Did You Know That

Evryone One is Intelligent ?

CHAPTER - IV
INTERVENTION PROGRAMME

4.0 INTRODUCTION

The present study is about the development and implementation of an instructional strategy incorporating the theory of MI. Further, as it is explained earlier in chapter one, an instructional strategy includes, both, the act of teaching as well as the techniques of evaluation of learning. The act of teaching is generally carried out with the help of a lesson plan. Therefore, the intervention programme consisted of two parts, namely, introduction to the theory of Multiple Intelligences to the sample of teachers and the development of the instructional strategy incorporating the theory of Multiple Intelligences, and the observation of the actual transactions of the developed instructional strategy. The development of the instructional strategy incorporating the theory of Multiple Intelligences itself further comprised of two parts; the first part dealt with the remodelling of lesson plans, and the second with the preparation of achievement tests to evaluate the learning outcome of students according to the theory of Multiple Intelligences.

The first part of the intervention programme dealt with the materials prepared by the researcher and then presented to the sample of teachers and the second with the developing of the instructional strategy consisting of the remodelling of lesson plans and the prepa-

ration achievement tests for the evaluation of learning outcomes of the students incorporation the theory of Multiple Intelligences.

4.1 PART ONE : THE THEORY OF MULTIPLE INTELLIGENCES

4.1.1 INTRODUCTION

Just like the word love, intelligence too is being used by people today quite loosely. For example, it is said - I love *Biryani*, I love Indian cinema, I love Henry Newman, I love you etc. In all these, the word or the verb *to love* has been used in different meanings. In a similar manner people use the word intelligence too. For example, if a child solves a mathematical problem quickly and correctly it is said that he/she is intelligent. Again if a child grasps the meanings of words, idioms and phrases, and grammar of a language well, it is said that he/she is intelligent. If a person understands the scientific concepts and is able to explain natural phenomena scientifically, he /she is labelled intelligent. If a student scores 90% in an examination, he / she is considered bright, intelligent. From cases such as these, what generally can be concluded is that intelligence is something to do with science and mathematics. True, but this is not everything about intelligence. When a person sings very well, for example, why is he / she not considered intelligent? Similarly even a person who dances gracefully why is he / she not consid-

ered intelligent? Is intelligence confined to the acts of solving mathematical and scientific problems only?

This kind of one-sided or biased considerations about intelligence in favour of one or two aspects of life leaving aside a whole gamut of areas in the life of a human person led Howard Gardner to postulate the theory of Multiple Intelligences. And he advocated that a human person could be intelligent in many ways. According to him human intelligence in not a singular entity. Quite on the contrary, human intelligence is a multiple reality. Championing this idea he proposed nine intelligence. He further opined that list of nine intelligences is not an exhaustive list of intelligences. In future there could be more added to the list. This theory promises a lot in the field of education not only for the effective instructions of students, but also for their wholesome evaluation. In other words, the theory provides an important tool for the wholesome education of students. Let us familiarize ourselves with these human intelligences proposed and advocated by Gardner.

4.1.2 MULTIPLE INTELLIGENCES

In his career long research Howard Gardner realized that the I.Q. index although did provide an indication of one's general intellectual ability, it definitely was not the all of an individual's intelligence. How could such a complex reality as intelligence possibly be measured with a single score? He further posited that the intelli-

gence of an individual is a multiple reality. And so he proposed nine intelligences, namely, the Linguistic Intelligence, Logical Mathematical Intelligence, Spatial Intelligence, Bodily – Kinesthetic Intelligence, Musical Intelligence, Interpersonal Intelligence, and Intrapersonal Intelligence, Natural Intelligence and the Existential Intelligence.

However, even as when he made this claim, at the starting point of his contentious journey, he honestly confessed, "the exact nature and breadth of each intellectual 'frame' has not so far been satisfactorily established, nor has the precise number of intelligences been fixed. But the conviction that there exist at least some intelligences, that these are relatively independent of one another and that they can be fashioned and combined in a multiplicity of adaptive ways by individuals and cultures, seem to me to be increasingly difficult to deny" (Gardner, 1983, pp. 8-9). This was his initial confession. Today, however, he asserts with a fair amount of confidence that human intelligence is definitely not a single entity. There are many intelligences.

4.1.2.1 LINGUISTIC INTELLIGENCE

Linguistic intelligence is the ability to use with clarity the core operations of language. It is the ability to use language to describe events, to build trust and rapport, to develop logical arguments and use rhetoric, or to be expressive and metaphoric. People with linguistic intelligence have sensitivity to the meaning of words – the

capacity to follow rules of grammar, and, on carefully selected occasions, to even violate them. At a somewhat more sensory level Linguistic Intelligence implies- sensitivity to sounds, rhythms, inflections, and meters of words – that ability which can make even poetry in a foreign tongue beautiful to hear, a sensitivity to the different functions of language- its potential to excite, convince, stimulate, convey information, or simply to please. The ability to mesmerize one's audience whether with just a small speech or to keep them spell bound for hours together with practically no substance at all is possessed by the Linguistically intelligent persons. These can create new meanings with the same old words or phrases of a language. In fact, a language remains alive largely due to these people. This intelligence is manifested best among the storytellers, administrators, salespersons, clergy, counsellors, lawyers, philosophers, playwrights, orators, politicians, editors, journalists etc.

4.1.2.2 LOGICAL-MATHEMATICAL INTELLIGENCE

The Logical mathematical intelligence, primarily, is the capacity to use and manipulate numbers effectively and to excel in reasoning. It is the capacity to recognize the inherent logical patterns in things, events, etc. It is the ability to use numbers to compute and describe, to use mathematical concepts to make conjectures, to apply mathematics in personal daily life, to apply mathematics to data and construct arguments, to be sensitive to patterns, symmetry,

logic, and aesthetics of mathematics, and to solve problems in design and modelling. It is the ability to discover the cause-effect relationships in the world. In other words, this intelligence ensures that reasoning must precede everything. Things must be logical and coherent. Thus, mathematicians, accountants, lawyers, scientist, computer programmers etc. exhibit this intelligence.

4.1.2.3 SPATIAL INTELLIGENCE

Leonardo da Vinci, Rodin, M F Hussain and the like have left their indelible marks in human history. They have done with ease things which probably none will in future. They have created immortal masterpieces. They have transformed concepts that they conceived into physical realities. They were genius spatially.

The Spatial Intelligence is characterized by the ability to perceive the visual-spatial world accurately and to perform transformations on those perceptions. Further, special sensitivity to colours, forms, space, shapes and their relationships distinguishes this intelligence. The capacities to visualize vividly with ease the verbal concepts and information tell us of the development of this intelligence. In other words, it is the ability to perceive and represent the visual spatial world accurately, to arrange colours, lines, shapes, forms and space to meet the needs of others, to interpret and graphically represent visual or spatial ideas, to transform visual or spatial ideas into imaginative and expressive creations. The Fine Artists, people working in

the field of advertising, interior and exterior decorators, sailors, engineers, surgeons, architects, painters, carpenters, masons, jugglers, theatre artists, sculptors etc. can be seen as possessing and to have developed this intelligence.

4.1.2.4 BODILY-KINESTHETIC INTELLIGENCE

Sergi Bubka soared to the heights that probably none would. Ben Johnson sprinted the hundred meter race within ten seconds. This again would remain an ever unbroken record! The magic of Johnson's feat in basketball will echo for ever in the minds and ears of the people of the world. Much in the same way, Pele will remain the idol of all footballers of the world. What did all these personalities have in common? Undoubtedly the ability to coordinate and manipulate the movements of the limbs of their bodies generating an awesome amount of perfection. This is the result of the bodily kinesthetic intelligence at its zenith. To be intelligent Bodily-kinesthetically means to deal with and to manipulate body movements effectively and meaningfully to express ideas and feelings. The ability to handle object skillfully is another characteristic of this intelligence. To perform specific bodily movements with proper balance and coordination of various parts of the body requires this intelligence. The performing artists, sports persons, even surgeons, craftsmen, instrumentalists, artisans etc. exhibit this intelligence.

4.1.2.5 MUSICAL INTELLIGENCE

Over a period of time it was observed in a certain school that the students did very badly in mathematics. Year after year it was observed that students fared poorly in mathematics. What intrigued the teachers most was that even those students who did very well in the other subjects could not score a first division marks in mathematics. Everything was tried. All possible helps and assistance were given to the students. Yet the result was the same. Students, year after year, almost had come to believe that mathematics was simply not their cup of tea. Teachers too tried various approaches to deal with the issue, but nothing seemed to work.

Then the science teacher of the school set himself on a course to tell the students that mathematics after all wasn't that difficult. He diagnosed the demon: first, students did badly because they could not remember the mathematical formulae; second, the students were very good at folklores. So he personified each variable in all the school mathematical identities/formulae and composed them into folklores of the place and taught them in the class. And lo! Mathematical phobia had disappeared. Every time the students needed an identity/ formula, all that they did was to hum the tune of the folklore silently and it was in their finger tips. The result? Well, that is anybody's guess - there was no failure in mathematics thereafter till this day. The Musical Intelligence of Howard Gardner had done the job.

The Musical Intelligence, as the name itself indicates, is the ability to handle, perceive, discriminate, transform, compose, and express musical tones. It is the ability to understand and develop musical techniques, to respond emotionally to music and to work together to use music to meet the needs of others, to interpret musical forms and ideas, and to create imaginative and expressive performances and compositions. Sensitivity to rhythm, pitch, etc. of music is the hallmark indication of this intelligence. A musically intelligent person is able to create melodious compositions out of individual musical notes. He /she is able to perceive the fine distinctions between notes. Further, he/she is able to relate mere prosaic presentations with more poetic ones. Facts and ideas he/she can put in musically which often becomes more pleasant not only for the purpose of their presentations to others but which also turn out to be easier for remembering.

4.1.2.6 INTERPERSONAL INTELLIGENCE

The Interpersonal Intelligence is the ability to perceive and make distinctions in the moods, intentions and feelings. This is to be sensitive to and recognize various bodily expressions such as facial, gestures, voice/tone etc. of another, to have the distinction of being attractive and magnetic and to be able to share/exchange these with another and even influence others effectively. It is the ability to organize people and to communicate clearly what needs to be done, to use empathy to help others and to solve problems, to dis-

criminate and interpret among different kinds of interpersonal clues, and to influence and inspire others to work towards a common goal. This intelligent is best manifested among the administrators, managers, politicians, social workers, doctors, nurses, therapists, teachers, sociologists, psychologists, consultants, evangelists etc.

4.1.2.7   INTRAPERSONAL INTELLIGENCE

Apart from being able to relate with others meaningfully, there is a greater need to know oneself. Self-knowledge, that is, to have an accurate knowledge of oneself is essential for a sustained interpersonal relationship. Intrapersonal Intelligence facilitates this process. It is the ability to assess one's own strengths, weaknesses, talents, and interests and use them to set goals, to understand oneself to be of service to others, to form and develop concepts and theories based on an examination of oneself, and to reflect on one's inner moods, intuitions, and temperament and use them to create or express a personal view. To be aware of one's own moods, feelings, inner desires and aspirations, motivations etc. not only enhance self-esteem but also at the same time enrich societal living. Intrapersonal intelligence is best manifested among planners, businessmen, psychologists, artist, religious leaders. As stated above, a strong Intrapersonal intelligence is almost a prerequisite for strong interpersonal relationship. This is the binding force as it were of any relationship.

4.1.2.8 NATURALISTIC INTELLIGENCE

One morning, Mr. Gyamy behaved rather strangely. He refused to do anything none knew why. Upon inquiry the administration of the institution learnt that the only yellow rose plant had gone missing from the garden. He neither ate nor spoke to anyone till he had found the missing yellow rose plant from his garden and subsequently was assured that the stolen rose plant was going to be well looked after. Much in the same way, Mr. Padam cried silently the whole day when he found that the old cow in the farm was no more. Mr. Biswas paid an unthinkable price of Rupees eight thousand for a piranha that weighed less than a kilogramme. Some would call these acts of sheer madness. But these acts weren't so. These were the manifestations of love for nature. They are examples of naturalistically intelligent persons. The Naturalistic Intelligence is exhibited in one's expertise in understanding, recognizing, relating to, distinguishing and classifying the flora and fauna of one's environment. Further, to show special love and sensitivity to nature and the natural phenomena one needs Naturalistic Intelligence. Biologists, Environmentalist, Geologists, farmers, hunters etc. require this intelligence.

4.1.2.9 EXISTENTIAL INTELLIGENCE

This intelligence is the newcomer among the above-mentioned eight intelligences. It is the ability to recognize, uphold, share, and impart values (social, religious, human) of life. This is concerned with

human's living and not merely existing. Advocates of value education, for example, need their existential intelligence developed more!

4.1.3 BASIS OF MULTIPLE INTELLIGENCES

The theory of Multiple Intelligence has not yet been fully appreciated and their potential exploited in the educational process. Simple questions like, what is new about this? How are they different from talents or skills or competencies or aptitudes? What is the basis for this? etc. have already been asked by the people. That is to say that the theory has not been accepted as having universal application. Yet Gardner hasn't been discouraged. He is fully aware of the objections raised regarding the authenticity and universal applicability of Multiple Intelligences. Despite these he consciously prefers to call these 'intelligences' and not simply be satisfied by calling them talents or aptitudes. "I am deliberately being somewhat provocative. If I'd said that there are seven kinds of competencies, people would yawn and say ' Yeah, Yeah'. But calling them 'intelligences', I am saying that we have tended to put on a pedestal one variety called intelligence, and there's actually a plurality of them, and some are things we have never thought about as being 'intelligence' at all " (Weinreich-Haste, 1985, p. 48). He then calls these intelligences because these pass the eight tests / evidences, namely:

1. Potential isolation by brain damage.
2. The existence of Savants, Prodigies, and other Exceptional Individuals.

3. A distinctive development history and a definable set of expert "End State" performances.

4. An evolutionary history and evolutionary plausibility.

5. Support form psychometric findings.

6. Support form experimental psychological tasks.

7. An identifiable core operation or set of operations, and

8. Susceptibility of encoding in a symbol system.

Armstrong (2000) has dealt with these eight evidences in detail. These are clearly beyond the scope of this research report. Hence the investigator would not dwell on them.

4.1.4 DEVELOPMENT OF MULTIPLE INTELLIGENCES

As stated above, these intelligences can be developed to an adequate level of competency. Given an opportunity each of these nine intelligences can be developed by all. Therefore, at any given moment of time Gardner would hesitate to say that this one or that one is either the weak or strong intelligence in someone. Who knows that the one considered as weak intelligence of someone, some day in a more appropriate condition that might not turn out to be his/her strongest! This appropriate condition according to him can be the following three factors:

1. Biological endowment including hereditary or genetic factors and the accidental factors like brain injuries before, during and after birth. For example, a lame or a fat boy cannot possi-

bly be a good athlete or a dancer. (Exceptions in rare cases not ruled out!)

2. Personal life history of an individual too plays a significant role in the development of his/her intelligences. Parents, teachers, guides coaches, peers, friends -all can help an individual develop his/her intelligences significantly. The opposite too can be the case.

3. Cultural and historical background of an individual too can either accelerate or retard the development of intelligences. The economics too is not ruled out.

The development of any of the intelligences would depend mainly on two factors, namely, the Crystallizing or Paralyzing experiences. These experiences often take place very early in one's life and act like turning points for the individual. While the crystallizing experiences enhance the development of intelligences the Paralyzing experiences retard the development of them. In fact, the crystallizing experiences of an individual almost set a platform, as it were, for the development of that/those intelligences. Quite, on the contrary, the Paralyzing experiences almost draw the curtain for an individual. After a Paralyzing experience an individual almost certainly comes to a full stop as far as the development is concerned.

The development of intelligences also depends on certain situational factors, such as, access to resource person/persons or mentors, the

historical/cultural atmosphere, geographical, and familial factors. A coach for, example, may spot certain talents of an individual in a particular field or area of the game of which the player him/herself was never aware. Upon coach's guidance the individual may start working on it. And who knows one day that individual may even excel

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working on it. And who knows one day that individual may even excel beyond anybody's imagination! Similarly, in an era or a race or a nation where the study of music or art is culturally valued, it is likely that the children of that era or race or nation would develop their musical or spatial intelligences more than the other intelligences. Much in the same way the normal, familial atmosphere play a great role in the growth and development of intelligences of individuals.

Further Gardner (1993) adds that as far as the distribution of the intelligences among the two sexes is concerned, these are distributed evenly. There is no evidence at all to assert that these are distributed among the two sexes in any preferential manner. Neither the males nor do the females enjoy any kind of advantages.

4.1.5 PRINCIPLES OF MULTIPLE INTELLIGENCE THEORY

From the above discussion on the theory of Multiple Intelligences it is possible to condense the whole theory itself into some basic principles. These principles could provide a bird's eye view to the entire theory; one does not have to conduct a study of the theory of Multiple Intelligences to know what it is. For the purpose of familiarizing oneself with the theory, these principles would suffice.

1. Human intelligence is not a singular entity; it is a multiple reality.

2. Every person is a unique blend of dynamic intelligences.

3. Intelligences vary in their development, both within and among individuals.

4. All intelligences are dynamic.

5. Multiple Intelligences can be identified and described.

6. Every person deserves opportunities to recognize and develop the multiplicity of intelligences.

7. The use of one of the intelligences can be used to enhance another intelligence.

8. Personal background, destiny and dispersion are critical to knowledge, belief, and skills in all intelligences.

9. All intelligences provide alternate resources and potential capacities to become more human, regardless of age or circumstances.

10. A pure single intelligence is rarely seen.

11. Developmental theory applies to the theory of Multiple Intelligences.

12. Any list of intelligences is subject to change as we learn more about Multiple Intelligences.

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12. Any list of intelligences is subject to change as we learn more about Multiple Intelligences.

4.1.6 MULTIPLE INTELLIGENCES INSTRUCTIONAL TOOLS

There are a number of teaching tools in MI theory that go beyond the traditional teacher-as-lecturer method of instruction. The following list provides a broader, but still incomplete list of methods and techniques that may be employed in teaching through the multiple intelligences.

INTERPERSONAL
Cooperative groups
Interpersonal interaction
Peer teaching
Cross age tutoring
Group brainstorming
Peer sharing
Community involvement
Simulations
Academic clubs

EXISTENTIAL
Value correlation
Value generation
Application exercises
Value awareness

SPATIAL
Charts, maps, diagrams & graphs
Visualization
Photography
Video, slides, & movies
Art appreciation
Imaginative story telling
Picture metaphors
Creating daydreaming
Painting, collage
Sketching
Graphic symbols
Visual pattern seeking
Colour cues

LINGUISTIC

Lectures
Large and small group discussion
Books
Worksheets
Manuals
Brainstorming
Writing activities
Word games
Sharing time
Students' speeches
Story telling
Talking books and cassettes
Extemporaneous speaking
Debates
Journalling
Choral reading
Individualized reading
Reading to the class
Memorizing linguistic facts
Tape recording one's words
Publishing

MUSICAL

Musical presentations
Singing, humming, or whistling
Playing recorded music
Playing live music
Group singing
Rhythms, songs chants etc.
Linking old tunes with concepts

NATURALISTIC

Nature walk
Aquariums
Gardening
Pet-in-the-classroom
Nature video, films, & movies
Nature study tools
Eco-study
Plants as props

BODILY-KINESTHETIC

Creative movement
Hand-on experiences
Field trips
Miming
Classroom theatre
Competitive and cooperative games
Hands-on activities
Crafts
Body maps
Manipulative activities
Physical education activities
Body language/signals
Physical relaxation exercises

INTRAPERSONAL

Independent study
Self paced instruction
Individualized projects & games
Private spaces for study
One-minute reflection periods
Personal connections
Self-teaching programmed instruction
Self-esteem activities
Journal keeping
Goal setting sessions

LOGICAL–MATHEMATICAL

Solving problems on the board
Socratic questioning
Demonstrations
Logical problem solving
Classification & categorizing
Creating codes
Logic puzzles and games
Heuristic method
Quantifications & calculations
Scientific thinking
Logical-sequential presentation
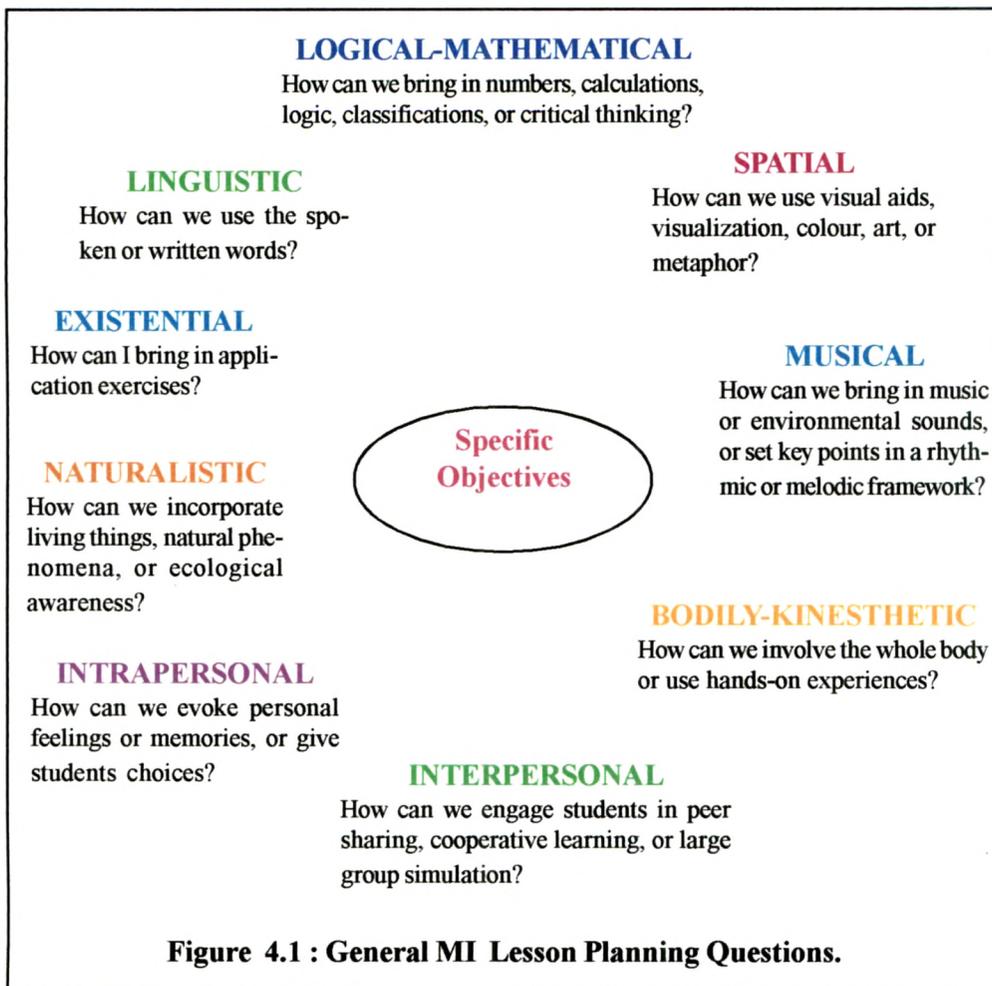of matter

4.1.7 MULTIPLE INTELLIGENCES LESSON PLANNING

An instructional strategy consists of two components. First, the act of teaching; second, the act of evaluation. The act of teaching is generally carried out with the help of lesson plans. Therefore, for the Multiple Intelligences instructional strategy, first a lesson plan had to be developed incorporating the theory of Multiple Intelligences. Armstrong (2000), outlines the procedure of preparing such a lesson plan. To prepare such a lesson plan he suggests the following five steps:

4.1.7.1   Focus on a specific objective or topic

In preparing a lesson plan incorporating the theory of Multiple Intelligences, it is important that the focus on the specific objective is maintained. To do this, the specific objective of the lesson is to be written down at the centre of the page symbolically suggesting that everything else revolves around that. Then various intelligences are to be written around that.

4.1.7.2   Ask key Multiple Intelligences questions

Keeping the focus on the objective, certain specific questions need to be asked and written down under each of the intelligences. These questions would obviously further intensify the focus on the objective. At this stage the plan would appear something like the figure 4.1 below:

LOGICAL-MATHEMATICAL
How can we bring in numbers, calculations, logic, classifications, or critical thinking?

LINGUISTIC
How can we use the spoken or written words?

SPATIAL
How can we use visual aids, visualization, colour, art, or metaphor?

EXISTENTIAL
How can I bring in application exercises?

MUSICAL
How can we bring in music or environmental sounds, or set key points in a rhythmic or melodic framework?

Specific Objectives

NATURALISTIC
How can we incorporate living things, natural phenomena, or ecological awareness?

BODILY-KINESTHETIC
How can we involve the whole body or use hands-on experiences?

INTRAPERSONAL
How can we evoke personal feelings or memories, or give students choices?

INTERPERSONAL
How can we engage students in peer sharing, cooperative learning, or large group simulation?

Figure 4.1 : General MI Lesson Planning Questions.

4.1.7.3   Consider the possibility

There are numerous approaches in executing a lesson according to the theory of Multiple Intelligences, (refer to pp 83-84). For each of the intelligences a teacher could adopt one or more of them as it may deem appropriate and necessary. Therefore, for a given topic and the objective thereof one needs to consider one or more approaches according to its/their feasibilities in a particular classroom situation. While thus considering the approaches, one

further needs to bear in mind that the approaches selected are naturally fitting to the topic and in no way do they appear forced creating an artificial atmosphere. Also that in a class all intelligences need not be considered.

4.1.7.4   Brainstorm

Along with the approaches appropriate activities/aids also need to be considered. It is better therefore to brainstorm and list all the activities/aids that come to mind. These activities and aids then are to be stated clearly. For example, if as the result of the brainstorming, one of the activities listed is a *game* under the Bodily-Kinesthetic Intelligence, then the nature, rules, duration etc. of the game have to be clearly stated. Similarly, if a *video* is listed under the Spatial Intelligence, then "video about what" needs to be stated explicitly. The concern here is that whatever activity one chooses, the activity or aids must be clearly stated. Nothing must be taken for granted or left ambiguous.

4.1.7.5   Select the most appropriate approach and activity

Not all approaches and activities would be suitable and feasible. Therefore, from the lists of approaches and activities only the best suitable and appropriate under each of the Intelligences are selected. Again, there could be just one approach and one activity per Intelligence or there could be more than one. The number is

not important. What really matters here is that the selected approaches and activities must facilitate the act of teaching with optimum efficacy. They must aid the act of teaching. Also while selecting the particular approach and activity one needs to examine whether these may not turn out to be sources of distraction to the students in some way. Finally, while the selection of the approaches and activities are being made, it must be borne in mind whether or not the teacher is comfortable executing them. Otherwise, no matter how good the approaches and activities may be in themselves, they will not elicit the desired result.

Finally, a sequential plan of the entire process of implementing such a lesson plan is to be drawn. Only then the lesson plans thus created should be implemented.

4.2 PART TWO : REMODELLING OF THE LESSON PLANS

After having familiarized the teachers constituting the subjects of this study with the theory of Multiple Intelligences, the main concern of the researcher during the first workshop was to help them remodel the lesson plans. To do this the teachers were divided in groups of four according to the subjects they taught. The language teachers also taught Social Studies. Hence the remodelling of the lesson plan on Social Studies was not taken up during the Workshop. Then they were instructed to follow the steps involved in remodelling a lesson plan as suggested by Armstrong (2000).

4.2.1 Focussing on the Specific Objectives

After the groups had chosen their topics, they were instructed to sit in their respective groups and write down the Specific Objectives of the lesson they had chosen in common. Writing of Specific Objectives was to be along the lines of the taxonomy of instructional objectives propagated by Bloom, namely along Cognitive, Psycho-Motor, and Affective domains. They wrote as many as it was possible. Then from these objectives, they selected a few based on their appropriateness for the class and the topic. Once they had finalized thus with their Specific Objectives for the lesson, they were instructed to write them down at the centre of a chart paper. Each group wrote its Specific Objectives at the centres of the chart papers provided for the purpose.

4.2.2   M I questions

Having written the Specific Objectives at the centre of the chart paper they were instructed to write down all the nine multiple intelligences around the specific objectives in different colours indicating that each of the nine intelligences was different, unique and special. Under each of these nine intelligences, the subject teachers of the study were instructed to ask themselves pertinent questions indicating how exactly they intended to transact the lesson that would cater to the needs of students who were differently intelligent, (showed their preferential style of learning), in that particular intelligence. As the teachers asked themselves these ques-

tions, they were instructed to bear in their minds the fact that each of the intelligences involved a number of aspects, areas. Hence they were not to be satisfied with just one or two questions per intelligence so as not to leave out other aspects of subtle but vital importance of the intelligence. So the teachers asked themselves as many questions as possible under each of the intelligences.

The purpose of these MI questions is to focus on the appropriate teaching methods. Also these questions would help choose the appropriate teaching activities later. For example, while teaching the topic "Area of Triangle", if the questions asked under the Logical Mathematical Intelligences were- How can I bring in calculations?; how can I bring in logic? etc., then the teacher would choose activities that would involve numbers as well as the relationship between a rectangle and a right angled triangle. Logically the teacher would be able to show how the formula to calculate the area of a triangle is derived from the area of a rectangle.

Then like in the process of writing the Specific Objectives, they selected the best questions under each of the intelligences and wrote them down under the respective intelligences. At this stage the chart paper looked something like the figure below, (Figure 4.2):

SUBJECT : MATHEMATICS
Topic : Area of a triangle

LOGICAL-MATHEMATICAL
How can we bring in numbers, calculations, logic, classifications, or critical thinking?

LINGUISTIC
How can we use the spoken or written words?

SPATIAL
How can we use visual aids, visualization, colour, art, or metaphor?

Specific Objectives

EXISTENTIAL
How can I bring in application exercises?

* to define a triangle.
* to recall the formula for calculating the area of a rectangle.
* to compare a triangle with a rectangle.
* to derive the formula of the area of triangle.

MUSICAL
How can we bring in music or environmental sounds, or set key points in a rhythmic or melodic framework?

NATURALISTIC
How can we incorporate living things, natural phenomena, or ecological awareness?

INTRAPERSONAL
How can we evoke personal feelings or memories, or give students choices?

BODILY-KINESTHETIC
How can we involve the whole body or use hands-on experiences?

INTERPERSONAL
How can we engage students in peer sharing, cooperative learning, or large group simulation?
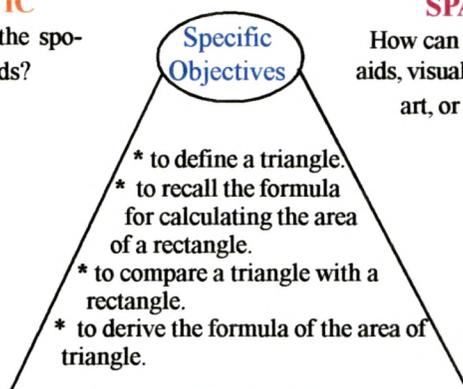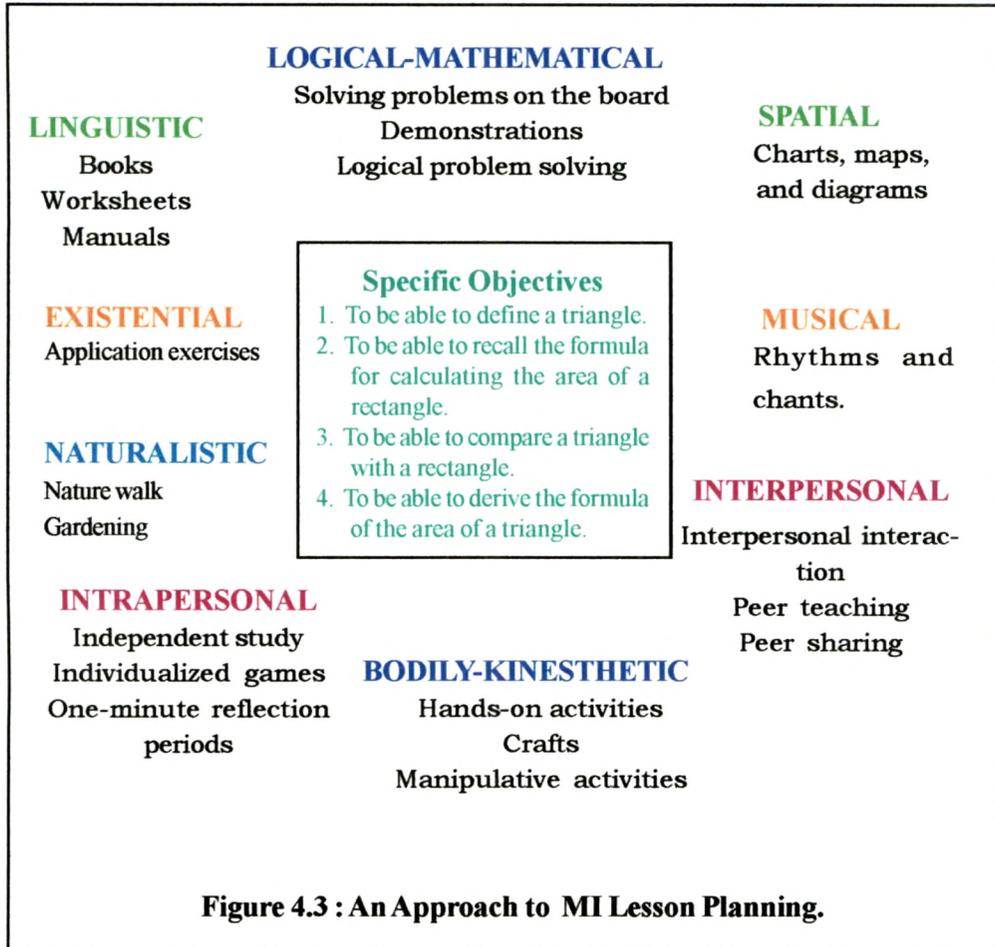
Figure 4.2: MI Lesson Planning

4.2.3 Consideration of possibilities

There are numerous approaches to execute a lesson plan according to the theory of Multiple Intelligences, (refer to pp 85-86). This list was presented to the teachers constituting the sample. The teachers considered the most appropriate ones while remodelling the lesson plan under each of the intelligences. Having thus considered the possibilities the teachers prepared the lists of approaches

and wrote them down under each of the intelligences already written down on the chart. One such lesson plan at this stage appeared as figure 4.3 below.

<table>
<tr><td colspan="3" align="center">**LOGICAL-MATHEMATICAL**
Solving problems on the board
Demonstrations
Logical problem solving</td></tr>
</table>

LINGUISTIC
Books
Worksheets
Manuals

SPATIAL
Charts, maps,
and diagrams

EXISTENTIAL
Application exercises

Specific Objectives
1. To be able to define a triangle.
2. To be able to recall the formula for calculating the area of a rectangle.
3. To be able to compare a triangle with a rectangle.
4. To be able to derive the formula of the area of a triangle.

MUSICAL
Rhythms and chants.

NATURALISTIC
Nature walk
Gardening

INTERPERSONAL
Interpersonal interaction
Peer teaching
Peer sharing

INTRAPERSONAL
Independent study
Individualized games
One-minute reflection periods

BODILY-KINESTHETIC
Hands-on activities
Crafts
Manipulative activities

Figure 4.3 : An Approach to MI Lesson Planning.

4.2.4 Brainstorm

After listing the approaches under each of the intelligences the teachers were instructed to think of the most appropriate teaching activities or aids under each of the approaches listed. Since these teaching activities / aids are the ones which make a difference in the actual classroom the teachers were reminded that they were

not to act in any haste. Rather, they were told to list all the activities / aids that they could think of in the group. In other words they were instructed to brainstorm in search of teaching activities / aids. From the listed activities/ aids as the result of the brainstorming, they were asked to choose the most appropriate and possible ones from the list. While thus making their choices of the activities / aids they were reminded that the activities / aids had to be clearly stated. If for example, a *game* under the Bodily-Kinesthetic intelligence was selected as one of the activities, then the everything about the game had to specified, such as, its nature, rules governing the game, number of players, duration of the game etc. Similarly if an *audiovisual aid* was selected then *the kind* and *the content* of that audiovisual aid had to be specified.

According to the teachers this was the most difficult exercise. They had almost no difficulty in suggesting an activity / aid but as soon they had to specify everything about that activity / aid they found themselves struggling. But the struggle brought about something that they were not aware of till then - clarity. As they struggled specifying the activities/aids chosen under each of the intelligences, they realized that their approaches were getting more and more focussed and refined. Although they struggled on the first day of remodelling exercises, later on as they carried on with the exercises they began to feel more confident about it.

4.2.5 Selection of the most appropriate approach and activity

Not all activities / aids could be utilized in a class of forty minutes. Therefore, from among the activities / aids listed only some of them could be selected for a class. The criteria for selection of the activities / aids had to be made whether or nor they were feasible and naturally fitting into the situation. In no way were these activities/ aids to be sources of distraction to the students. Also that the teachers concerned were comfortable handling them. Hence the teachers selected carefully only those activities/aids that were naturally fitting into the situation. But as these activities/aids were being selected the teachers kept in their minds that they selected at least one activity /aid per intelligence. The list of these activities in order of their implementation was prepared for the chosen topic for which the lesson plan was being made.

Now the materials for the remodelled lesson plan incorporating the theory of Multiple Intelligences were ready for writing the remodelled lesson plan. A sample each of such remodelled lesson plans in Physics, Mathematics, English and Social Studies is presented here below:

4.2.1   REMODELLED LESSON PLANS

Note: There are many kinds of lesson plans. However, so as not to confuse the teachers who would be preparing the remodelled lesson plans, the researcher has followed in preparing the following lesson plans, the headings and steps are according to the headings and steps being currently followed by the teachers of the school where the study has been conducted.

NO. 01 : PHYSICAL SCIENCE

           CLASS   : **VIII**

           DAY'S LESSON   : *FRICTION*

A.   General Objectives

   1.   To develop scientific attitude.

   2.   To grow in appreciation of the contributions of science.

   3.   To develop critical thinking.

B.   Specific Objectives : Students shall be able to

   1.   to describe the phenomenon of friction.

(aims at developing their Linguistic intelligence).

   2.   to enumerate and describe different kinds of frictions.

(aims at developing their Linguistic and Logical Mathematical intelligences).

3. to demonstrate the existence of friction.

(*aims at developing their Linguistic, Logical-Mathematical, Spatial, Interpersonal and Bodily-kinesthetic intelligences*).

4. to list the uses of friction.

(*Here it is aimed at developing their Logical-Mathematical and existential intelligences*).

5. to prepare models/charts depicting different kinds of frictions.

(*Here it is aimed at developing their Spatial, Logical-Mathematical, and Bodily-Kinesthetic intelligences*).

C.   Motivation

We shall begin the class with some fun! I need two volunteers. Two students come forward. They stand in front in the full view of the rest of the students.

Teacher :   (To the two volunteers) Hold each other's hand in the handshake position and pull as hard as you can. The two students pull at each other while the rest of the class cheer them on. After ten seconds the teacher asks them to stop. Then he takes a bottle, opens its cork, applies its content on the palms of the two and asks them to repeat the same exercise. The two go apart flying. The teachers asks the two:

BODILY-KINESTHETIC

- 98 -

Teacher : Can you tell us, why you two went apart flying?

Students : Because our hands were slippery.

Teacher : Very well. But can you explain it scientifically?

Students : May be because of what you applied in our palms. It looks like grease.

Teacher : Yes it is. But that is not what I am asking. Can you tell what happened exactly.

Students : No sir.

Teacher : Well then. That is what we are going to learn about today. You went apart flying because you had no grip. This grip is due to friction.

D. ANNOUNCEMENT

So, dear students, we shall learn today about *friction.*

E. TEACHING AIDS

Apart from the normal teaching aids in the classroom, the teacher uses self-made charts, objects and models.

F. PRESENTATION

Step 1 : The teacher

: explains the concept of friction.

: describes various kinds of frictions with examples.

: enumerates the uses (advantages and disadvantages) of friction.

: discusses the salient features of each kind of friction distinguishing them from each other.

Step 2 : **The teacher asks the students**

(to develop *their scientific, critical, and logical thinking*)

: when does friction occur?

: how does friction work?

: why is friction so important in life?

: which are the things/materials/compounds that either increase or decrease friction?

(The teacher corrects the incorrect answers and explains to them the above matter).

Step 3 : **The teacher** demonstrates the phenomena of friction with suitable diagrams, physical activities and exercises involving the students.

(a)   (b)   (c)
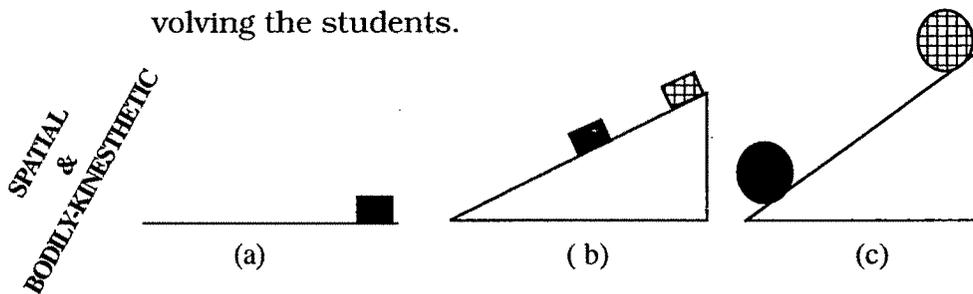
Activity 1. Keep your note book flat on the desk. Then place an eraser on one end of it. Now slowly lift the note book from the end where the eraser is placed keeping the other end resting on the desk itself. Explain what you noticed.

Activity 2. Keep your right hand horizontally with palm

opening upward on the desk. Place a piece of chalk/ marble (ball) in your open palm. Slowly lift your hand upwards keeping the elbow resting on the desk. Explain what happened to the chalk or the marble?

Activity 3. The teacher places a piece (1 x 1 sq. ft) of glass on the table. He divides the glass piece into three sections with three lines. The top section is left as it is. In the middle section he puts a little bit of water and to the last section he applies a little bit of oil. Then asks one of the students to write something on the glass with a piece of chalk, one section at a time. After he has completed writing on the glass and discussing the impact and consequences of friction in life.

Step 6 The teacher asks the students to write down in their note books

EXISTENTIAL

: how he/she plans to use friction to make his/her as well as other's life better.

G. RECAPITULATION

The teacher summarizes the lesson according to the Specific Objectives.

H. HOME ASSIGNMENT

1. Prepare one chart/model each on each kind of friction.

NO. 2 : MATHEMATICS

    CLASS   : VIII

    DAY'S LESSON   : AREA OF A TRIANGLE.

A. GENERAL OBJECTIVES

1. To develop scientific attitude.

2. To grow in appreciation for the contributions of mathematics.

3. To develop interest and love for mathematics.

B. SPECIFIC OBJECTIVES: The students will be able

1. to define a triangle.

(aims at developing Linguistic Intelligence)

3. to compare a triangle with a rectangle.

(aims at developing Spatial and Bodily-Kinesthetic Intelligences)

4. to derive the formula of the area of a triangle.

(aims at developing Bodily-Kinesthetic and Logical-Mathematical Intelligences)

5. To solve numerical problems on area of triangle.

(aims at developing Logical-Mathematical and Existential Intelligences)

C. TEACHING AIDS

In addition to the usual classroom teaching aids, a rectangular piece of thermocol sheet, a thermocol cutout of a triangle.

D. MOTIVATION

Teacher : Good morning dear students. In the last class we learnt how to calculate the area of a rectangle. Can any one of tell me what was the formula we found to calculate the area of a rectangle?

One student : Yes, sir. The area of a rectangle can be found by multiplying its length and breadth, that is Area = (a x b), where **a** is the length and **b** is the breadth of the rectangle.

Teacher : Very good! With the help of this, now let us see if we can calculate the area of a triangle.

E. ANNOUNCEMENT

Today, therefore, we shall learn how to calculate the *area of a triangle.*

F. PRESENTATION

Step 1: The teacher takes the thermocol sheet and with the help of a ruler gets one of the students to measure its length and breadth. He writes the measurements on the chalkboard. He then asks the students to calculate the area of the thermocol sheet. Students calculate the area of the thermocol in their note books.
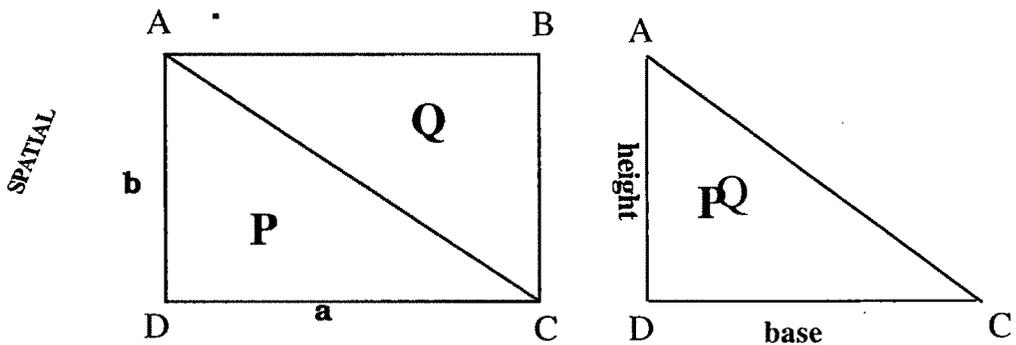
Step 2 : He takes the triangular piece of the thermocol and asks the students to find its area. Students struggle to calcu-

late its area.

Step 3 : The teacher takes the rectangular sheet of thermocol. Then with a knife cutting it diagonally and folding the two pieces on top of each other, shows it to the students. He then asks the students- what did you see? Students answer- two right angled triangles. Excellent!

Step 4 : The teacher explains the relationship between a rectangle and a right angled triangle with the help of diagrams on the chalkboard.

Area of the rectangle, (ABCD) = length **x** breadth

$$= DC \textbf{ x } DA$$

$$= a \textbf{ x } b$$

Area of the triangle, (ADC) $= \frac{1}{2}$ Area of (ABCD)

$$= \frac{1}{2} \text{ (a \textbf{ x } b)}$$

$$= \frac{1}{2} \text{ (base \textbf{ x } height)}$$

Step 5 : The teacher asks one of the students to come to the board and explain to the rest of the class the procedure of finding the relationship between a rectangle and a triangle. Also to find the formula for calculating the area of a triangle.

LINGUISTIC

Step 6 : The teacher draws a triangle on the chalkboard and asks the students to find the procedure for finding its area individually.

INTRA PERSONAL
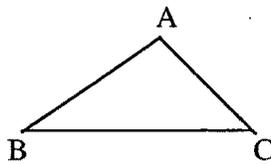
Students struggle to find the height of the given triangle. So the teachers asks the students to discuss in groups of five and find the height of the given triangle. Students fail to find the height of the given triangle.

INTERPERSONAL

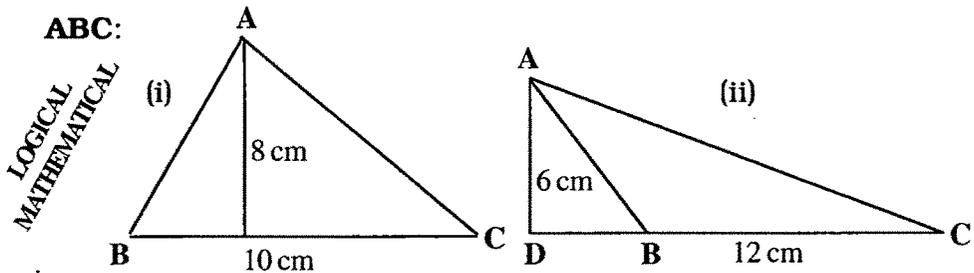**Step 7** : So the teacher explains to them the procedure of finding the height of a triangle.

i. choose the base of the given triangle.

ii. from the vertex **opposite** to the **base**, drop a perpendicular to the base. The length of the perpendicular is the height of the given triangle.

G. RECAPITULATION: The teacher asks the following questions:

1. How are a rectangle and a right angled triangle related?

2. How will you find the area of an equilateral triangle?

H. HOME ASSIGNMENT: 1. Find the area of the given triangles,

ABC:

(i) triangle with A at top, B and C at base, height 8 cm, base BC 10 cm

(ii) triangle with A at top, D B at base, height 6 cm, base DC 12 cm

LOGICAL MATHEMATICAL

No. 03: ENGLISH

CLASS : VIII

DAY'S LESSON : **ADJECTIVES**

A. GENERAL OBJECTIVES

1. To appreciate English literature.

2. To grow in love of English Grammar.

B. SPECIFIC OBJECTIVES : Students will be able

1. to define adjectives.

(*aims at developing their Linguistic Intelligence.*)

2. to recognize adjectives in a given sentence.

(*aims at developing their Logical Mathematical Intelligence.*)

3. to classify various kinds of adjectives.

(*aims at developing their Logical -Mathematical Intelligence.*)

4. to illustrate the use of adjectives.

(*aims at developing their Intrapersonal Intelligence.*)

C. TEACHING AIDS

Along with the usual classroom teaching aids, a chart showing the list of adjectives.

D. MOTIVATION

The teacher asks the students to closely observe for a minute or so everything in the classroom. Then he asks them to select an object that he/she observed in the classroom and write down at least three sentences about it. When all the students have written these, he asks two of them to read them aloud for the whole class. As they read them the teacher writes them down on the chalkboard as:

1. The chalkboard is green.
2. It is rectangular in shape.
3. There is a small duster kept in front of it.
4. There are four windows in the classroom.
5. These are smaller than the doors.
6. Those windows are open.

The teacher underlines the words green, rectangular, small, four, smaller and open.

Teacher　　: Can you tell something about these words?

One student : They tell us something about the chalkboard and the windows.

Teacher　　: And what are these, the chalkboard and the Windows, known as in English grammar?

Another student : These are called nouns.

E. ANNOUNCEMENT

Very good. Today therefore, we will learn about those kinds of words that qualify the nouns. In English grammar, these are called Adjectives.

F. PRESENTATION

Step 1.　　The teacher calls shows two pieces of chalks, one is full and the other is a small bit. Then he asks one of the students to describe the two.

Student　　: The one in the left hand is *small*, and the one on the right is *big*.

The teacher writes down the sentence on the chalk board. Then showing two pens, (of any two colours), he again asks another students to describe them.

Student　　: The one in your left hand is *black*, and the one in your right is *red*.

The teacher writes down the sentence on the chalk board.

Teacher　　: What are the words small, big, black and red doing?

Student　　: They tell us something about the chalks and the pens.

Teacher : Good! These words are describing the chalks and the pens. And we know that chalks and pens are nouns. Therefore, adjectives are the words that describe nouns.

Step 2 : The teacher writes down the following sentences on the chalk board and asks the students to identify the words that qualify the nouns in them:

1. He is an <u>honest</u> man.
2. India is a <u>large</u> country.
3. I ate <u>some</u> rice.
4. He has <u>no</u> money.
5. The hand has <u>five</u> fingers.
6. There are <u>many</u> shops in the market.
7. <u>These</u> mangoes are sour.
8. <u>Which</u> way shall we go?
9. <u>That</u> boy is taller than Jack.
10. <u>What</u> an idea!

Step 3. : Students underline the words that qualify the nouns in the above sentences on the chalkboard.

Step 4. : The teacher asks one of the students to explain to the rest of the class as to how the words, honest, large, some, no, five, many, these, which, taller, and what qualify the nouns in the respective sentences.

Student : Words such as honest and large tell us about the *quality* of the nouns. While words such as, some, no, five, many etc. tell us about the *quantity* and *number about* the nouns. Words such as *these, which* and *that* demonstrate/indicate about the particular nouns; the word *what* in the last sentence exclaims about the idea.

Teacher : Very good! Thus from the explanation given by you we learn that there are many kinds of adjectives. Then he explains to the class the various kinds of adjectives, namely:

1. Adjectives of Quality or Descriptive Adjectives.

   Example: (He is an **honest** man.)

2. Adjectives of Quantity

   Example: (He has lost **all** his wealth.)

3. Adjectives of Number or Numeral Adjectives

   i. Definite Numeral Adjectives

   Example: (There are **five** fingers in a hand.)

   ii. Indefinite Numeral Adjectives

   Example: (There were **many** people at the bus stop.)

   iii. Distributive Numeral Adjectives.

   Example: (**Every** student must work hard.)

4. Demonstrative Adjectives

   Example: (**These** mangoes are sour.)

5. Interrogative Adjectives

   Example: (**Which** way shall we go?)

6. Emphasizing Adjectives

Example: (I saw it with my **own** eyes.

7. Exclamatory Adjectives.

Example: (**What** an idea!)

Teacher : Now sit in groups of five and make a list of adjectives, at least ten, under each of the kinds of adjectives. Students begin to do the assigned work.

INTERPERSONAL

Teacher : Come back to your places. Take your school diary and open page number 12. Now let us sing the song, "One Day At a Time".

Teacher : Now identify the Adjectives and their kinds in the song.
Logical-Mathematical & Intrapersonal

G. HOME ASSIGNMENTS

Spatial
1. Prepare a chart demonstrating at least four kinds of Adjectives.

Musical
2 Write a stanza of a song that you know and identify the Adjectives in it.

No. 04 SOCIAL STUDIES

CLASS : VIII

DAY'S TOPIC : MAN & SOCIETY.

1. GENERAL OBJECTIVES

1. To appreciate the relationship between man and society.

2. To develop love for the society.

2. SPECIFIC OBJECTIVES: Students will be able

1. to define man and society.

(*to develop Linguistic Intelligence.*)

2. to list the reasons why man needs the society.

3. to list the reasons why society needs man.

(*to develop logical-Mathematical Intelligence.*)

4. to illustrate the relationship between man and society.

(*to develop Interpersonal, Intrapersonal & Existential Intelligences.*)

3. TEACHING AIDS : The usual classroom teaching aids.

4. MOTIVATION

Teacher : **Do you know the story of an eaglet?**

Students : Yes, Sir.

Teacher : Can anyone tell when and how did that eaglet come to know that it was an eagle and not a chicken as it imagined to be? Or perhaps, it would be better if some one narrates the story once again to the whole class.

Linguistic One student narrates the story to the class and also points out when and how the eaglet realized its true identity.

Teacher   : So, do you see that the eaglet realized its true identity when it came in contact with an eagle?

Students   : Yes, Sir!

Teacher   : Excellent! Let us then identify a child with the eaglet and the eagle with the society. What can you say, now?

Student   : A child develops into man in the society.

Teacher   : Very good!

5. ANNOUNCEMENT :

So today we shall study about man and the society.

6. PRESENTATION

Interpersonal The teacher makes the class to sit in groups of five and asks them to list the reasons why man needs the society. Students do the assigned task.

After the students have completed the task he asks one from each group to read out the list of reasons why man needs the society and writes them down on the chalkboard under the heading " **Man needs the society because**".

Teacher   : Get back to your places. When the students are seated

at their places he asks them; " Have you seen a bou-quet?"

Students : Yes, Sir!

Teacher : Why does it look so beautiful?

Student : It looks beautiful because so many different kinds of flowers are neatly arranged in it.

Teacher : Good! So is it with man. A child becomes a man fully developed and appreciated in a society. Now you may recall the definition of man given by Aristotle and appreciate it. "Man is a social animal".

Teacher : Now take a piece of paper and write down the reasons why society needs man.

Intrapersonal Students write the reasons individually.

After each one has completed the task, the teacher asks a few of the students to read out the reasons listed by them and writes them down on the chalkboard as they read them under the heading, **"Society needs man because".**

The teacher then summarizes the lesson by explaining to the students that just as man needs the society for his growth and development, so does the society needs man for its existence. Both compliment each other.

7. HOME ASSIGNMENT

Intrapersonal & Existential

1. How do you plan to make your society beautiful?

2. "Man cannot develop in isolation". Explain.

4.2.2 PREPARATION OF THE ACHIEVEMENT TEST

The second component of the instructional strategy was the preparation of the teacher-made achievement test incorporating the theory of Multiple Intelligence. The teachers were assisted in the preparation of an achievement test on the topic for which the lesson plan was made which included test items related to as many intelligences as was possible. A sample of the achievement test items prepared by one of the groups on the topic "FRICTION" is presented here below:

ACHIEVEMENT TEST

Full Time: TWO hours.   **Full Marks** : 100

Answer all questions. Figures in the margin indicate full marks.

Q. 1. Linguistic Intelligence   (4 + 6 + 5 = 15)

i.   Define friction.

ii. List at least five advantages and disadvantages of friction.

iii. Describe the principle involved in the use of ball bearings.

Q. 2. Logical-Mathematical Intelligence (12 + 3 + 7 =22)

i.   Differentiate different kinds of frictions clearly with suitable examples.

ii. Classify the following actions under different kinds of frictions: sitting, walking, skating, writing with a ball pen, skiing, movement of a carom coin.

iii. How can the efficiency of a table fan be increased?

Q. 3. Spatial + Bodily-Kinesthetic Intelligences (10 +10+ 8 = 28)

i.   Draw a diagram and explain the actions/forces involved in a static friction.

ii. With the help a suitable diagram explain the action of skating.

iii. Draw a diagram which depicts sliding friction and label it with various forces acting on it.

Q.4. Intrapersonal Intelligence (4 + 6 = 10)

i.   Is it possible to do away with friction? Why ?

ii. "Every human action is made possible because of friction", substantiate the statement.

Q. 5. Existential Intelligence (10)

i.   Should the phenomenon of friction be used to improve human living?

6. Naturalistic Intelligence (7 + 3 = 10)

i.   How can friction be utilized to safeguard soil erosion?

ii. List the frictionless tools/implements/machines, if any, used in gardening.

7. Presentation (5)

_____

Note:

While preparing the achievement test according to the theory of Multiple Intelligences it was borne in mind that although it is not necessary that there be test items related to all the intelligences, nevertheless there be as many of them as possible. As could be seen in the sample presented above, there are no test items related to Musical and Interpersonal intelligences. These two intelligences find their places in the act of teaching, which is the first component of the instructional strategy. Also that two or more intelligences may be combined in the same test item. The intelligences that could be combined together are the Spatial and Bodily-Kinesthetic intelligences. And as it is obvious, the underlying intelligence for all the test items is the Linguistic intelligence.

Apart from the teacher-made achievement tests, however, there are other ways of evaluating the learning of the students. Home assignment is one of them. During the intervention programme home assignments provided ample opportunities for evaluating the learning of students in other intelligences. Evaluations of students' learning according to Musical, Spatial and Bodily-Kinesthetic intelligences were achieved best through the home assignments.

The other important means of evaluation of the learning outcome of students is the classroom projects. This is where students were evaluated in their Interpersonal intelligence. Students in groups of three, sometimes of four, were assigned small projects. And they were evaluated together as a group.

4.3 CONCLUSION

The teachers constituting the sample were introduced to the theory of Multiple Intelligences and the process of developing an instructional strategy incorporating the theory of Multiple Intelligences. Then, assisted by the researcher, they went on to develop the instructional strategy , that is, to remodel the lesson plans as well as construct the teacher-made achievement tests according to the theory of Multiple intelligences.

** ** ** ** **