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4.0.0 Introduction

In the light of the discussion made in chapter III, and the implications drawn at the end of the chapter, a study was formulated to develop the integration stratagey and establish the integrational effectiveness of teaching skill. The evolution of the problem has been presented in the chapter I as a historical perspective of practice teaching in India. The chapter also ends with establishing the significance of the study and objectives to be covered during the course of this research study.

In the beginning of this chapter details regarding methodology, followed by achievement of objectives, have been briefly presented. The presentation is spread over four sections.

The first section will include the objectives of the study, formulation of research hypothesis and both, dependent and independent variables to be considered for the present study as well as the different tools both, prepared and adopted to be used during different stages of the study.

The second section of the study includes details regarding the developmental measures involved for developmental validation. The third section will elicit details regarding field tryout and experimentation. The fourth section will present the scheme of analysis generated to process the data.

SECTION - I

4.1.1 Objectives of the Study

The investigator basically aims at studying the process involved in the integration of teaching skills. In order to achieve this goal the investigation has been carried out through several distinct phases. These phases can be sequentially arranged according to their occurance and have certain specific objectives to realise. The specific objectives stated in Chapter I can be further recalled.

1. To develop a follow up stratagey for integration of teaching skills developed through the Indian Model of Microteaching.
2. To establish the validation of the stated stratagey in terms of class room teaching effectiveness.
3. To study the relative effect of stated variables including teaching experience, academic qualifications, academic merit, availability of free study time, attitude towards microteaching programme, attitude towards teaching in general and skill comprehension achievement.

4.1.2 Hypotheses for the Study

In the light of related literature reviewed and a logical analysis of the integration processes arrived at, a stratagey of integration has been developed and presented in the Section II. This does not require further formulation of hypotheses. For the achievement of objectives II and III, the following major research hypotheses were earlier formulated for the study. These research hypotheses, further fragmented into measurable statistical hypothesis,

during the analysis of data.

1. There will be a significant difference between pre-integration and post integration recording of skill component interactions, skill integration indicators viz., skill association, skill shift and skill dispersion obtained by skill interaction analysis category system, establishing the validity of integration stratagey.

2. There will be a significant difference between the pre-integration scores and post integration scores on, general teaching competency and teaching comprehensive effectiveness establishing the validity of integration stratagey.

3. There will be a significant difference between the two groups in terms of the integration pattern changes from pre-integration to post integration on skill component interactions, skill integration indicators viz., skill association, skill shift, and skill dispersion obtained by skill interaction analysis category system, when the two groups are formed on a variable. The variables considered are : teaching experience, academic qualification, academic merit, availability of free study time, attitude towards microteaching programme, attitude towards teaching in general and skill comprehension achievement.

4. There will be a significant difference between the group means of the two groups, i.e. post-integration scores on general teaching competence and teaching effectiveness comprehension scales, when two groups are formed on a variable and statistically equated on their post-integration scores. The variables are qualification, academic merit, availability of free study time, skill comprehension achievement, teaching experience, attitude towards micro-teaching and attitude towards teaching in general.

4.1.3 Variables under the Study

An important aim of research, be it experimental or otherwise, is to study the relationship between variables. In an experimental study the researcher has scope for controlled observations which makes it possible for him to study not just the relationship between variables but their cause and effect relationship.

The causal variables are the independent variables for the study and affected variables are termed the dependant variables. Though there could be several independent variables that affect the dependent variables of a study, there is a scope for controlled observation through sampling and research design, which helps the researcher to study one or more than one variables under study.

The major independent variable in the study is the integration stratagey'. This stratagey as it is meant here, includes all those instructional inputs that are identified and arranged under the training stratagey. The dependent variables are integration competency for teaching skills measured through general teaching competency scale, comprehension teaching effective scale, and skill interaction analysis category system.

Apart from mentioning the main variable, there are seven secondary independant variables which are identified as having significant relationship with the dependant variable.

The variables are qualifications, academic merit, teaching experience, teaching skill comprehension, attitude towards teaching, attitude towards microteaching, and free availability of study time. The required data for specifying the variables teaching experience, qualifications, academic merit and free availability of study time are collected from general information sheet. Data for attitude towards teaching, and attitude towards microteaching were collected from attitude rating scales. For skill

achievement test, a paper-pencil achievement test is used. The variables, graduates/post-graduates are dichotomic variables, whereas the rest are continous variables, The continuous variables are artificially dichotamised for the study. The details of tools have been presented at the end of this section.

4.1.4 Scope and Limitations of the Study

The study aims at establishing the validity of the strategey prepared for integration. The validation is limited to be tried out with a group of student-teachers using a pre-test - post-test design. The performance of the student-teacher as effect variable is measured through class room observation of student teachers teaching with rating scales and skill interaction analysis category system. The sample is limited to, English medium instruction - science student teachers stream of one year B.Ed. course. The sample size is further limited to thirteen students. The study limits, to study the effects of secondary independent variable to qualifications, free availability of study time, academic qualification, academic merit, experience in teaching, attitude towards teaching and attitude towards microteaching programme.

Measurement of class room teaching through only observational technique, application of single group design for experimentation, sample size of thirteen science student teachers, and the single try out are the limitations of the study.

4.1.5 Tools for the Study

This section on tools for the study discusses two types of tools that were used for this study. The first type of tools discussed are those which were developed exclusively for the present study. They include an interaction observation schedule for teaching observation called 'Skill Interaction Analysis Category Systems', an observation rating scale, Comprehensive effectiveness of teaching, an achievement test on the skill application, a reactionnaire to interview student teachers regarding their opinion on various aspects of the programme and a personal information proforma. The second type of tools discussed hereunder are those which were made use of but not developed for this study. They are, the Baroda General Teaching Competency Scale, an 'Attitude Toward Microteaching and an Alhuwalia's Scale for attitude towards teaching.'

Tools developed for the Study

A. Development of a class room interaction observational schedule in terms of skill components' Skill Interaction Analysis Category System.'

As the name indicates this is a classroom interaction recording tool. The tool requires the classification of all the observable behaviours of teacher performance into a few components and record the frequency of happening on a time scale line. This tool aims at measuring the amount of time spent on each observable teacher behaviours in terms of categories and the sequential occurance of categories in the form of patterns.

The tool is very much in line as Flanders Interaction Analysis Category System developed by Flanders. (1972). The FIACS category take into account the cognative, the affective and the psychomotor activities of the class room, whereas, the present tool categorise the teacher behaviours into skill and skill components.

Procedure : This involves development of categories of classroom teacher behaviours in terms of skills and skill components, testing the pool of categories for content validity and interobserver reliability. The construct validity will be inherent in the tool since the categories incorporated will be based on the microteaching skills developed and in use, which has the skills construct (Lalitha,1976,Rama,1978). The important stages while preparing the tool are discussed in the succeeding pages.

Development of Primary List of Categories : The first requirements for constructing this tool is to list out all the observable skill components from the skills to be practised through microteaching for the purpose of using in a regular class. The list was critically studied for its distinctiveness and validity. However, the list comprising components of all the skills formed and validated for studying the inherent coherency was found to be of higher order. Keeping in mind the skill list, the investigator observed a few classes, observations were made every five seconds as a teaching move to diagnose any other

observable teacher behaviours that did not fit within the listed ones. After 8 class room were observed, a few additional skill categories were added to the list. The teachers observed in these 8 classes were experienced science teachers practicing teaching in their respective schools. Each of the new categories were defined so as to differentiate them from each other and also for their meaningfulness validity.

Screening the Primary Pool of Categories : The pool of categories obtained were exhaustive and numerous. They covered not only the skills components that were to be observed for integration, but other categories too. The final tool was envisaged to have three types of categories viz. (i) Important skill components out of those under microteaching practice, that determine the pattern formation and effectiveness of class room teaching when observed in for fortyfive minutes class room. (ii) Important skill components of those skills which may not be under microteaching practice, but occur in classroom teaching and (iii) Other behaviour that may not be covered as skill components in microteaching skills but essentials in class room teaching. To achieve the tailoring of categories within the preview of objectives stated for the present tool, five judges were asked to opine on inclusion or disclusion of the categories selected for the purpose. The judges comprised five teacher educators who have more than three years of teaching experience in teacher education with

doctoral research competeney to their credit. They were provided information regarding purpose of the tool and a criteria for either sustaining or discarding the categories as follows :

'The investigator intends to construct a 'skill interaction analysis category system tool,' for observing the class-room teaching in the form of interaction, similar to that of Flanders Interaction Analysis Category System. The purpose of the tool is to observe the integration of teaching skills namely, skill of probing questioning, skill of explanation, skill of illustrating with example, skill of stimulus variations, skill of reinforcement, and skill of blackboard writing. The investigator requests you to compare this list of categories and finalise the categories to be included in the tool. An exhaustive list of primary pool of skill components is enclosed along with the skill instructional material for your reference. The categories selected after observing the lesson proceedings are required to be written on the last page provided for the purpose. A suggestive criteria has been provided to help formulate the final decision.'

1. The tool has to meet the need for the study in terms of integration of teaching skills viz. skill of probing with examples, skill of stimulus variation, skill of reinforcement and skill of blackboard writing to meet this requirement the tool should necessarily include categories which represent these skills.

2. The tool will include teaching behavioural observable during a teaching process, which is necessary to make teaching meaningful
3. In case a category is included which is not presented in the list, it should be further well defined as presumed by the compere
4. If necessary, closely related skill components can be clustered to form a behaviour unit, similarly, any skill component can be subdivided further, if necessary.
5. The final list of categories should not be more than fifteen in number as it would create observational problems. However, one can suggest additional extra components with a priority sequence.

Analysis of Judgement : The evidences collected by the comperes were analysed for preparing a tryout tool. The verdict of the five compares were listed in priority. A list was prepared of all skill categories mentioning five priority numbers to each skill component. The priority numbers for each skill component were averaged to form a final priority number. The skill components having no priority number by any of the compares were discorded. These items, wherein the four comperes gave priority number to a particular component and the other did not, were considered. In these cases sixteen number as the priority was given for the list wherein they were not. If more than two compares did not opting were rejected. The final list so formed was rearranged by giving the first priority to the lowest average number. The so formed fifteen components list was prepared and further discussed with the same compares for further refinement. The so formed category list was ready for the final tryout.

First Tryout : The tool prepared had sixteen categories numbered one to sixteen. The toolw was then tried out in six local schools with eight teachers for a duration of 32 lessons. The analysis of the data provided additional information to redefine the categories and reduce them in number. The final tool prepared has eight categories. Questioning, explaining, student response, blackboard work, repeating and reproducing dictations, attending behaviour and reading, managerial work and stimulus variation. The tool has been presented in its final form in appendix

Final Tryout for Establishing Reliability : Investigator selected two researchers who had sufficient background of class room teaching as observers. They were oriented about the purpose of study and the tool tryout. They were provided with the tool literature and discussion on each category was conducted. Both the investigators practiced the code numbers associations with the specific categories. This self memorising practiscing were then followed by the audio tape practice. In this session the competes were requested to listen to the taped lessons and record the audio categories. Then the coding obtained was compared to understand the reasons for differences. After the sufficient practice to attain the speed and accuracy the observers were asked to compere real class room teaching.

The two comperes sat throughout the class hour to hear and observe the participants. At the end of an each five seconds

interval the observers decided seperately regarding the category best represented. Whent the communication between the comperes stopped they wrote down that category number while simultaneously assessing communication in the next five seconds interval. This procedure continued at a rate of 12 observations per minute. The tempo was maintained as steady as possible. Thus observed coding made a sequence of numbers written in rows and column of 12 X 35 matrix. Each rwo represented one minute of the class room teaching having 12 numbers. The two observers did not communicate in between till the last minute of the class. Similarly, the observations were done by two observers for 25 class hours.

The reliability was determined by the method proposed by Scott's Method. This reliability index is unaffected by low frequencies, it can be adopted to percent figures, it can be estimated more rapidly as is more sensitive at higher levels of reliability. The coefficient value calculated for the present study was 0.81. This reliability could be considered to be reliable measure of the observers categorisation according to Scott.

B. Teaching Effectiveness Comprehensive Rating Scale :

This rating scale was prepared based on the findings of the study 'Differences between effective and ineffective teachers' by Kamla Arora (1978). The study has listed six characters as indespensable which are (i) class explanation of content (ii) clear presentation of subject matter (iii) systematic organisations of

subject matter (iv) Ability of expression (v) Skill in stimulation of interest and motivation of students and (vi) planning and preparation for lesson. The detailed procedure followed by the investigator to arrive at these characters, are as follow.

A Teacher Characteristics Description Form (TCDF) was developed after deep study of relevant literature, viz. educational books and research reports, describing characteristics which effective teachers ought to have or were found to posses such characteristics were listed and rearranged under different headings, namely, personal characteristics, professional characteristics, academic background and scholarship, pupil-teacher relationship, class room management and discipline, and miscellaneous. Each characteristic was amply explained in the form for clear understanding of the respondent. In all, 51 characteristics were listed. Against each characteristic there were columns under the headings : (1) Indispensable; (2) Desirable; and (3) Not important. The respondents were requested in a seperate note accompanying the questionnaire to express their opinion in respect of each characteristic by checking (✓) in column (1) if they considered that the characteristic was indespensable for an effective teacher; in column (2) if they regarded the characteristic desirable for an effective teacher and column (3) if they thought that the characteristic was of no importance in so far as teacher's effectiveness was concerned. For

further clarification, the terms 'indespensable', 'desirable', and 'important' were also defined in the note. An indespensable characteristic, implied that without it teacher could not be an effective teacher.

After necessary tryouts and modifications the finalised TCDF was given to one hundred respondents; twenty each of (i) principals (ii) teachers, (iii) teacher educators, (iv) supervisors, and (v) researchers.

From an analysis of data collected through the TCDF, the results showed that, out of 51 characteristics listed and described in the three were considered not important by a majority of the respondents. Of the remaining 48 characteristics, 12 were considered indispensable and 36 desirable for an effective teacher. Out of 12 indispensable characteristics 6 were found related to class room teaching.

In the present study these indespensable six characteristics of ~~the~~ class room teaching were taken as the item to formulate a rating scale. Thus the 'Teaching Effectiveness Comprehensive Scale' constitutes six statements with ratings ranging from 0 to 7.

(c) Skill Comprehension - Achievement Test on Skills : This is a paper-pencil test prepared to obtain student-teachers achievement of 8 teaching skills under practice. This test requires content validity as the basic requirement. The objectives of the test were to measure their performance through a performance test on the application

of skills, understanding of skills and also at knowledge level. To assure content validity a blue print matrix was constructed considering on one side the objectives level dimension and skill contents on the other. Efforts were made to cover application level items for all the content aspects. In case of content where application is, not the purpose suitable understanding and knowledge level questions were set up. Herein it is presumed that the application level items subsume understanding and knowledge levels. The detailed test is presented in the Appendix C . The test has eight major questions. It consist of recalling all components of seven skills at the knowledge level. Necessary care is taken to cover all the components at the understanding level also. Application items were to apply the knowledge in different examples and to find out faults from given situations. All the items are objective type and require writting one or two sentences in majority of the cases.

(d) Interview Questionnaire for Student Teacher Reactions :

The purpose of interview questionnaire was to get the reactions of student-teachers on the different components of the integration stratagey. The field tryout of the study will be with a small sample of fifteen students. The student-teachers is an adult group and will be able to provide their personal reactions on various aspects of the programme. Taking into consideration the two characters namely, sample size and nature of sample it was decided to personally interview all the student

teachers with the help of open ended questions.

The schedule has Part A and Part B. The first part has emphasized on the simulated training aspects whereas the second part on real class room practice. Part A has five subsections covering aspects training material, interaction sessions, lesson planning, practice teaching, and observation-cum-feedback sessions. All the five sessions together comprise 50 questions. Similar to Part A, the second section has five sub sections covering aspects, controlled class room practice, simulation and diagnostic sessions, unit planning, and co-curricular activities. The responses of the student teacher were to be represented in the descriptive form. A copy of the questionnaire is presented in the Appendix

(E) Student Teacher General Information Data Sheet :

A general information proforma to get the bio-data of each student-teacher was developed. The sheet sought information regarding their academic and professional growth since secondary education stage, their age, sex, merital status, teaching experience, proficiency in English language, present service conditions etc. The sheet was of the fill in the gap nature. The purpose of the sheet was to get learners characters. The Bio-data sheet has also been presented in the Appendix

Used Tools

(F) Baroda General Teaching Competency Scale (BCTCS) :

This was developed by Passi et al. (1976). This tool defines 'teaching competency' as an effective performance of all the observable teacher behaviour that brings about desired pupil outcomes. Thus competency measurement involves identifying all the teaching skills constituting the entire teaching task and making observations on the effectiveness of performance of each of those teaching skills.

There are 21 items related to 21 teaching skills which encompass the entire teaching - learning process in the class room. The items are such that they are centred around teacher class room behaviour in relation to pupil behaviour. The various teaching skills included are related to objectives of the lesson, content selection, content organisation, selection of audio-visual materials, introducing fluency of questions, use of probing questions, explaining, illustrating with examples, stimulus variation, use of silence and non-verbal cues, increasing pupil participation (Items 12 and 14), pausing, use of blackboard, achieving closure, giving assignment, class room evaluation, diagnosis of pupil difficulties, recognising attending behaviours and maintaining class room discipline.

It is a seven point scale ranging from 'not ata all' with a scale point one, to 'very much' with scale point seven. The

scale is standardised after having been administered to a group of one year B.Ed. course students. The classes observed were of fortyfive minutes duration following real class room teaching by trained observer. The reported inter observer reliability coefficient for the scale between trained observer range from 0.85 to 0.91. (Passi and Lalitha 1979). The scale has both content and factorial validity (Ram, 1980). The scale is presented in Appendix

(G) Ahluwalia's Teacher Attitude Inventory :

This inventory is prepared by Ahluwalia and others (1970) as a project work at Banaras Hindu University sponsored by NCERT. The inventory is a 90 item Likert instrument, consisting of six sub scales. Each scale has fifteen statements that pertain to a particular aspect of prospective teachers' professional attitudes. The six aspects dealt within the inventory are attitudes towards (i) Teaching profession (ii) Class room teaching (iii) Child centred practice (iv) Educational processes (v) pupils and (vi) Teachers.

As many as 150 items, twenty five on each scale were tried out on a sample of 1402 prospective teachers, students of B.Ed. and L.T. classes of different secondary teacher training colleges of the five Hindi speaking states, namely, Uttar Pradesh, Haryana, Madhya Pradesh, Rajasthan and Bihar. Of these ninty psychometrically 'good' attitude statements; fifteen on each subscale were selected, which constituted the final form of inventory.

Out of the ninty items, fifty six are in positive declarative form and thirtyfour of them are in negative form. As many as fortythree items are meant to assess favourable attitude and fortyseven the unfavourable attitude.

Each item, alternative has been assigned a weight ranging from 'four' (Strongly agree) to zero (Strongly disagree) for favourable items and from zero (Strongly agree) to four (Strongly disagree) for unfavourable items. The attitude scores of a subject is the total of item scores for all the six sub-scales. The theoretical range of scores is from 'Zero' to 360. With the higher score indicating the more favourable attitude towards teaching.

The corrected split half reliability coefficient for the inventory was found to be 0.65 (N = 239). The test-retest reliability coefficient after the interval of three months and 9 months were found to be 0.58 (N = 102) and 0.64 (N = 290) respectively. An appraisal of item validity was made through the application of 'known groups' and 'stimulus groups' technique and the resultant validity coefficient were found to be satisfactory. Norms have also been developed for the five Hindi speaking states on which the inventory was standardised.

(H) Attitude Towards Microteaching Programme - A Rating Scale :

This scale was used to measure the attitude of student teachers towards microteaching programme. The scale is prepared by Passi et al. (1976). The scale was widely used during the first and

and second National level projects undertaken by CASE (1977) and Indore (1979) respectively. The scale has 32 items on different aspects of microteaching programme. Six items of the 32 are unfavourable items which are located randomly in the scale. Each item is assigned a weightage ranging from '5' Strongly agree to '0' Strongly disagree for favourable items and from '0' Strongly agree to '5' Strongly disagree for unfavourable items.

SECTION - II

4.2.0 Development of Integration Stratagey

Systematisation of training / instruction at any level of education has certain pre-determined objectives to achieve. These predetermined objectives are spelt out in behavioural terms and the aim of systematisation is to achieve these behavioural outcomes as efficiently as possible, under given instructional settings. A major component of the training setting which more or less determines the behavioural outcomes is the content out line. Thus, any attempt at systematisation of training begins with preparing the content outline and enlisting behavioural outcomes in the form of behavioural objectives, the terminal behaviours may encompass all the three domains of personality, viz. cognative, affective and psychomotor. It is needless to say that one single method of training cannot achieve all the behavioural outcomes. As it has been

brought out in Chapter II of related literature, the trend is to have a training stratagey with various suitable techniques for achieving integration. For the present study, developing an integrated stratagey specifically to be used as post-microteaching programme in Indian context, when student teachers have practised seven skills through the Indian Model of Microteaching viz. Skill of writing objectives, skill of explaining, skill of probing questioning, skill of illustrating with example, skill of stimulus variation, and skill of reinforcement.

This section on development of the training stratagey deals with the development of software for different phases of stratagey. It is with an effort of forcing an external logic on the presentation that the parts of this section are sequenced. Thus, before the presentation of software for the integration stratagies phases, there will be a discussion on the stages of development of training stratagey namely, identification of general training objectives, preparation of content outline listing the terminal behaviour, and preparation of testing measures.

4.2.1 Identification of General Objectives

Attempts at identifying general objectives for stratagey for integration were done in two specific ways. One, consultation of literature on the integration stratagey, and two review of the objectives formulated for general teaching

effectiveness by different studies. In most of the integration stratagey reviewed there was no attempt, whatsoever to provide the general training objectives for the integration stratagies. It was with this background that a new set of general objectives related to the training stratagey were arrived at. Before the actual presentation of the general objectives the target population for which these objectives are formulated has been defined.

This training integration stratagey has been formulated for those who aspire to transfer their skill competency acquired through the microteaching programme to real class room teaching for effective teaching. Before entering the training stratagey they already have satisfactory level of competency in at least seven skills viz. skill of writing objectives, skill of explaining, skill of probing questioning, skill of stimulus variation, skill of reinforcement, skill of illustrating with example and skill of blackboard work. The entering trainees have a basic degree in science courses. Apart from this degree and certain general cognitive abilities expected of graduate students like comprehending verbal presentation in English and able to speak in English, the course does not presuppose any specific entering behaviour of trainees from the content point of view.

General Objectives :

1. The trainees will acquire the knowledge and understanding of the facts and principles provided to them in the integration stratagey.
2. The trainees will develop an ability to apply their knowledge and skill competencies to class room teaching.
3. The trainees will develop their own patterns of teaching with the acquired skill competencies for applying different class room situations.
4. The trainees will develop an understanding of pupils class room behaviours by analysing their class room responses.
5. The trainees will be able to organise instructional experiences for science teaching to achieve different types of objectives.
6. The trainees after going through the stratagey on integration of skills, will have a positive attitude towards teaching.

4.2.2 Preparation of the Content Out line

The content for integration stratagey is a novel idea by itself. None of the studies referred to in the literature provide any training content material. All the stratagies of integration so far available have stressed on techniques and no much importance is provided in creating structured material. On the basis of guide lines derived in chapter III the investigator listed the type of content required for the training. The content material was discussed with three experts who

had experience in microteaching training for not less than three years.

Accordingly, the content was organised under six headings representing the six phases of stratagies. The six content blocks identified has been presented in the following :

UNIT I : Use of Questioning and Explanation in Class room teaching.

1. Types of questions in class room teaching.
2. Modes of explanation in classroom teaching.
3. Questioning and explanation patterns in teaching.
4. Steps for pattern developments.
   - (i) Developing main questions for a lesson
   - (ii) Developing an ability to probe and use other questions depending upon the situation.
   - (iii) Identification of situations in interaction for effective explanations.
     - (a) Pre-setting the background for interaction.
     - (b) To introduce new words, statements, and phrases.
     - (c) Post interaction explanations.
     - (d) Presentation of summary.

UNIT II : Use of Blackboard in Classroom teaching

1. Blackboard as an effective instructional material
2. Different types of blackboard work and their management
   - (i) Important words
   - (ii) Main teaching point
   - (iii) Diagrams

(iv) Flow charts
(v) Student Responses
(vi) Marginal Work

3. Postures for blackboard work

4. Selection of different blackboard work for a lesson.

UNIT III : Use of visual aids in class room

1. Types of visuals available for class room teaching.

2. Selection of appropriate visuals for class room.

3. Chart as a visual centre for class room interaction and skill pattern.

4. Planning for demonstrations

5. Steps involved in demonstrative classes.

UNIT IV : Scientific inquiry as a method of teaching science

1. Role of a teaching method in class room teaching.

2. Method and skills as complementary components of teachings

3. Inquiry - a method of teaching science

(a) Generating an issue in class room

(b) Defining the problem

(c) Evolve alternative ways of solving

(d) Arriving at solution

(e) Generating related applications and assignments

UNIT V : Personalisation of Reinforcement

1. Reinforcement as a value statement

2. Teacher's personality and reinforcements

3. Excessive use of reinforcers and their problems

4. Effects due to misuse of reinforcers

5. Reinforcers as a devolving relations between teacher and student groups.

UNIT VI : Teaching skills as a function of class room variables.

1. Teacher behaviours and their relations with class room conditions.
2. Type of the objectives to be achieved and in relation to teaching skill patterns.
3. Learners character and its relation to teachings skill pattern.
4. Type of content and its relation to teaching skill pattern
5. Evolving teaching patterns in relations to the specific nature of class room.
6. Role of teacher in formations of skill patterns at planning stage and at implementation stage.

UNIT VII : Diagnostic Stage Remedial Classroom Behaviours practice.

UNIT VIII : Extension of teaching beyond class rooms.

Project 1 : Procedural details of conducting science exhibitions related to their academic topics.

Project 2 : Procedural details of organising science quiz for different grade students.

Project 3 : Procedural details of organising guest lectures for science topics.

Project 4 : Procedural details for organising science field works for material collections and field observations.

Project 5 : Procedural details for preparing and conducting science activity oriented assignment.

4.2.3 Listing the Terminal Behaviours

On the basis of the detailed [illegible] content outline and the course objectives arrived at, the terminal behaviours to be achieved through the training stratagey was listed. The terminal behaviours provide the target for directing the instructional efforts. The present study aims at developing integration ability, mainly concerned with application level. The terminal behaviours were all set at application level. The terminal behaviours classifiable under the three categories of knowledge, comprehension and application, have hierarchial relationship. The ability to comprehend presupposes acquisition of relevant basic knowledge, and the ability of application presupposes the earlier two abilities (Dave 1976). Eventhough the present stratagies are not centred for understanding and comprehension level categories it has to necessarily pass through these intermittant categories to achieve the application level. The actual list of terminal behaviours has been provided in Appendix

There are no specific criterion tests prepared for testing the learning out comes at each stage. This is due to the fact that nature of learning is, performance in the sense, application oriented. The observers and supervisor have to observe the practising student teacher during his exercise and judge the level of achievement attained, which will be revealed to him during the feedback. Moreover the type of exercises are continuous, and a particular exercises practised before will repetatively occur during his forthcoming exercises. The integration ability

has to be taken as a gestaltic out put of all the inputs at the end of the stratagey. The interim tests become very essential when the terminal behaviours are listed at all the three category levels, which is not in the present study.

4.2.4 Procedure for Selecting Method and Media for Different Terminal Behaviours

The effectiveness of a programme to attain the set objectives depend on the content outline selected and the techniques involved in presentation of the content. The method and media have to be selected on the criteria that, the extent of its competency in achieving the set objectives, the availability of resources in adopting the specific media and the time involvement. For the present study, the inputs located for integration, hypothesized as suitable inputs is presented in chapter III were judged and matched at each terminal behaviour. Besides this a pilot combination of content part, technique to be adopted, and mode of content presentation were framed. The findings of previous studies were taken into consideration while selecting the nature of feedback, discussion session and written material. There is no literature available with reference to the different simulation techniques to be adopted for integration stratagey. The logical reasoning and general finding available from other areas were the basis in selection. The pilot sequence programme framed was presented to three experienced educational technologists who had at least three year experience in microteaching programme

at the teacher education level. The selected method and media were further moderated as per the suggestion. The so framed sequence of programming is presented in the Figure
The major inputs selected were written instructional materials at each phase, live demonstrations, lectures, discussion, simulated practice of teaching, extemporary practice in simulation as modified in basket technique, controlled real class room teaching, and field work.

4.2.5 Development of Software for Individual Phases of the Integration Stratagies

Software development for the seven instructional stratagies, is viewed in terms of development of instructional material for the components of the stratagies. The use of the term 'Software' is in line with the terminology of educational technology and should be taken to mean as the specific verbal material of an instructional component of a stratagey. However, apart from the teacher no other hardware has been used for conducting or handling the software. The foregoing pages of this section present a brief discussion on the procedure adopted for developing the software for each component. Also presented in the concluding pages of this section is a discussion on the sequential arrangement of these components for training.

As a first step towards development of material, the sequential exercises that are to be practised were sequenced. Each unit was represented through a sequenced table along with the decided method

and media. The purpose of these tabulations were to arrive at a sequential arrangement of different exercises to be covered under each unit, so that, the flow from one exercise to other becomes smoother for presentation. The completed sequential arrangements are presented into seven units in the following pages as well as in Appendix I to Q. Each exercise formed a single comprehensive sub unit for which software were developed with three basic head lines viz. objective of the exercise, theory of the exercise, mode of exercise, and example for exercise. Following are the details on each of these aspect.

Objectives of the Exercise : In this phase the expected behavioural changes were presented. This will help the student-teacher to concentrate in the direction set for the exercise and focus his effort accordingly.

Theory of Exercise : In this phase the theoretical knowledge is presented in the form of descriptive notes. The description includes meanings of new concepts, explanation regarding their importance need and their use in class room teaching practice. This part of the material expects the student teacher to read thereby and acquire the knowledge to comprehend.

Mode of Exercise : To acquire the particular ability the student has to practice. The detailed procedure of practise to be carried is presented along with the examples. In this phase

also includes information regarding role of student-teachers as teacher, as peer, as observer, and as feedback provider. The examples presented are all from science discipline. The science content selected to prepare examples is from the secondary school text books. This phase will help the reader to be familiar with the type of work he will be doing before he comes to practice.

4.2.6 A Laboratory Tryout

In order to know the appropriateness of the language and the content from a learner's point of view, the developed programmes were given to a science graduate who had neither undergone B.Ed. course nor had teaching experience of any kind. From their maturence and prior qualification they were at par with a teacher trainee for whom the programmes were developed. With certain minor changes made in the language of the programmes, the programmes were ready for use during the experimentation. All the seven programmes in their final form have been presented in Appendix

4.2.7 Format of the Integration Stratagey

The stratagey is phased into seven stages. Each stage has a specific purpose. The sequencing of phases is structured and graded in consideration with the skills practised during microteaching. The stratagey is a post microteaching input. The stratagey presumes that, the student teacher before entering the stratagey will be developing skills of teaching viz. skill of probing questioning, skill of explaining, skill of illustrating with examples, skill of stimulus variation, skill of reinforcement, skill of writing on blackboard

and skill of forming instructional objectives, through the Indian Model of Microteaching as presented in the Description of Introduction Section 1.6.5. The stratagey is basically evolved for training in integration of teaching skills for science student-teachers. Stratagey along with the training material are presented in the Appendix I to Q. Following are the eight phases involved in integration stratagey :

Phase I : Basic Interaction Structures in Class Room Teaching;
(Use of questioning and explaining skills)

Phase II : Personalisation of skills of reinforcement for Class room Teaching.

Phase III & IV : Media in class room teaching
(Background management and A.V. materials use in class room teaching)

Phase V : Methods of teaching complementary to skill interaction structure
(Inquiry Approach)

Phase VI : Variations in classroom conditions and its relation to skill interaction in classroom teaching

Phase VII : Diagnostic remedial teaching practice in simulation

Phase VIII : Acquaintance to co-curricular activities related to classroom teaching.

Following is the brief explanation about the content in each stage and techniques applied in the training situation.

Phase I : Basic Interaction structures in class room teaching
(Use of questioning and explaining skills)

The emphasis in this phase is on formulation of the basal structure of interaction for the period as main interaction components.

doing so student-teacher requires additional information about different type of questions usable other than probing. Similarly, they also need to understand variety of explanations such as short term - long term, informative, illustrative, etc. The student-teacher will be provided with orientation and written notes on these aspects.

The group will analyse a few lesson plans into their sequence of skill occurance. The lessons will be observed by student prior to the analysis. The discussion will centre upon the possible reason of selecting a specific sequence of explaining and questioning and its effectivity in achieving pre-set instructional objectives. The discussion arrive at a few salient features as conclusion, wherein student teachers realise that, class room teaching may involve pure explanatory form of lecture to a completely discussion oriented with questioning to its fullest form. The extent of the skill occurance and their sequence depends upon the need of class room teaching like, type of objectives, time availability, learner character, a type of content etc. A complete instructional material package is provided to student teachers regarding different interactive units which can be used in class.

As a practical exercise the emphasis is more on formation of effective patterns and adapting them to suitable content extemproraly. The practice exercises are not in the form of microteaching units. Each teacher trainee will take a turn to the teaching platform and tryout a few content context without any

written planning. In the later phases student teachers are given on the spot teaching content and will try teaching using the interaction teaching pattern. This practice can be compared to the inbasket technique adapted for developing decision making ability in management trainings.

A few of the contexts that were specifically practiced are introducing new words, and concepts to class during teaching, interaction styles when learner provide contradictory responses, interaction styles when learners provide variety of responses, interaction styles for summarisation of concepts etc.

During the practice the student teacher may use any skill freely unlike any microteach session. The teach sessions were emphasized for totality of teaching. The teaching was evaluated in terms of teaching patterns potentials to achieve the lesson objectives.

Phase II : Personalisation of skill of reinforcement for class room teaching

The purpose of this phase is to provide experiences in using the skill of reinforcement in class room in an integrated form. The technique applied here is a discussion session to critically analyse every student teacher's previous teach sessions in terms of different reinforcement they have used. The discussion will aim at discovering that reinforcement is a value oriented statement for recognising the learners responses in class room. All most all behaviours that teacher uses in a class room to some extent act

as reinforcer statements. The values prescribed in reinforcive behaviours change from teacher to teacher. For instance, the praise given as 'good' by one teacher may not necessarily mean the same for other teacher. There cannot be a standard set of reinforcement for all. One has to select the rewards usable for class room teaching suitable to his personality. The group will provide feed back about the use of reinforcement to each one according to their individualised class room teaching tempo. This phase has no teaching practice. A few video/audio lessons of variety of lessons with reference to the reinforcement we were provided before the discussion.

Phase III and IV : Media in Class Room Teaching (Black board management and A.V. Material Use in the Class room teaching)

This phase has two parts. The first one was on the Blackboard management during class room teaching, and the other on the use of audio-visual material during class room.

During the first part, student teachers were provided instructional material, pertaining to black board management. The material was additional information, which was new to them, and was not a repetation of material from skill of blackboard writting. The material emphasized on certain decision making regarding what to write, when to write and where to write. The material specifically emphasized on forming key conceptual teaching points and presenting on black board new words, numerical aspects keeping in account black board spacing for teachers

planned B.B. work, incidental rough work and students work. The second aspect of material emphasized drawing i.e. How charts on development of concepts, representation of concepts in simple single line diagramatic form and use of colour chalk.

The student teacher would have to go through the material required for practice the next day, they would further discuss the read material and then practice one by one using one teach concept. The teachers were basically asked to develop a concept through flow chart and explain along with developmental work on black board. Similarly, they would be asked to summarise the class room teach content on the black board in terms of points. The emphasis would be on his decision about content selection to be written on the blackboard, his timing, form, and opening. Each teach exercise would be followed by the feedback session. The plan for teach session was to encourage mental planning before proceeding to actual practice in the class room.

During second part of the teaching phase the students were similarly provided information of using charts, models, demonstrations, and experimentation. The material was further discussed in class room. Each student would have a concept teaching exercise of teaching with charts and teaching with models, demonstrations or experimentation. Each of the lessons would be discussed as feedback. Wherever necessary student-teachers would be provided more practice depending upon their individual competency.

Phase IV : Methods of teaching as complementary to skill interaction structure

In this phase the role of teaching methods in sequencing is emphasized. During this phase student teachers are provided with instructional material which includes different commonly used methods in teaching. The student teacher will discuss the material at length. They will view a few audio-film lessons to study the methods followed and their relation with objectives, skills and teaching process. The student teachers will also be given live demonstration of method used in teaching and planning.

In the present study, the investigator has decided to prepare the integration stratagey for science student teachers. This essentially necessitated to select methods of teaching related to science subject. The inquiry method of teaching is considered highly suitable for science teaching and is been intensively used in teacher training. The method has flexibility of using skills, but emphasizes on both long term objectives of class room science teaching like development of scientific method, scientific attitude and short term objectives like acquisition of knowledge, its understanding and application. Because of the methods competency in covering broad range of science objectives, the method was intensively used. However, it should be noted that, the method can be replaced by other suitable methods of teaching depending upon the subject to be taught and objectives of the lesson. The main emphasis would be critically study the relationship

between sequencing of content, and deciding about the skill interaction of class room.

Student-teacher will be asked to plan at least two full length classes. Their plans will reflect in detail the moves that concentrate on the method of teaching applied and their competency achieved at planning stage. Each student's lesson plan will be screened for suitable guidance. The student will understand through guidance the various teaching moves, skill interaction pattern, content sequencing to great extent during the planning stage. Practising with peer learners in simulation and feedback in the form discussion will be the last step of this phase. The lessons will be centred on a specific single concept. The time taken by the teacher at teach session and other peripheral constraints will be overlooked. The method here is considered as sequencing of content and teaching techniques following the specific guiding principles, set for the method.

Phase VI : Variations in classroom conditions and their relation to skill interaction in classroom teaching

During this phase student-teacher enters the real class room, with deliberately regulated controls on specific variables. In the beginning the student teacher is provided with instructional materials regarding different variables of class room that affect the interaction and teaching. The variable emphasized are, heterogenity of students in terms of sex, achievement, age, SES background, classroom variation regarding availability and non-availability of A.V. materials, variation in teaching due to type of content and

objectives, and finally variation due to different standards. When these variables occur in different combination and ... interact around the teaching content the uniqueness of the class room evolves. The student teacher should be sensitive to these variables and teach accordingly. A discussion session on all these variables and possible ways of teaching will also be conducted. The student teacher observation of live class teaching during their visit will be the ground data for this discussion.

During the practice session each student teacher will be asked to plan for few classes differentiating one class from the other on a variable and gain experience by teaching. For instance, a student-teacher selects eighth standard class to teach a few concepts from the unit on heat. He will divide the class of fifty students in two groups, one having all high achievers and the other having under achievers, plans and teach separately. This exercise will provide first hand experience about the influence of the variable learners achievement level. There will be a feedback to student-teacher comparing the two situations he found and the interaction patterns that were followed. In the present integration stratagey three pairs of situations are selected for exercise. One has been already mentioned as learner's achievement, the second is the use of audio-visual material and third variation in grade level keeping the content same.

In this phase students are nearly exposed to the reality but with deliberately planned controls on a few variables. The class sizes will be half of the real size. The time length of the lesson will be of one class hour duration. The feedback will be completely

based on the learner behaviours.

Phase VII : Diagnostic remedial teaching practice in simulation.

During this phase the student-teacher will be teaching a normal class room. In the beginning he will teach a few individualised classes slowly upgrading to full work load of a school teacher. During the practice an important intervention will be made by observing each teacher for his discrepancy and short coming and also accordingly providing individualised guidance. If found very weak the student teacher will then repeat his specific lessons in simulation with proper guidance from the supervisor. By observing himself improving over his shortcoming the teacher achieve greater confidence to face the class.

Phase VIII : Acquaintance to co-curricular activities related to class room teaching.

This phase does not appear as seperate stage but runs along with the previous phase hand in hand. The specific inputs for this phase will be to expose the teacher to the various co-curricular activities related to his class-room teaching. The input will emphasize the teaching for the subject which will not be limited to the four walls of the classroom but extend beyond the class room experiences. In this stratagey provision will be made for science teacher oriented activities, viz., organising visits to science fairs, museum, health centres, community science centres, botanical garden, organising science quiz programmes, essay competition and organising science exhibition.

SECTION III

4.3.0 Experimentation

This section on 'experimentation' deals with the organisation and conduct of an experiment to establish the validity of integration stratagey through field study. The design of the experiment comprises single group pre and post test. The four sub sections of this section are devoted to four major stages of experimentation and are presented according to their chronological order of occurance. The four subsections are pre-integration treatment namely skill development through microteaching, pre-testing, integration treatment and post testing. The presentation made under the sub sections have been mainly on an organisational and methodological basis. But since those details have already been discussed earlier further repetitions have been avoided unless it was felt essential to present them afresh. However, attempts have been made to cite the exact place where they have been discussed and hence are referable. Before presenting the experimentation the sample formation for the study is presented.

Nature of Target Population : The integration stratagey prepared is specific to the context present in the Indian teacher education courses. The application of stratagey is very much limited to the specific context for which it has been evolved namely, to provide an integration stratagey for one year

B.Ed. courses wherein the Indian microteaching model is already in practice with seven major skills for their practicing viz. skill of writing objectives, skill of explanation, skill of probing questioning, skill of illustrating with examples, skill of stimulus variation, skill of reinforcement and skill of writing on blackboard.

The investigator having his basic qualification from science discipline, will be handicapped to have insight into the methods of teaching social sciences. Each discipline has its own specific objectives and methodology of teaching. When skills are to be integrated it cannot be done without taking into consideration the methods of teaching. This necessitated the investigator to limit himself to only one method of teaching restricting the scope of stratagey to science student teachers.

A large number of students practice their class room teaching stratagies in regional languages, due to the fact that, in India the mother tongue is the basic language through which secondary education is imparted. However, the present stratagey material is prepared in English language. This is mainly due to two reasons, namely, to avail the advantage of using the material throughout the country, if necessary by translating it into their respective regional languages and because of the investigator's limited knowledge into regional language for conducting the field work.

The B.Ed. courses of one year duration have approximately one hundred students as the intake capacity with 10 staff members on

on the faculty. This has roughly standardised the student-teacher group formation of 10 to 15 students per staff members during practice teaching. A unit of size 10 - 15 students form a specific type of group structure having unique features of organising practice session, school practice session, project works, and team work. The feasability of this stratagey requires trying out the integration programme on one or multiple units of 10 - 15 student-teachers.

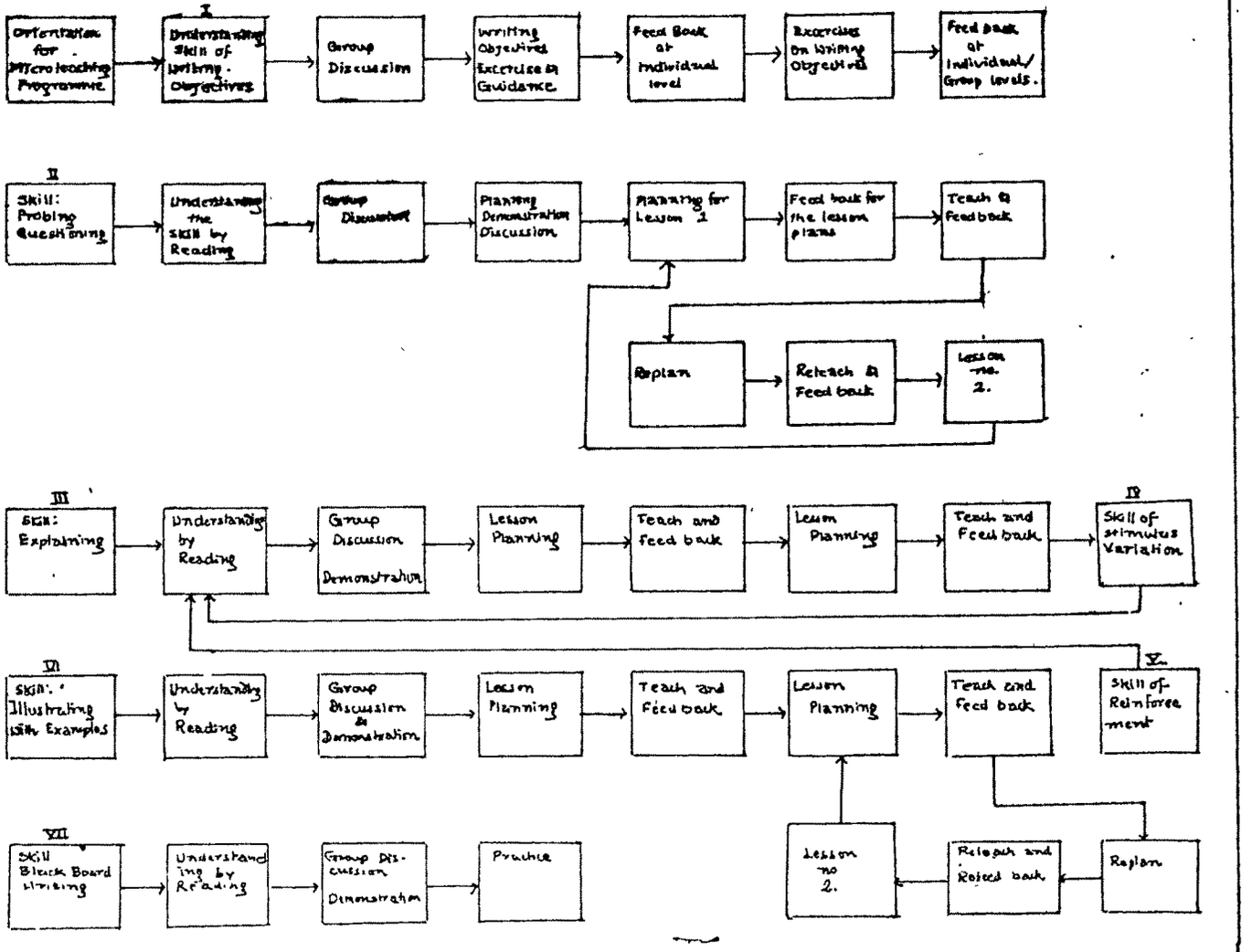
Sampling : The above referred conditions have determined the nature of sample and restricted the scope for application of sampling methodology in selecting the student teachers. The availability of student teacher with English as the medium of practice teaching and with science as the method of teaching will be very limited. Therefore, it was decided to bank upon the purposive sampling, wherein all the students falling under the required conditions are taken for the study.

Sample : The sample consists of thirteen students available from one year B.Ed. course from the Department of Education, M.S. University of Baroda during the year 1980-81. There were in all 210 students out of which only thirteen had opted for science as first method of teaching. All had English as the medium of practice teaching. Distribution of the sample with reference to variables sex, qualifications, teaching experience is presented in Table 4.1.

TABLE: 4.1 SAMPLE DISTRIBUTION ON THE VARIABLES

St. Tr No.	SEX		QUALIFICATION		Tg. Experience		Married		Teaching		Age
	Male	Female	Degree	P.G.	Yes	No	Yes	No	Yes	No	
1		✓	✓		✓			✓		✓	20
2		✓		✓	✓		✓			✓	31
3		✓	✓		✓		✓			✓	25
4		✓		✓		✓	✓			✓	25
5	✓		✓			✓		✓	✓		24
6		✓	✓			✓	✓	✓		✓	19
7	✓		✓		✓		✓		✓		32
8		✓		✓		✓	✓			✓	30
9		✓	✓			✓		✓		✓	29
10		✓		✓		✓		✓		✓	22
11		✓	✓			✓		✓		✓	20
12		✓		✓	✓		✓		✓		27
13		✓		✓	✓			✓		✓	26
Total	2	11	7	6	6	7	6	7	3	10	

FIG 4-2 A SCHEMATIC REPRESENTATION OF MICROTEACHING PROGRAMME



4.3.2 Experimentation Procedure

The experimental chronologically falls under four phases which are presented below sequentially.

Pre integration Treatment : Microteaching Programme

General Orientation :

The selected thirteen students were given orientation on the first day. This session aimed at understanding each other within the group and then clarifying the aims and objectives of the programme. The major aspects focussed during the orientation were a brief idea about the practice-teaching and its relation to B.Ed. course, the different phases of practice teaching namely microteaching, integration and block practice teaching programmes. The detailed microteaching programme steps were written on black board and each step was explained separately. The different skills to be practised were also explained in brief. The role of student-teachers during different phases of microteaching programme were clarified. A hand out on 'skill of probing questioning was provided to each one of the students and they were asked to read and comprehend the skill during the free time before the group met the successive day. Handout material prepared by Bimla Passi(1976) would be validated material for practicing the skill of probing questioning. During the last thirty minutes, the group will be encouraged to shoot questions and doubts which would be discussed later on.

Orientation for Skill of Probing Questioning : As per the procedure suggested by The Indian Microteaching Model the orientation was provided. The student teachers already had gone through the material given to them priorly. The conceptual meaning of probing questioning, detailed differences between the components, their function were explained. A live demonstration on the skill of probing questioning was presented using the same group as peer learners. A script of the demonstration lesson was also provided to the student-teacher for their reference. Before demonstration they were also oriented about the observation schedule and technique of recording. The live demonstration was discussed later along with the group with the help of observation schedule. There was also a teacher educator to observe demonstration lesson, whose recordings were taken as supervisors recording for feedback discussion. The group was assigned to plan a lesson and take necessary guidance from the investigator during their free time. The investigator himself acted as the supervisor during the programme.

Practice for Skill of Probing Questioning : The skill practice was done in simulated conditions. At each teach session, two peers acted as peer supervisors. One peer was left free to prepare his teach session, which would immediately follow and one of them would be the practicing teacher. The remaining nine teachers were the peer learners. The supervisor also did the observation during the teach session. Each teach session was of 7 minutes to 10 minutes. Soon after the teach session, the whole group was involved in feedback

session. The feedback was therefore of a mixed type. No hardwares were used. The reteach was not immediate. They were asked to replan at their free time and reteach the following day. The feedback on an average was a 10 to 15 minutes session. After the feedback the next successive student teacher used to take the role of teaching. In all, on an average seven to eight students used to complete their one teach session per day. The skill practice for question[illegible] took four days utilizing full working class hours to complete, two cycles involving four teach session.

Orientation and Practice for Skill of Reinforcement : At the end of practicing probing questioning skill the group was provided with cyclostyled hand outs for skill of reinforcement. They were asked to read and understand the skill before coming to the next class. This included the validated material by Bimla Passi (1976). During the first session the group was oriented about the skill and a discussion was carried out to clarify their doubts regarding various components. To economise on time, the group was directed to use the same lesson that was used during skill of probing questioning with appropriate changes. This decision was taken also with consideration that, since the lesson being practised the interaction required less involvement with reference to questioning, the trainee could also completely involve practicing skill of reinforcement.

Practice for the skill of reinforcement was on similar lines to that of skill of probing questioning. The student teachers were much at ease, and were able to practice with ease because of their experience of acquiring the previous skill. The reinforcement skill took three days to practice 2 cycles involving a total 4 teach

sessions per head. On the last day of practice a one hour session was taken to orient them to the blackboard skill.

Orientation and Practice for Blackboard Skill : One hour orientation was able to clarify the concept and components of blackboard work. They were also provided with the handout on blackboard work. The material is a validated work of M.S. Lalitha (1976). The student teachers were asked to come prepared with a five minutes write up exercise on black board.

During practice, the emphasis was on the skill of blackboard. The students during their teach session, in turn, were asked to write on blackboard certain teaching points and statements involving to a lesser extent other skills. Further teacher trainees were provided feedback. To practice complete cycles involved two teach and two reteach session per head. This exercise took two more days. At the end of session, the trainees were provided with the instructional material for skill of writing objectives.

Orientation and Practice for Skill of Writing Objectives : A day before discussion session the instructional material in writing objectives was given to student teachers. After conforming that, all had read the material an orientation was further provided. Wherein, the supervisor undertook examples of different type. The discussion was carried on for about two hours till the studentteachers felt convinced and satisfied. After lunch break they were asked to write down the objectives following the components of the skill.

They were also asked to prepare two sets for two different topics. Their exercise was evaluated and guidance was provided individually for further rewriting. This skill took one complete day for discussion and practice.

Orientation and Practice for Skill of Illustrating with Examples : The procedure followed is same as that of skill of probing questioning. The material used here was prepared and validated for the skill by Joshi S.M. (1977). The skill practice involved totally four days practice to complete 2 teach and 2 reteach sessions per head.

Orientation and Practice for Skill of Stimulus Variation : Prior to a day the hand out for the skill was provided to student teachers. The discussion was carried over later during the day after confirming that student teacher had read the skill literature earlier provided to them. The material provided to them was prepared and experimentally validated by Joshi S.M. (1977). The procedure followed for the skill of reinforcement was followed in this case. The lessons prepared for skill of illustrating, with examples, were asked to a great extent to practice the skill of stimulus variation. The group had two days practice to complete two teach and two reteach sessions per head for this particular skill to practice.

Orientation and Practice for the Skill of Explanation : The sequential steps were same as that of probing questioning skill, namely, providing written material on skill, reading time for

the skill material, discussion on the skill and practice on the skill. The material used was prepared and experimentally validated by Lalitha M.S. (1976). In all it took three days for covering all the thirteen students for two teach and two reteach sessions on the skill. With these skills the micro-teaching practice sessions on all the seven skills were completed.

(b) Pre-Test :

The group was administered with pre-test soon after completion of the preliminary requirement, namely, practicing seven teaching skills through the microteaching programme. At this point the student-teacher were at the entrance behaviour level. The pre test was administered to measure the teaching performance level with reference to application of each teaching skill as individual competencies, application of teaching skill as integrated complex behaviour and as general teaching competence.

For the pre test purpose, all student teachers were allotted two science periods one each in eighth and ninth grades. The periods were of forty minutes duration. The allotments were confirmed ½ one week in advance. The student-teachers were requested to select a topic to teach during these periods by consulting the respective science class teachers. The teacher trainees were also provided with the necessary guidance for period planning and other preparation required for teaching.

The teaching performance was tested by three observational tools. Skill interaction Analysis Category System (SIACS) was used to observe skill interactions in teaching. Two observers, who had sufficient practice in recording and high consistency were used. The practice in recording was given following the same procedure as given in tool preparation section 4.1.4. The two observers recorded the observation independently during classes. Two more observers were used to measure the rating scale observation. The rating scales used were Baroda General Teaching Competence and Comprehensive Teaching Effectiveness Scale. The two observers seperately rated both the scales. They were given sufficient practice, for valid and common agreement. All the four observers were research fellows having background in teacher education practices and teaching observation. There were 5 lessons to be observed every day. All the pre-test lessons, two per head, in all twenty six lessons were arranged during a week.

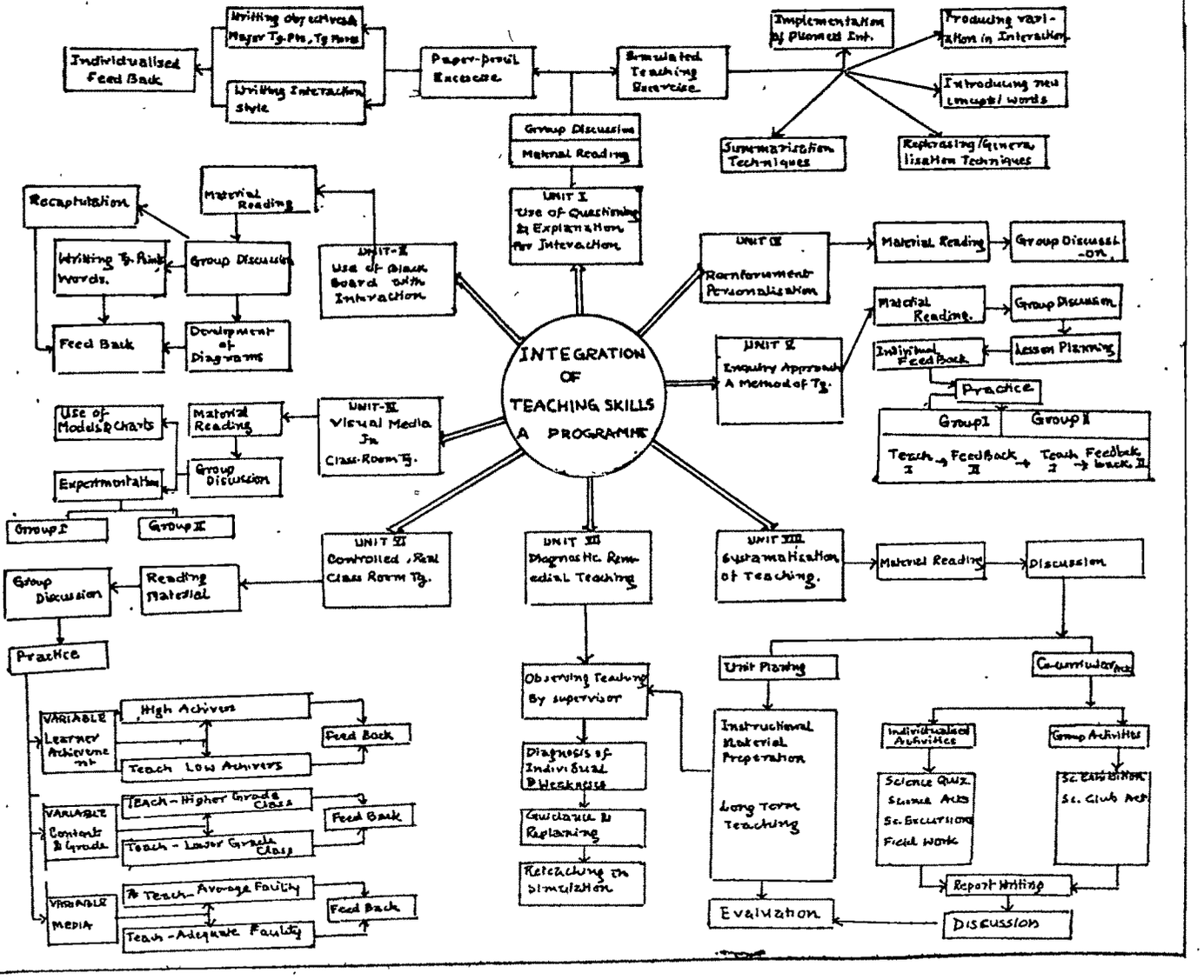
In addition to the pre-test, the students were given a self responding bio-data proforma sheet. All the student teachers wrote the required information. Two attitude scales namely Ahluwalia's attitude towards teaching inventory, and attitude towards microteaching were also administered. All psychological measures were taken to collect free and impartial opinion of student teachers.

(c) Experimental Treatment :

The detailed format of integration of the programme with emphasis on soft ware and techniques used is presented in the previous section. In the succeeding pages the chronological events have been presented. The details already given in previous section have not been detailed again so as to avoid repeatation. As discussed before the stratagey has eight units. The first five phases are sequential in nature and the last three phases are simultaneous in their action.

Phase I : Basic Interaction in Class Room Teaching : This is a phase to provide opportunity to use questioning and explaining as basic skills in forming class room communication sequences. In the beginning all teacher trainees were given ready software material prepared for the purpose. They were also given time to read the material. The material was further discussed during class room session. In all there were four exercises in this phase. The first was more of table work, wherein, they had to decide the major concepts, major questions and major clusters of interactions and explanations. This exercise was demonstrated on the board. The group was asked to draw a similar plan by taking a topic. The exercises completed later on followed adequate facilities for guiding teacher trainees individually. This exercises were carried for two days. All the students had two exercises each with two topics.

FIG:4.3 A SCHEMATIC REPRESENTATION OF INTEGRATION STRATEGEY



On the third day, the second exercise was taken for practice. In this phase, the trainees were supposed to extemporarly teach one major concept from the previously planned lesson. Here the microteaching technique was used. However, the observation and feedback were more gestaltic than skill component specific. Each one had to be provided two extemporary sessions as a part of the exercise. This exercise continued for one and a half days. The third exercises were to extemporarly deal with situations wherein the teacher had to generalise or summarise, or the different responses of students to move to the next teaching step. For this exercise the teacher was once again asked to select a single aspect from his first exercise and practice teaching. Peers provided enough opportunities by deliberately providing chances to practice. Once again the microteaching teach session techniques were adopted. This exercise took a duration of one day to practice. The last exercise was to deal with situations, wherein, the student teacher had to introduce new words and new concepts to the class. Each student teacher was extemporarly provided with new words and concepts and was asked to teach. The exercise was carried for a day marking the end of first phase.

Phase II : Personalisation of Skill of Reinforcement for Classroom Teaching : This was a phase of short duration having software on details of relation between teacher personality and reinforcements. The software material was provided to student

teachers a day prior to the discussion session. During discussion session the details given in the software material were reviewed. After the discussion session, the group critically studied each one's types of reinforcements used and his personality suitability of reinforcer and guidance was provided. The complete phase covered three hours single session.

Phase III : Blackboard Management in Classroom Teaching :

The software material was provided a day prior as usual for their reading. The detailed discussion along with demonstration was done before the student-teacher were asked to plan for their exercises. There were two exercises in this phase. The first one was to use the blackboard by managing the space for different type of works. All students, one by one, in turn, taught a concept, by using as much as blackboard space possible, thereby providing scope for blackboard management. Similarly, for second exercise namely development of a flow chart/diagram on blackboard, the concept was explained side by side while doing blackboard work. Both the exercises followed the microteaching - teach session technique for practice. In all this phase continued for two and a half day for completion.

Phase IV : Use of Visual Materials in Class room Teaching :

A hand out of software material were provided to all students prior to the discussion. The discussion was to orient them for the exercises that were to be practised for the session.

Demonstration was also provided for the exercise. The group was then divided in two equal halves for economy of time. Both the group practised in two seperate rooms. The feedback was mainly done by peers and less from supervisors. All students practised by taking a concept and selecting an appropriate visual readility available from A.V. Centre of the institute. This phase was completed within two days.

Phase V : Use of Inquiry Approach for Integration of Skill to teach Science : A detailed hand out was provided similar to the previous. A detailed discussion on the steps of inquiry approach along with demonstration was undertaken during the first session. The exercise was to select a demonstration involved concept and teach using inquiry as method of teaching in simulation. All the students teachers selected suitable concepts and planned the lesson. Individual guidance was provided to each one of them to improve upon. In the later session each by turn taught the lesson. Time was not taken as limitation during this session. The phase took 4 days of exercises work to cover all the students.

Phase VI : Controlled Classroom Teaching : Software material in the form of written hand out were provided to all the student teachers followed by a discussion session. Later the whole group was divided into seven pairs. Each pair was allotted four class hours during the first week and two class hours during the second

week. They were expected to carry out two practice lessons in real class room situations during this phase by controlling one variable at a time. Each pair had totally six lessons allotted. Out of these six consecutive lessons, two lessons were practiced in the same classes. This was done to facilitate organising controlled practice without disturbing the school time table. During each period the class was divided into two groups namely Group A and Group B and each one of the two peers would have to teach the two groups separately in two different rooms independently. During the second allotted period the groups would be exchanged by the two student teachers. During the second teach session the student teacher was expected to make necessary changes to control the variable as suggested in the softwares. Following is an example of these organisations :

Example :

Period Allottment Chart

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Student Teacher - A	VIII A	VIII A	IX B	-	IX B	
Student Teacher - B	3rd pr.	2nd pr.	1st pr.		5th pr.	

Student teachers A and B decided to control student-achievement for their first two lessons. Their Class Room arrangement was as follows :

Variable and	Student Teacher A	Student Teacher B
Student Achievement	Lesson 1 Monday VIII A Third period Topic : Heat	Lesson 1 Monday VIII A Third period Topic : Sound
	25 students group having their achievement in science with first 25 ranks in the class (Group X)	25 students group having their achievement in science from 26th to 50th rank in class. (Group Y)
	Lesson II Tuesday VIII A Second period Topic : Heat Group Y	Lesson II Tuesday Second period Topic : Sound Group X
A.V. facilities	Lesson III Wednesday IX B Ist period Topic : Photosynthesis Group X : Randomly selected 25 students A.V. material used and Laboratory	Lesson III Wednesday IX B Ist period Topic : Energy Group Y Randomly selected 25 students A.V. material and Laboratory not used
	Lesson IV Friday IX B Vth period Topic : Photosynthesis A.V. Material and Laboratory not used	Lesson IV Friday IX B Vth period Topic : Photosynthesis A.V. material and laboratory used

Based on the previously mentioned lines each student teacher completed 6 lessons of real class room teaching with controlling monitored. The feedback was provided by peers and self. The type of feedback was provided to compare and contrast the interaction styles involved in two classes and their relations with the controlled variables. This exercise took in all two weeks for completion.

Phase VII and VIII : These two phases were to provide a diagnostic remedial teaching and acquaint the student teacher with co-curricular science activities respectively. This phase immediately proceded to the phase VI where in they were provided with a unit to teach, where in they planned series of activities and lesson to achieve the set objectives for lesson. Along with this the weaknesses of the student teachers were diagnosed and they were individuallyg guided for the special aspect. They were also asked to repeat particular sections of their unit in simulation, whenever they were found weak. Along with this activity they were encouraged to take certain science project works as teams. All the thirteen students were divided into four groups and each group was provided with a project. At the end of two weeks they completed their unit teaching, as well as projects. The project reports were read in the presence of all the student teachers and were discussed to mark the end of integration stratagey.

(d) Post - Test :

The post test was carried on similar lines to that of the pre-test. In all four observers were involved in the observation.

Besides, the student teachers were allotted with two lessons each a week in advance and were asked to give lessons. Guidance during planning stages was also provided wherever needed. Same tools were utilized namely, Skill Interaction Analysis Category System, Baroda General Teaching Competency Scale, and Comprehensive Teaching Effectiveness Scale.

In addition to these each of the student trainee [illegible] were interviewed individually at their free time using the structured interview schedule for their reactions. The reactions were noted by the investigator.

SECTION IV - SCHEME FOR ANALYSIS

4.4.0 Introduction

The procedure followed for analysing data is presented to three parts. The first part deals with conversion of raw data into processed data, so that, the data is valid for testing hypothesis, the second and third parts present analysis of data for objectives second and third respectively. There is no testable data for the first objective, namely, development of an integrational stratagey for teaching skills. The detailed procedure followed for the development and measures taken for internal validity are presented in the section development of stratagey of this chapter.

4.4.1 Primary Analysis

The data available for processing is mainly of four types, namely, the interaction analysis category sequences, the ratings on Baroda General Teaching Competency Scales, the ratings on Comprehensive Teaching Effectiveness Scale and reactions of student teacher on the stratagey. The conversion of raw data and processing for parameters are presented tool wise in the following pages.

(a) Skill Interaction Analysis Category System :

The method of recording the sequence of skill categories was to sequentially record the occurances as they are apparent. The observers recorded events at the rate of one recording of skill categories within 5 seconds considering the skill most called for. The recording was in terms of code numbers already decided specifically for each of the categories. The recording was carried on a matrix of 12 X 45 blocks, consisting horizontal 12 rows and vertical 45 columns. Each row represents one minutes recording. Figure 4.4 represents the recording of 5th and 6th minutes occurance of events in the class as an example.

In the matrix it is observed that, for the 5th minutes the first five seconds are represented by category number one representing as dominated event. During 2nd and 3rd five seconds student response continued recorded as 7 and 7. This recording is very much similar to the FIACS recording system. For each class there were two matrix available one each for the two

TABLE: 4 4 CLASS ROOM SIACS RECORDING MATRIX

Name of Student Teacher: _

Topic _ _ _ _ _ _ _ _ _ _ _ _ Period _ _ _

Class _ _ _ _ _ _ _ _ _ _ _ _ Date _ _ _

TIME Min / En Sec	1	2	3	4	5	6	7	8	9	10	11	12
1"												
2"												
3"												
4"												
5"	1	7	7	6	6	6	2	7	2	7	6	6
6"	9	9	6	6	6	10	1	1	1	1	10	7
7"												
44"												
45th Min												

Name of Recorder: _

Fig: 4.5 MATRIX – TYPE-I.

TRANSACTION IN TERMS OF FREQUENCEY FOR EACH PAIR OF CATEGORY

Name of Student teacher: _

Topic : _ _ _ _ _ _ _ _ _ _ Period: _ _ _ _

Class : _ _ _ _ _ _ _ _ _ Time : _ _ _

	1	2	3	4	5	6	7	8	9	10	TOTAL
1	III						I			I	5
2							II				2
3											
4											
5											
6		I				IIII			I	I	8
7		I				II	I			I	5
8											
9						I			I		2
10	II						I				3
TOTAL	5	2				8	5		2	3	25

Recorder : _

observers. In all these were 52 matrix of pre test and 52 matrix of post test available for analysis. Each of these formates were converted into Type I matrix wherein total numbers of five second units for each category were noted considering the relation to succeeding category so that the sequence was also recorded. The system followed for this analysis is same as that of Flanders Interaction Analysis category System (1972). Figure 4.3 represents recording of paired transaction in terms of frequency numbers from matrix in Figure 4.4

There were two type - I matrix available for each of the lesson. There were two lesson on pre-test and two lessons on post test. All the type I matrix numbering four for pre test were clubbed to form matrix type II. Similarly, all four type I matrix of post test for each student teacher were also clubbed. At this juncture, there were 13 type - II matrix for pre test representing 13 student teachers and 13 type II matrix representing post test. Type - II matrix were further converted to percentage matrix Type - III. This was computed by using information available from Type - II. The total frequency available was reduced to 100 as unit and each block frequency was graded accordingly. The following equation was used to compute percentage frequency occurance for each of the blocks.

Grand Total Frequency	:	100	: :	nth block Frequency	:	nth block percentage
(Known quantity)				(Known quantity)		(Unknown quantity)

The so formed Type - III matrix helped to put all the student teachers pre test and post test records on a single scale for comparison and further testing.

Comprehensive Teaching Effectiveness Scale : There were two observers for each class to judge this scale. The two observers had pre practice on the scale for the common argument. Each item on the scale was rated individually. There were two ratings available for each lesson. The ratings were added of all the items together to form the total effectiveness score. The were two separate spaces for totalling each lesson, because of two observers. Since every student gave two lessons as pre test, there were four scores totalling all. The average of all the fourscore totals formed the pre test total score on the scale for the individual. Similarly post test score totals were also computed to get post test mean scores for each individual.

Baroda General Teaching Competency Scale : The computation was similar to the comprehensive teaching effectiveness rating scale. Apart from this itemwise scoring was also computed. To do this the four ratings available for each student on pre tests were averaged to find single rating, itemwise. The ratings so obtained for all the thirteen student-teachers together represented the itemwise achievement of group . Similarly, post-test ratings were also computed itemwise.

Objectivewise Analysis of Data

The experimental data processed as presented in the previous pages, were used to test the hypotheses framed for objective second and third as follows.

4.4.2 Analysis for Objective 2

The objective was to establish the validity of integration stratagey in terms of class room effectiveness.

This objective required to analyse the data groupwise, with reference to different type of data collected from different tools. The data was collected at three stages and thereby responding to the objective collectively.

Skill Interaction Analysis Category System Data

Analysing the data of SIACS the first measure was calculated to find change in amount of time from pre-test to post test for different skill components. Each skill category on each student teacher's matrix Type - III shows the two types of frequencies, namely the frequencies in the sustained blocks which indicates sustained long interval exhibition of each categories and transition blocks which indicates shift from one skill components to other components. All the percentages of respective blocks were added for thirteen students on pre test matrix. Similarly all the percentage of respective blocks were added for thirteen students on post-test matrix. A table indicating change in amount, from pre-test to post test for each sustained as well as transition blocks, is formed. The

difference was qualitatively interpreted to respond for the objectives. SIACS data is further used to calculate skill integration indicators. One of the major dimensions of skill integration is to find the relations formed and patterns formed between and with skills components. To arrive at such characterisation three indicators were formed, namely, skill association, skill shift and skill dispersion which are as follows :

Skill Associations : This is rate of intermixing of skills with each other. This presumes that integration has an element of associating different skills with each other which are related to enhance effectiveness. If a teacher has developed effective questioning, then there will be a proportionate increase in pupil participation also. The extent of ease the teacher feels to use explanation along with blackboard work changes from time to time in the amounts of both proportionately. The following major skill associations are calculated from group major matrix derived from Matrix Type - III. The major matrix of group is the matrix of deriving all the thirteen students pre-test scores on each category seperately and forming major matrix. Similarly, major matrix of group for post test is also formed.

(1) Skill Association Between Questioning and Student Response :

$$\frac{\text{Post test total percentage scores for group on category student Response}}{\text{Post test to total percentage score for group on category questioning}} - \frac{\text{Pre test total percentage scores for group on category student response}}{\text{Pre test total percentage scores for group on category questioning}} = A$$

Indicator 'A' found positive indicates increase in association and change in amount show the magnitude.

(2) Association between explaining and blackboard :

This index is computed as the change in proportionates using (a) explanation followed by blackboard and (b) blackboard followed by explanation when both the skills are exhibited alternatively as follows :

(a) $$\frac{\text{Post test percentage scores on sustained explanation category block}}{\text{Post test percentage total scores on category explanation to blackboard}} - \frac{\text{Pre test percentage total scores on sustained explanation category block}}{\text{Pre test percentage total scores on category explanation to blackboard work}}$$

(b) $$\frac{\text{Post test percentage scores as sustained blackboard category block}}{\text{Post test percentage total scores as category explanation to blackboard category}} - \frac{\text{Pre test percentage scores on sustained blackboard category block}}{\text{Pre test percentage total scores on category explanation to blackboard category}}$$

The readings of 'a' and 'b' act as compliments to each other. If one is positive and other is negative marking no apparent changes then it should be considered as the association process is in formative stage. Here the dynamic relation of to and fro is in process from one skill to another. If both 'a' and 'b' indicates

negative reading. The indication is dissociation and if both reading are positive, then the overall reading should indicate greater association.

(3) Association of Major Basic Skills :

This is an index, based on generalisation of interaction category system analysis, that increase in indirect behaviour is a sign of effectiveness. Here it is considered that if all major skills together combine so as to increase student participation more then the association is more.

$$A = \frac{\text{Post test percentage scores on category student response}}{\text{Post test scores on categories questioning + category explaining + category blackboard work}} - \frac{\text{Pre test percentage scores on category student response}}{\text{Pre test scores on categories questioning + category explaining + category blackboard work}}$$

A being positive indicates increase in association of skills, and vice versa.

II Skill Shifts :

This is the rate of shift from one skill to another. While considering shifts, all shifts cannot be considered as favourable for integration and effective teaching. These shifts can be grouped into three classes namely (A) Shifts which are meaningful and increase in rate contribute towards integration of skills (B) Shifts which are meaningful but there decrease in rate contributing towards integration of skills, and (C) shift which are unexplainater towards their contribution for effectiveness, when calculated in general, but explainable contextually. In the following pages only

only meaningful shifts are been presented and are used in computing for responding to set objective :

(1) Shifts from Explaining Skill to Questioning

$$S = \frac{\text{Post test percentage scores of category Explanation to Questioning}}{\text{Post test percentage scores of category Explanation to Blackboard category Blackboard to Explanation}} - \frac{\text{Pre test percentage scores of category Explanation to Questioning}}{\text{Pre test percentage score of category explanation to Blackboard + Category Blackboard to explanation}}$$

The positive 'S' indicates increase in amount of changes from explanation to blackboard and vice versa which is presumed to be a desirable one for integration of skills.

Shift from Questioning to Student Talk and Vice Versa

$$S_1 = \text{Post test percentage scores of category Questioning to Student talk} - \text{Pre test percentage scores of Category Questioning to Student talk}$$

$$S_2 = \text{Post test percentage scores of category student talk to questioning} - \text{Pre test percentage scores of category student talks to questioning}$$

S_1 and S_2 represent the continuous interaction between teacher and student. Both the shifts namely student talk to questioning and from questioning to student talk are desirable in classroom. Positive S_1 and S_2 signify favourable shift for integration and collective teaching.

Skill Dispersion :

This index will present the ability of a teacher to relate a category with all the other categories. If a teacher is able to

shift from a skill to all the other categories it is a positive aspect of integration which is referred here as skill dispersion. In the present study student talk, blackboard work, questioning, explaining are taken as important basic skills. The dispersive ability of each of these categories is computed by following equations.

1. Skill dispersion for student talk =

   Post test scores of the category student talk to rest — Pre test scores of the category student talk to rest

2. Skill dispersion for blackboard =

   Post test scores of the category blackboard to rest — Pre test scores of the category blackboard to rest

3. Skill dispersion for explanation =

   Post test scores of the category explanation to rest — Pre test scores of the category explanation to rest

4. Skill dispersion for questioning =

   Pre test scores of the category questioning to rest — Post test scores of the category questioning to rest

The fourth dispersion category for skill of questioning measures the negative dispersion on effectiveness since the questioning followed by student response is the only effective shift. Therefore, to form it a positive index post test scores are deducted from pre scores unlike the rest.

Baroda General Teaching Competency Data :

After the general processing of the data namely, the total general teaching competency calculated for each student on his pre test and post test score it was further subjected to calculate group mean, standard deviation for pre test and post test. To find out the significance of difference between the means, the small group 't' test was applied.

The data was also processed for skillwise analysis. There are ratings available on each skill item for each student as pre test and post test findings. All items from all the ratings obtained of thirteen students were further added on pre test score to get total ratings for the group an a particular item. Similarly, calculations were adopted for post test. Finally the difference between the two presented, change in ratings, skill wise.

Comprehensive Teaching Effectiveness Data :

The processed data is very much similar to that of BGTC data. The only difference was the items on BGTC were skill oriented, whereas on this scale, they are on functional dimensions of teaching other than skills. Therefore, the same type of analysis is carried out as that of the previous one.

Interview Data :

The reactions were tabulated studentwise and the data was clustered in the form of favourable reaction and unfavourable reactions about each of the components commented on. They were then presented as frequency of students in favour or

against a particular view.

The following type of data was available to interpret for the objectives which were collectively taken.

1. Change in teaching skill category appearance in class room in terms of amount of time spent from pre integration stage to post integration stage.
2. Change in classroom interaction style indicated by skill integration indicators on three dimension skill association, skill shift and skill dispersion.
3. Change in group means of general teaching competency from pre integration stage to post integration stage and the significance of difference between them.
4. Percentage group change in skill competency from pre integration stage to post integration stage.
5. Change in group teaching comprehensive competency from pre integration stage to post integration stage and the significance of difference between them.
6. Reactions of student teachers on each component of integration stratagey as their usefulness in integrating the skills.

Considering all the six parameters the interpretation regarding validity of stratagey was arrived at.

4.4.3 Analysis for Objective 3 :

The objective was to study the relative effect of variables teaching experience, academic qualification, academic merit, availing of free time to study, attitude towards teaching, attitude towards microteaching and achievement on skill comprehension test.

This objective required to analyse the data available in similar form on that of the objective one. The difference being to study the dates with reference to the variable under the study. To study the relative effectiveness of stratagey, with reference to the independent variables mentioned, the single group was divided into two groups on the basis of a variable at a time. The two groups formed were considered as separate groups and all the steps followed in objective one were followed once again with the two sub-groups. The relative difference obtained were tested for the set hypothesis. This methodology required analysis to be carried on in three stages. The first stage was to analyse the data on variables so as to form two groups. This has to be done seven times with seven variables each one taken separately at a time. During the second stage the sub-groups were taken as an independent group and the scores available on BGTC and CET were processed through analysis of covariance. The last stage required analysis of SIACS taking the two subgroups separately.

Group Formation on Variables

There were seven variables in all each one of them were taken care of separately the details are given below :

(1) Groups formation for variable - Attitude towards Teaching :

The data available from Ahluwalia's Attitude towards teaching was taken as the basis. The scoring of rating scales

gave attitude scores for each of the students. In all there were thirteen reading since the total sample is thirteen. The mean for the thirteen reading were computed. The student-teachers having scores above the mean formed the group having above average attitude and the rest formed the group having below average attitude group. The above average group had 4 student teachers and 7 in the below average group.

(2) Group formation on Variable : Attitude towards micro-teaching programme :

The basis was attitude towards microteaching scale. The methodology followed was similar to that used for variable attitude towards teaching. The below average in attitude towards microteaching had 7 and average in attitude towards microteaching had 6 student teachers.

(3) Group formation on Variable - Achievement on Skill Test :

The written test paper on Skill Achievement were scored. The paper was objective in nature. There were in all thirteen scores each representing a student teacher. The mean for the group was computed. And two groups were formed as high achievers on skill test and low achievers on skill test. The high achievers were in all 5 and the low achievers were 4.

(4) Group formation on Variable : Teaching Experience :

Teaching experience data was available from the general information proforma. There were student teachers on one hand with no experience whereas same had 2 to 3 months to 2 to 8 years teaching experience on the other hand. Students having four month and lesson were considered as good as having no teaching experience since the four months will not have appreciable influence in forming teaching structure. It is more like an exposure to the classroom. Moreover, these exposures were all in lower primary school. Student teacher having minimum one term and more were classified as a group having teaching experience. There were few student teachers having tution class experience for a period of two years. This case was also considered for the teaching experienced group. The so formed group out of thirteen students categorised having teaching experience group with 7 student teachers and having no teaching experience group had 6 student teachers.

(5) Group formation on Variable - Free Availability of Study time:

The basis for data on this variable was collected from the general information sheet. Student teachers having married and working as housewives, student teachers teaching during non-college hours while doing B.Ed. and student teachers having any other similar works involving free time activity in their non-college hours were grouped as students teachers having no availance of free time to study. Other student teachers who have taken only studying as a career while doing B.Ed.

were grouped those having free time for study. The student teachers having no free availance of study time constituted 7 and the other group having free availance of study time constituted 5 number of students.

(6) Group formation on Variable Qualifications :

The basic data to classify was obtained from the general information sheet. Those students who have done their post-graduate qualification formed the post-graduate group, and those having graduation as the qualification formed the graduate group. The post-graduate student teachers were 6 and graduate student teachers were 7.

(7) Group formation on Academic Achievement :

The basic data for this grouping was collected from general information sheet. Students having consistantly above fiftyfive percent of total scores in all board/university examinations and those having first class grades in both graduate and post-graduate level formed the high academic achievers, and the rest formed the low academic achievers. The high academic group consisted of 7 subjects, whereas the other consisted of 5 subjects.

Group Analysis for SIACS

As the first stage, from the individual student teachers matrix Type - III, change in amount of time from pre test to post test for different skill components, skill category to rest and vice versa for two groups on a variable were computed and tabulated. The system of analysis is similar to the group analysis. The only difference was, in group analysis all the thirteen formed a single group whereas in the present analysis on a variable two sub-groups were formed, and each sub group was considered as a group. The difference between

the two groups were used in to draw an inference on the influence of a particular variable on which the groups were formed. This analysis was repeated seven times with seven variables.

Apart from this Integration Indicators namely skill association, Skill Shifts and Skill Dispersion were also computed similar to the given in group analysis. The only difference was here in, the computations work on two sub-groups formed on a variable. This computation was repeated seven times for seven variables seperately.

Group Analysis for BGTC and CETS :

On the variable when the thirteen students were grouped into two, the two groups available were having pre integration scores on group I and group II, post integration scores on group I and group II. Since pre integration scores were not at equal levels on either scales, the post test scores were not comparable. This necessitated to equate the two sub groups on their pre-integration scores statistical control, and thereby having modified post-integration scores. This type of analysis required application by the method of single variance involved analysis of covariance. The ANCOVA procedure followed is as provided by Guilford (1954). This analysis was done seperately to scores available on BGTC and CETS, and further repeated for seven variable separately.

With the above mentioned analysis on each variable grouping, following data was availed

(1) Table of change in amount of time from pre test to post test for different skill categories for the two sub groups grouped on the variable.

(2) Table of change in amount of time from pre test to post test for skill categories to rest of skill categories and vice versa for the two sub-groups grouped on the variable.

(3) Table of ana lysis for integration indicators for the two sub groups formed on the variable.

(4) Table of ANCOVA for testing gain difference for the general teaching competence scores for the variable.

(5) Table of ANCOVA analysis for testing gain difference for the comprehensive teaching effectiveness scores for the variable.

4.4.4 Guidelines used for Interpretations

As presented before, the data obtained through skill interaction analysis category system, are tabulated into three tables. The tables indicate, change in amount of time from pre-test to post test for different skill components, change in amount of time from pre test to post test for specific skill components to rest of skill components and from other skill components to specific skill component, and analysis for integration indicators namely, skill association, skill shift and skill dispersion.

This analysis remains unchanged for the analysis of data for establishing the validity of integration stratagey and for variable study. In the later case the analysis involves presentation of relative change in the two sub groups. The analysed data, is interpreted and findings were deduced. In deducing these finding a few guiding principles are used which are taken from FIACS interpretation system in principle. They are as follows :

(1) The amount of time spent for any specific sustained category will represent the prolonged occurance of that category in the class. The change from pre test to post test represents the emphasis laid by teacher to use the specific skill component.

(2) Relating the changes for different sustained categories, it reveals the increase in some skill components and decrease in other skill component. For instance (i) increase in sustained questioning and decrease in explanation shows increase in discussion oriented class. (ii) Increase in student response along with increase in questioning and decrease in explanation will show shift from direct to indirect teacher behaviour. (iii) Increase in explanation along with blackboard work shows increase in use of both the skills together for communication. (iv) Increase in managerial work show increased amount of discipline problems in class room.

(3) The amount of time spent for any transitional components will represent the emphasis laid by teacher in shifting from one skill component to another skill component, thereby creating a consistent sequence formation of teacher behaviour.

(4) Relating the changes for different transistional categories, it reveals increase in some of the specific categories and decrease in the other transitions. This charging phenomenon shows the development of new patterns of teacher behaviours, relating the different teaching skill components in specific form. A few of the major occurances are interpretative in the following form, which are based on the Flanders interpretation system.

(i) Consistant increase in questioning to student response shows that students are able to respond increasingly to the questions of teachers.

(ii) Consistent increase in block questioning to repetition means that the teacher may not be getting instant response to the questions and has to repeat the questions to further clarify.

(iii) Increase in block explanation to student response means that students volunteer to raise questions, doubts when teacher is explaining. This may be due to students greater interest and high involvement in instruction or

(iv) Increase in student response to explanation means the teacher resort to explanation frequently soon after getting student responses. This means, use of questioning intermitantly while explaining.

(v) Increase in block, questioning to explanation means that, teacher after putting questions may not get response and resort to responding or may not wait for student to respond and may resort to answer himself.

(vi) Increasing in block questioning to blackboards and blackboard work to questioning indicates increasing use of blackboard for conveying question along with visual effect.

(vii) Increase in explanation to questioning indicates increasing use of questions intermitantly during explanation.

(viii) Increase in explanation to blackboard and blackboard to explanation indicates increasing use of blackboard as visual media along with verbal explanation.

(ix) Increase in block, student response to questioning indicates increase in continuous question-answer sequence as a method of instruction.

(x) Increase in block student response to repeatation represent increasingly adopting to rephrasing the student response and presenting to the group which may help to the group to understand the response and also it reinforces the respondant.

(5) In the process of transaction to types of flows are available, the first being a transit stage wherein the teacher behaviours of different types to a specific behaviour, which is termed as rest - to - specific category, secondly the transit stage from specific behaviour to rest all the other teacher behaviour termed as 'specific to rest'. Both the transit stages provide information regarding the relative position of each specific category with all other components.

The guidelines used to interpret such information is as follows :

(i) Increase in 'questioning to rest' indicates use of frequent questioning intermitantly and then shifting to any of the other behaviours.

(ii) Increase in 'explanation to rest' indicates use of frequent explanation statements in instruction and then shifting to any other behaviours.

(iii) Increase in 'student response to rest' indicates increasing involvement of student frequently and then shifting to questioning, explaining and other instructional behaviours.

(iv) Increase in transition from blackboard to rest, repeatation to rest, dictation to rest, managerial work to rest, movements to rest are also interpreted as similar lines as indicated above for questioning to rest.

(v) Increase in transition from rest to questioning indicates frequent shift to questioning behaviour from different instructional behaviour.

(vi) Rest to explanation, rest to student response, rest to blackboard, rest to repeatation, rest to dictation, rest to managerial work, and rest to movement also are interpreted on similar lines as referred above to the rest to questioning.