, theorems due to language.'

6.8.1 Summary Based on the Excerpts

Having interviewed various teachers, writing their individual interviews excerpts and also gleaning their views on particular questions a few conclusions seem to have emerged.

Teaching of mathematics and its associated activities are highly individual-dependent. While some have developed their own productive way of functioning even in dire situations, others have taken safe refuge in the students' lack of interest and inability. Lack of co-operation from the parents, lack of space and time to conduct remedial classes, need for separate syllabus for backward students, were strongly voiced. There seem to be a scale of initiatives and willingness on which the teachers could be

placed, with majority, on the higher level. Also the researcher felt that each one was trying to tackle unprecedented, grave, challenging cognitive and managerial problem single-handed. There is a need for periodic updating, replenishing. Most of the teachers showed dissatisfaction with the text-book in terms of arrangement of content. However, the collective wisdom of the mathematics teachers could be utilised rather than a few chosen ones. Every revision or change of text-book, should be preceded by survey of the consumers-teachers and students. More conscious efforts towards grading and maintaining two channels would serve the idea of avoiding some topics found difficult by backward students. Need for more problems for practice and homework, can be met by developing workbooks with graded problems. Teachers could be also provided with brief idea about the approach, the perspective and the objectives, of the text-book. The teachers need to be provided with assistance in terms of new approaches, methods, strategies for handling backward students. The state institutes, teacher educators, researchers could contribute towards the problem, rather than leaving it to the wisdom of the mathematics teacher alone.