CHAPTER II:

RESEARCH DESIGN
(PLAN AND PROCEDURE)

2.1 Introduction.
2.2 Preparation of Self-Instructional Material.
2.3 Sample.
2.4 Tools to be Used.
2.5 Statistical Treatment.
2.6 Conclusions.
2.1 OVERVIEW

As stated earlier in Chapter I, the present study, mainly aims at testing the effectiveness of skill-based self-instructional audio-cassettes in the acquisition of relevant teaching skills and thereby making student teachers competent teachers. The main objective of this study emerged from the present unsatisfactory state of affairs in the teacher education programme in general and the student-teaching in particular. Various strategies are being evolved to straighten this state of affairs. For some time microteaching technique supplemented by self-instructional material has found favoured with research workers as an alternative approach for increasing teacher competence. Without having a self-instructional (audio-cassettes) material which suits local conditions, it may be difficult to achieve the desired outcomes. This means that the development of such self-instructional material should be the first concern of this project.

2.2 PREPARATION OF SELF-INSTRUCTIONAL AUDIO-CASSETTES

As stated earlier the main concern of the present study is the preparation of self-instructional audio-cassettes for developing different teaching skills.
In order to achieve this objective it is but natural to prepare audio-cassettes. The process of preparation of audio-cassettes is time consuming and requires variety of sources to be taped. A procedure needs to be adopted, but as far as the knowledge of the Investigator goes, there is no uniform pattern for developing self-instructional material.

It would not be out of place to mention that the study is confined to the development of three teaching skills, i.e., probing questioning, explaining and illustrating with examples. Further only student-teachers who have opted for History and Geography as one of the teaching subjects have been trained in these three skills.

The procedure that has been followed in the preparation of self-instructional material on the three teaching skills is detailed out as under:

1. **PREPARATION**

   The first and the foremost task was to prepare self-instructional audio-cassettes which may facilitate the process of developing skills of probing questioning, explaining and illustrating with examples. It involved the preparation of the outlines of initial drafts of the self-instructional materials. To achieve this
objective the investigator did two things; one, to consult the relevant work done in the area concerned and second, to contact those who are working in the area. Literature was reviewed for getting information related to the meaning, importance and purposes of the skill and also the research work conducted regarding the development of self-instructional material. An initial draft of self-instructional material was prepared and taped and the tape-recorded draft of self-instructional material was referred to the panel of the experts, the student-teachers and the teacher-educators for their suggestions to improve upon the initial draft. The panel suggested a number of changes and improvements which were incorporated in the second draft.

After the student-teachers had gone through the material they pointed out that the language was difficult, and that the technical and research studies referred to, were too many and needed to be deleted. They also felt that examples to illustrate the components were insufficient. So more classroom examples were needed in order to describe the skill in the form of teaching episodes.

After the experts and teacher-educators had gone through the material similar suggestions were offered
regarding the format of the materials. They also suggested that the material should have only positive episodes. It was also suggested that programmed learning language should be used and repetition was necessary wherever key ideas were to be presented. The duration of the lessons, it was felt, should be shortened. The examples to illustrate the components of the skill, it was pointed out, were few in number and hence more examples needed be added from different subjects.

On the basis of the suggestions a number of alterations were made in the initial draft and in this way first draft was prepared and recorded.

**TRY OUT**

Next stage in the preparation of self-instructional audio-cassettes was the try out stage. A pilot study was conducted using the initial draft to ascertain the understandability and usefulness of the self-instructional material. This stage helped in developing better insight about the preparation of the self-instructional material.

When the self-instructional material in the form of the first draft was played to a group of student-teachers and teacher-educators, it was suggested that
it requires improvement at a number of points. Almost all were critical about the process of recording. So, it was suggested that this material should be recorded with reference to clarity and modulation of voice.

Another observation was about the concept of different skills and their components. It was suggested more particularly by student-teachers that theoretical orientation of skills should be recorded rather slowly and to clarify the concepts there is no harm if some repetition is made. There were many components in the recorded model lessons which were not fully clear. In order to reach consensus the discussion took place to clarify the meaning and use of components and wherever consensus could not be reached, hand-book on microteaching was consulted for reference.

On the basis of suggestions referred to above, a number of modifications were incorporated in the first draft which ultimately resulted in the preparation of the final draft. The audio script of SIM has been given in Appendix I.

**FINAL TRY OUT**

The major objective of the investigation is to study the effectiveness of self-instructional audio-cassettes
in developing teaching skills among student-teachers which 
ultimately, it is assumed, would increase general teacher 
competence. For this to be achieved some design has to be 
evolved and in the case of this investigation experimental 
approach has been adopted. The steps adopted in the exe­
cution of the study are presented in the table given 
below:-

<table>
<thead>
<tr>
<th>TREATMENTS</th>
<th>GROUPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group-I</td>
<td>Experimental Group-II</td>
</tr>
<tr>
<td>Control Group</td>
<td></td>
</tr>
</tbody>
</table>

Equating the groups on the factors of 
Intelligence, Academic Motivation, SES, 
and quality of student-teachers.

Pre-Test            Administration of Baroda General 
                     Teaching Competence Scale.

Training            Orientation and training through 
                     Microteaching through self-instructional audiocassettes.
                     Training Traditional method.

Post-test           Administration of Baroda General 
                     Teaching Competence Scale

The above table shows the design of the study in 
which the different steps of the process of treatments are 
presented. There are two treatment groups - Experimental 
Group and Control Group. In the first step Baroda General
Teaching Competence Scale was administered on thirty two students who constitute the sample of the study. In a microlesson the number of students should be between five to ten. The experimental group in the case of present study constitutes of sixteen students. Hence it was divided into two groups - Experimental Group I and Experimental Group II.

In order to develop teaching skills, these two experimental groups were exposed to self-instructional audio-cassettes. The control group III was exposed to conventional method of preparing student-teachers for class-room teaching.

2.3 Sample:

As mentioned earlier the study is experimental in nature. So, effort is made to locate the sample which should be, as far as possible, homogeneous in nature. Towards the achievement of this purpose the sample of the study was acquired after passing through the following stages:-

Stage I:

First of all student-teachers were selected on the basis of teaching subjects they have offered at their B.Ed. level. 250 women students were admitted to the B.Ed. class of Dev Samaj College of Education for Women, Ferozepur City. After consulting the office it was found out that out of 250 student-teachers 90 student-
teachers opted for teaching of History/Geography. The table given below indicates the number of student-teachers selected as sample at this stage.

**TABLE 2.2 SHOWING THE NUMBER OF STUDENT-TEACHERS WHO HAVE OFFERED TEACHING OF HISTORY/ GEOGRAPHY AS ONE OF THE TEACHING SUBJECTS.**

<table>
<thead>
<tr>
<th>No. of student-teachers admitted</th>
<th>No. of student-teachers offering Teaching of History/Geography</th>
<th>No. of student-teachers included in the sample at this stage</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>90</td>
<td>90</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Stage II**

To achieve further homogeneity in the group efforts were made to equate the ninety student-teachers referred to above, on the basis of Intelligence, Socio-Economic Status, Academic Motivation and Quality of student-teachers. The table given below indicates the composition of the sample after this exercise.

**TABLE 2.3 SHOWING THE COMPOSITION OF SAMPLE AT SECOND STAGE.**

<table>
<thead>
<tr>
<th>No. of student-teachers subjected to tests</th>
<th>No. of student-teachers who completed all the tests</th>
<th>Percentage who completed the tests</th>
<th>No. of student-teachers identified as homogenous</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>55</td>
<td>61.11%</td>
<td>32</td>
<td>58.18%</td>
</tr>
</tbody>
</table>
The above table shows that out of ninety student-teachers subjected to different tests, only fifty-five student-teachers had filled all the forms completely. It further shows that out of these fifty-five student-teachers thirty-two student-teachers were identified who were almost similar on intelligence, socio-economic status, academic motivation and quality of student-teachers. So, a group of thirty-two student-teachers were included in the sample of the study.

For the purposes of treatment these thirty-two student-teachers were divided as under:-

**TABLE 2.4 SHOWING THE COMPOSITION OF SAMPLE ON THE BASIS OF TREATMENTS.**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Nature of Group</th>
<th>Nature of Treatments</th>
<th>No. of student-teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Experimental Group I</td>
<td>Training of Teaching Skills through self-instructional Audio-cassettes.</td>
<td>8</td>
</tr>
<tr>
<td>2.</td>
<td>Experimental Group II</td>
<td>Training of Teaching Skills through self-instructional Audio-cassettes.</td>
<td>8</td>
</tr>
<tr>
<td>3.</td>
<td>Control Group</td>
<td>Teaching Practice in Traditional way of student-teaching.</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>32</strong></td>
</tr>
</tbody>
</table>
The student-teachers mentioned in the above table were given treatments to achieve the main objective of the study.

2.4 Tools to be used:

It is but natural that the help of some tools is taken for collection of the data. In a research project this step is very crucial because wise selection of tools facilitates both the process of data collection and data analysis. The following tools have been used in this study:-

2. Socio-economic status Scale by B.Kuppuswamy.
3. Junior Index of Motivation (Jim Scale): adapted (Form F) by Jack F.Frymer.
4. Questionnaire for Student-teachers.
5. Self-instructional Audio-Cassettes.
6. Baroda General Teaching Competence Scale, prepared at Centre of Advanced Study in Education,(CASE) M.S.University, Baroda.
7. Observation Schedule for the Skill of Probing Questioning prepared at Centre of Advanced study in Education: M.S.University, Baroda.
8. Observation Schedule for the Skill of Explaining prepared at CASE, M.S.University, Baroda.

9. Observation Schedule for the skill of Illustrating with Examples, prepared at CASE, M.S.University, Baroda.

The details about them are as under:

1. THE STANDARD PROGRESSIVE MATRICES, SETS A,B,C,D AND E:-

As one of the objectives of the study was to equate the group on the intelligence variable so Standard Progressive Matrices, Sets A,B,C,D and E prepared by J.C.Ravan, M.Sc. was administered to measure the intellectual level of the student-teachers. This test used in the study is designed to measure the level of observation, abstract and clear thinking and reasoning.

The scale consists of 60 problems divided into five sets of 12. In each set the first problem is very easy and nearly self-evident. The problems which follow become progressively difficult. The five sets provide five opportunities for grasping the method and the others to assess. To ensure sustained interest and freedom from fatigue, the figures in each problem are boldly presented, accurately drawn and pleasing to look at. Everyone, whatever his age, is given exactly the
same series of problems in the same order and is asked to work at his own speed, without interruption, from the beginning to the end of the scale. The scale can be given either as an individual, a self-administered or as a group test. A person's total score provides an index of his intellectual capacity, whatever his nationality or education.

The administration of the test:

The test was administered according to the instructions given in the Progressive Matrices, Sets A, B, C, D & E. One hour was given to the student-teachers to fill the forms of the test. The first problem i.e. A1. was solved by the supervisor and then the student-teachers were asked to turn over the next page of the test book and do the rest of the problems.

Scoring:

The record forms were checked by the supervisor and the right and wrong answers according to the scoring key were marked. The total of right and wrong answers was taken and according to that the intellectual level of each student-teacher was established.
When the intellectual level of all the student-teachers was established they were classified into different grades and ranks according to their percentile ranks.
Grading key of the progressive matrices:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Rank</th>
<th>Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Intellectually superior</td>
<td>95 and above</td>
</tr>
<tr>
<td>II</td>
<td>Definitely above average</td>
<td>75 and above</td>
</tr>
<tr>
<td>III</td>
<td>Intellectually average</td>
<td>Between 75 and 25</td>
</tr>
<tr>
<td>IV</td>
<td>Definitely below average</td>
<td>25 and below</td>
</tr>
<tr>
<td>V</td>
<td>Intellectually defective</td>
<td>5 and below</td>
</tr>
</tbody>
</table>

TABLE 3.6 SHOWING THE NORMS FOR THE SELF-ADMINISTERED GROUP TEST FOR ADULTS:

<table>
<thead>
<tr>
<th>Percentile Points</th>
<th>Chronological Age in year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
</tr>
<tr>
<td>95</td>
<td>55</td>
</tr>
<tr>
<td>90</td>
<td>54</td>
</tr>
<tr>
<td>75</td>
<td>49</td>
</tr>
<tr>
<td>50</td>
<td>44</td>
</tr>
<tr>
<td>25</td>
<td>37</td>
</tr>
<tr>
<td>10</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>23</td>
</tr>
</tbody>
</table>

2. SOCIO-ECONOMIC STATUS SCALE:

As one of the objectives of the study was to equate student-teachers on the socio-economic status
variable, socio economic status scale prepared by B. Kuppuswamy was used to measure the socio-economic status of student-teachers. The scale was prepared mainly to provide a simple instrument which could be used without spending much time and effort to obtain a correct measure of socio-economic status of a person.

The socio-economic status scale has three variables covering seven items:

1) Education
2) Occupation
3) Income

These three variables are explained by B.Kuppuswamy in the manual of socio-economic status scale as under:

1) Education

The aspect Education in scale includes the length and type of education. In the top category post-graduation education as well as high grade professional education are put in together. The lower grade professional education which is post high school will be put in the third category. Those who have education in old type Sanskrit or other language Institutions will be categorised according to the duration of the course.
Occupations

The professional group includes those people who are involved in decision making processes, in laying down policies and in executing them. Mostly they have high as well as professional education. This category includes doctors, senior administrative officers, readers, professors, principals of colleges, engineers, newspaper editors, architects, bank managers etc.

The semi-professional group includes those occupations which involve post high school or college education or lower grade professional training. To this category belong mechanical and electrical engineers of technological institutions, high school teachers, lecturers in colleges, junior medical practitioners, insurance inspectors, commission agents, musicians, research assistants etc.

In the next category the persons included have some training in Arithmatic and probably also in reading and writing. The work here is of repetitive nature. This category includes the clerk, the typist, the accountants, the school teachers, the shop-keepers, farm owners, station masters, guards, news correspondents etc.

The skilled workers are those with a long
training in a rather complicated work. The mason, the carpenter, the mechanic, the engine driver the telephone or telegraphic operators etc. are included in this category.

To semi-skilled group belong all those who need some training to do their jobs efficiently e.g. factory or workshop labourer, laboratory or library attendant, the car-cleaner etc.

All persons who are doing work which involves neither education nor training will come into the next category e.g watchman, peon, coolie, domestic servant etc.

The lowest category includes those persons who are unemployed irrespective of their general and professional education or training.

(iii) **Income**

Though it is easy to get information about education and occupation yet, it is difficult to get information about the income of a person. The only thing is that items are very broad and the slight errors will not make much differences.

So these three variables constitute the socio-economic status scale. The scale is given below:

**Items:**

A. **Education**
1. Professional degree, Master's degree and above.
2. B.A./B.Sc. degree.
3. Intermediate or post-high school diploma.
4. High School or its equivalent.
5. Completion of full course of elementary education or middle school.
6. Literacy or going to elementary school for a few years.
7. Illiterate.

B. Occupation:
1. Higher professions like engineering, medicine, law, administration etc.
2. Semi-professional
3. Clerk, Shop-keeper, farm owner etc.
4. Skilled work.
5. Semi-skilled work.
6. Unskilled work—domestic servant, farm labourer, casual labourer etc.
7. Unemployed, dependent, beggar, vagrant.

Monthly Income
1. Above Rs. 1000/-
2. Between Rs. 750/- & Rs. 999/-
3. Between Rs. 500/- & Rs. 749/-
4. Between Rs. 300/- & Rs. 499/-
5. Between Rs. 101/- and Rs. 299/-
6. Between Rs. 51/- & 100/-
7. Below Rs. 50/-.
Administration of the scale

The scale was administered by strictly following the instructions given in the manual of socio-economic status scale (urban) by B. Kuppuswamy. The specially devised inventory form was given to the student-teachers to be filled up giving the particulars about their parents or guardians. The three aspects of the scale, namely, education, occupation and income were duly filled by the student-teachers.

Scoring:

Scoring of the status score of each student-teacher was done by duly filling the score card and giving proper weightage to the various items of the score-card. The weightage of the scale items is given as follows:

The Scale:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-29</td>
<td>I High</td>
</tr>
<tr>
<td>16-26</td>
<td>II</td>
</tr>
<tr>
<td>11-15</td>
<td>III Average</td>
</tr>
<tr>
<td>5-10</td>
<td>IV</td>
</tr>
<tr>
<td>Below 4</td>
<td>V Low</td>
</tr>
</tbody>
</table>

3. JUNIOR INDEX OF MOTIVATION (JIM SCALE) ADAPTED (FORM P) BY JACK P. FRYMER:

As one of the objectives of the study was to equate student-teachers on the academic motivation
The Index of Motivation (JIM Scale) adapted (Form F) was used to measure the academic motivation level of student-teachers. This is a scale which has been prepared by Jack L. Frymier in order to measure pupils' motivation towards school. This is a paper pencil test. The scale consists of eighty statements which unfold students' motivation towards school, learning and their desire to excel in school subject.

These statements are to be rated on a five point scale i.e.

1. Agree
2. Slightly agree
3. Indecision.
4. Slightly disagree.
5. Disagree.

There is no time limit for the scale but generally students complete it within 30 minutes.

The instructions to be followed are given at the top of the scale.

**Administration:**

In order to obtain reliable information the students were taken into confidence before administering the scale. The instructions were verbally read out to
them. Care was taken that students do not consult each other. In order to avoid mutual consultation, the scale was administered to a maximum of 30 students at a time. The scale is in English. But its adapted form was used by the investigator.

Students were asked to mark (x) at the appropriate place against each statement.

**Scoring:**

Scoring was done to find out the total scores of each student-teacher on the scale. The scoring was done as follows:

- 2 marks to Agree.
- 1 mark to Slightly Agree
- -1 mark to Slightly Disagree.
- -2 mark to Disagree.

All the scores were summed up. This gives the converted scores of Academic Motivation. In order to get the real score, the sign reverted i.e. sign plus is changed to minus and vice-versa, then hundred is added. This gives the index of Academic Motivation of the students.

Out of the eighty statements in the questionnaire
only fifty statements are to be marked, they are:
5, 6, 7, 9, 10, 12, 13, 14, 16, 18, 19, 21, 23, 24, 26, 28, 29, 30, 31,
34, 36, 37, 38, 40, 44, 46, 48, 51, 52, 53, 54, 55, 56, 58, 60, 62, 63,
64, 65, 67, 68, 69, 70, 72, 73, 74, 75, 76, 79, 80.

4. **QUESTIONNAIRE FOR STUDENT-TEACHERS**

In order to get information about student-teachers a questionnaire was prepared. The questionnaire tries to ascertain information on the following aspects of student-teachers.

The first eight questions are about the identification data of the student-teachers in which information about age, sex, marital status, religion, nationality, castes, rural-urban background etc. has been sought. Information about qualification of student-teachers is also included in the questionnaire. Through question number eleven it is proposed to find out whether a student-teacher did his graduation while studying in college. Questions twelve and thirteen relate to the teaching experience and teaching qualification. Question number fourteen is to know whether there is any person in the family who had been a teacher. Question fifteen and sixteen are for studying family background. Question number eighteen relates to the place of residence of the
student-teachers. How much expenditure a student-teacher is likely to incur on her training would be revealed by the question number nineteen.

5. **SELF-INSTRUCTIONAL AUDIO-CASSETTES**

As one of the major objectives of the study was to test the effectiveness of self-instructional audio-cassettes in the acquisition of some skills, so self-instructional audio-cassettes were prepared and used.

The preparation of self-instructional material in the form of audio-cassettes was processed through a number of stages right from the first initial draft to final draft after final tryout.

By and large the process of preparation of SIM for different skills has a common structure. Generally the process of preparing the SIM starts with the presentation of theoretical background of a particular skill. It is presented in a simple language with many classroom examples so that students can easily understand. Generally, the rational for the skill is introduced by presenting teaching episodes highlighting the importance and purposes of using that skill. Simultaneously, the
meaning, definition and purposes of the skill were exposed by the commentator. A description of each component of the skill with classroom examples and episodes is given. The main purpose behind this is to enable the student-teachers to practice the skill in the classroom, to get clarity about the components and to make them aware of each instance and its application.

The exercises are presented in the next stage in order to know the student-teachers' comprehension about the skill. It will also enable them to identify the components of the skill.

The third stage in the process of the preparation of SIM is in the form of model lesson presented through audio-cassettes. At this stage the main emphasis is to enable the student-teachers to write the lesson plan and to practise the skill with ease listening the model by themselves. Following this, two types of observation proformas, frequency and rating type, prepared at CASE, Baroda, are explained. Both of these observation schedules include items on all the components of the corresponding skill. The frequency type is included for purposes of noting down the frequency of occurrence of each of the behavioural components during the lesson and hence,
for giving pin-pointed feedback quantitatively.
For purposes of giving feedback qualitatively a seven point rating scale is included for the same items. This helps the trainee to know the direction in which he has to improve in terms of quality. These observation schedules can be used by the trainee himself after replaying the tape of his/her own lesson.

This is the general structure of self-instructional audio-cassettes.

Administration of SIAC

After observing the two traditional lessons of each student on Baroda General Teacher Competence (BGTC) scale, they were oriented to microteaching technique, and skill of probing questioning through audio-cassettes. They listened the cassette twice. Then they were asked to prepare their own micro-lessons in their respective method subjects for practising the skill to achieve its maximum level. They taught the lessons to seven peers for 6 to 8 minutes which were taped by the trainees.

Then the lesson was replayed and the trainee got self-feedback by using the observation schedules - both frequency and rating types. Then they replanned their
lesson, delivered them again, taped, replayed and received refeedback for the lesson. After completing one cycle they again listened the SIAO and then second cycle began. After the third cycle it was observed that the student-teachers had mastered the particular skill and afterwards they went on to the second skill in which again the same procedure was followed. Similar procedure was adopted in the training of the third skill.

After getting training in all the three skills, two traditional lessons of each student-teacher in actual classroom situations were observed using BGTC to get post-test scores. The effectiveness of SIAO was tested by comparing the pre-test and post-test scores on BGTC.

6. **THE BARODA GENERAL TEACHING COMPETENCE SCALE:**

As one of the objectives of the study was to test the effectiveness of self-instructional audio-cassettes in increasing the teaching competency of student-teachers, observation schedule for general teaching competence prepared at CASE, Baroda was used to get initial test scores and final test scores. This scale is based mostly on the teaching skills developed at the Stanford University and the Far West Laboratory and the list of teaching skills
developed at the CASE (Lalita 1975). They have conceptualised twenty one skills which are essential for general teaching competence.

The Baroda General Teaching Competence Scale (BGTC Scale) has been developed and measuring criteria for each of the skills included in it have been provided. This scale has five parts: (i) Planning (Pre-Instructional), (ii) Presentation (Instructional), (iii) Closing, (iv) Evaluation, and (v) Managerial. In the present study three aspects of BGTC Scale have been used. These are (i) Planning, (ii) Presentation, and (iii) Closing.

(1) **PlANNING**

The planning aspect includes the pre-instructional planning on the part of the student-teacher. It explains the aims and objectives in the context of the content selected by the student-teacher. This part brings to light whether the objectives were appropriate or not, whether the objectives were relevant to the content selected or not and whether they were sufficient with respect to the unit taught or not. It also explains if the objectives can be attained within the time limit and facilities available.
It also explains whether the content selected was related to the objectives, maturity level of the pupils and facilities available or not. The adequacy and accuracy of the content is also judged from this aspect. The organisation of the content is also seen from this part. It explains whether the content was logically organised or not, whether it proceeds from simple to complex or not. Besides, it also explains how many audio-visual aids were used, were they enough or not, whether they were sufficient or not and whether they appealed to and interested the students or not. In general this portion explains whether the teacher has planned on the right lines or not. It brings to light why the teacher has selected a particular topic and how he is going to teach it. However, the terms used in the planning aspect of BGTC scale are explained below:

1. **Objectives of the Lesson**

   a) **Clearly stated**: An objective is said to be clearly stated when it satisfies the following criteria:

   (i) There is a verb which describes the learning outcome in the pupils in behavioural terms,

   (ii) the learner is specified

   (iii) the conditions under which the learning outcome
is measured are indicated, and (iv) the standard-qualitative/quantitative of achievement is specified.

b) Relevant to the content: An objective is said to be relevant to the content when the objective is related to what is being taught.

c) Adequate: The list of objectives is said to be adequate when it is sufficient with respect to the unit taught, different levels of learning outcomes, the maturity level of the pupils, time and facilities available.

2. Content Selected:

a) Relevant: When content is related to the objectives specified, the maturity level of the pupils, time and facilities available.

b) Adequate: When content is sufficient to cover all the objectives specified.

c) Accurate: Content is said to be accurate when there is no technical mistake.

3. Organisation of Content Selected:

a) Logical Continuity: There is logical continuity in the content when every unit of content to be presented is logically linked with the previous unit.

b) Psychological Organisation: The content is said to be psychologically organised when it is arranged
in such a way that pupil's previous knowledge forms the basis for presenting new knowledge and it proceeds from simpler concepts to difficult concepts.

4. Audio-Visual Materials Chosen:
   a) Suited to pupils: To their interest and maturity level.
   b) Suited to Content: When they are related to the content to be presented and make the presentation of the content more vivid.
   c) Adequate: When they are sufficient with respect to the content they explain.
   d) Necessary for the attainment of objectives: When they facilitate attainment of objectives to a greater extent than in their absence.

PRESENTATION:

Presentation is the practical aspect of the planning part. It includes the introduction of the lesson, use of questioning, explanation of the content, use of various stimuli, use of silence and non-verbal cues, use of verbal and non-verbal re-inforcers, pacing of the lesson and blackboard work. In general presentation aspect explains the strength of efforts
which were made by the student-teacher to achieve the aims that he has placed before himself. Further, it also explains the extent to which the student-teacher was successful in his efforts. It explains whether he was successful in introducing his lesson effectively and in an adequate way or not. It shows the quality of the questioning of the student-teacher and how nicely the problems of no response, partially correct response, and completely correct response were handled. This aspect also brings to light how far the teacher was attentive to the responses of the pupils, whether he maintained meaningful silence or not. It also explains the extent of the use of verbal and non-verbal reinforcers. Lastly, presentation aspect includes the assessment of the blackboard handwriting of the student-teacher if it was adequate, neat, of reasonable size and legible or not. So, presentation aspect is the explanation of the activity of the teacher and how the teacher can maximise the pupil activity in the classroom. This presentation aspect tests the ability and capacity of the teacher in making the presentation of the lesson in the best way.

5. **Lesson Introduced:**

(a) **Ready emotionally**: When pupils are attentive and keen to learn the new lesson as indicated by their
non-verbal participation like postures, attentive looks towards what the teacher does etc.

(b) **Ready from knowledge point of view**: Indicated by pupil's verbal participation in terms of correct responses to teacher's questions and pupil's meaningful initiation.

(c) **Use of previous knowledge**: When already possessed knowledge of pupils is being used.

(d) **Continuity in statements or questions**: When a teacher's statement or a question is related to the immediately preceding statement or question.

(e) **Relevant**: When every statement or question uttered by the teacher is related to the objectives of the lesson.

(f) **Use of appropriate device or technique**: When the device or techniques used are suitable to the maturity level, age level, grade level, interest, culture, experience of pupils and to the unit to be taught.

6. **Questions Put**

(a) **Well structured**: A question is said to be well-structured when it is grammatically correct, relevant, specific and concise.
i) **Relevant:** When it is related to the topic being discussed and does not contain any technical term not taught earlier.

ii) **Specific:** When it calls for a single correct answer.

iii) **Concise:** When it is not lengthy and does not contain extra words.

b) **Properly Put:** A question is said to be properly put when it is uttered with suitable speed and pause (so that it facilitates the understanding of the question) and suitable voice (suitable to all pupils, raised and clear.)

7. **Questions for Probing**

   (a) **Prompting question:** A probing question which includes a hint for the pupil that helps him in reaching the expected response, generally asked when there is a 'no response', 'partially correct response', 'incomplete response', or 'wrong response'.

   (b) **Seeking further information:** A probing question which asks for more information about the response.

   (c) **Refocusing question:** A probing question which expects the pupil to compare the idea or phenomena in his
response with other idea or phenomena (which he has already learnt) for similarity, contrast or for other relationship.

(d) Increasing critical awareness question: A probing question which seeks 'how' and 'why' of pupils' response with an intention of increasing critical awareness about the response.

8. Explanation of concepts and principles: -

(a) Statements to create set: Those that create readiness in pupils (regarding what is to be explained) emotionally and from knowledge point of view.

(b) Concluding statements: They are summary statements covering the main points in explanation.

(c) Relevant statements: Those that are related and contribute to what is being explained.

(d) Statements that have continuity: Statements that are linked logically with the previous ones and having spatial and time sequence.

(e) Appropriate Vocabulary: Technical terms appropriate to the particular class, age group, and known to majority of pupils.

(f) Explaining links: Words and phrases (mostly conjunctions and prepositions) which indicate that the teacher is explaining.
9. **Illustration of concepts and principles**
   (a) **Appropriate examples**: Those that are simple, relevant and interesting.
   
   (b) **Simple example**: One that involves previous knowledge of pupils, which can be judged from their participation.

   ii) **Relevant Example**: One that exemplifies the concept or principle being illustrated.

   iii) **Interesting example**: One that can arouse curiosity and interest in pupils, which can be judged from their attending behaviour.

b) **Appropriate media (verbal and non-verbal)** Refers to those that are suited to age, grade and maturity levels and to the unit taught.

10. **Securing and sustaining attention by varying stimuli**
   
   (a) **Movements**: Those movements that are deliberately made from one place to another, in order to secure pupil's attention.

   (b) **Gestures**: Include movements of head, hand and body to direct attention, to indicate shapes, sizes, movements etc.

   (c) **Change in speech pattern**: Include sudden change in tone, volume or speed of teacher's speech.
(d) **Focusing**: Includes verbal, gestural or verbal-gestural focusing (drawing pupil's attention to specific aspects in the lesson).

(e) **Change in interaction style**: Include change in one type of interaction style to another - teacher-group, teacher-pupil, and pupil-pupil.

(f) **Pausing**: Involves deliberate silence in order to draw pupil's attention.

(g) **Oral-visual switching**: Includes change from one medium to another - oral, visual and oral-visual through which information is conveyed to the pupils.

11. **Use of deliberate silence and non verbal cues**:

(a) **Silence**: Includes meaningful silence meant to stimulate pupils to think, for considering pupil's questions, after a pupil's response indicating him to continue, etc.

(b) **Non-Verbal cues include the following**:

   1) **Facial cues**: A smile, a frown, looking thoughtfully at the pupil and a quizzical look.

   2) **Head movement**: Nodding, shaking, tilting of head etc.
iii) **Body movement**: Movement from one place to another.

iv) **Hand movements**: Pointing to the student, 'continue' cue, 'anything else' cue, 'stop' cue, pointing from one student to another etc.

12. **Use of verbal and non verbal reinforcement**:

   (a) **Verbal reinforcers**: Include expressions like good, excellent, come on, think, um-um, etc., and also repetition and rephrasing of pupil's response which reinforce the pupil's behaviour positively and encourage him to participate.

   (b) **Non-verbal reinforcers**: Include non-verbal behaviours like nodding, smiling, moving towards responding pupils, looking attentively at the responding pupil, writing pupil's response on the blackboard which reinforce or strengthen pupil's behaviour and encourage him to participate.

13. **Pacing of the lesson**: Speed of presentation matching with the rate of pupils' understanding; When before proceeding from one unit to another, pupils' understanding about the earlier unit is brought out.

14. **Blackboard work**:

   (a) **Legibility in handwriting** includes the following:

   i) every letter is distinctly different from the other.
ii) There is adequate pacing between two letters and between two words.

iii) Slantness of each letter is closest to the vertical.

iv) Size of each letter is large enough to be read from the far end of the room.

v) All capital letters are of the same size and all small letters are of the same size.

vi) Thickness of the lines is of same width.

(b) Neatness in blackboard work includes the following:

i) Words and sentences written are parallel to the base of the board.

ii) Spacing between lines is adequate.

iii) There is no overwriting.

iv) Only the relevant matter which is under the focus of classroom discussion is retained on the blackboard.

(c) Appropriateness of written work on the blackboard includes the following:

i) There is continuity in the points being presented on the blackboard.

ii) Points written are brief and simple.

iii) Important points are underlined to draw pupils' attention.
iv) Coloured chalks are used suitably.
v) Diagrams are proportional in size.
vi) Diagrams/illustrations are developed along with the lesson.
vii) There are no unnecessary details in the diagrams/illustrations.

3. **CLOSING**

The closing aspect includes the way student-teacher assessed the comprehension of the pupils whether the present knowledge was linked to the previous knowledge or not and if home work was given according to the individual differences of the pupils or not. The closing aspect explains how efficiently the student-teacher ended his lesson. The closing aspect brings to light what were the situations in which the student-teacher tested the comprehension of the pupils and how far the assignment given was relevant and adequate to the content taught. This is the aspect which testifies whether the content was presented adequately or not. It is a criterion which finally testifies to the ability of the student-teacher. The terms used in the closing aspect of BGTO scale are explained below-

15. **Assignment**: Suited to weak students (simple recall or recognition type items), certain are suited to average
(more than recall and requires understanding), and others are suited to above average students (challenging, requires creative, original and higher order thinking).

(b) Relevant: Related to the content being taught
(c) Adequate: Sufficient with respect to the content covered and to the checking of the objectives specified.

The BGTG is a seven point scale ranging from 'not at all' to 'very much'. Score zero represents 'not at all' and score seven represents 'very much'. All the twenty-one items on the scale are positive and maximum total score is 147.

The inter-observer reliability coefficient ranged from .85 to .91. The observers were the research-workers of the CASE, the M.S.University, Baroda. They were working in the area of microteaching.

7. OBSERVATION SCHEDULE FOR THE SKILL OF PROBING QUESTIONING

As one of the objectives of the study is to develop the skill of probing questioning through self-instructional audio-cassettes, the observation schedule for probing questioning prepared at CASE, Baroda, was used to observe and measure this skill. This schedule is of two types.
These two types are identical in content but differ in the mode of responding. These modes of responding are based upon (i) frequency system, for marking tallies, and (ii) numerical weightage system to ascertain the extent to which the student-teacher uses the skill of probing questioning.

The details of the observation schedule are given as under:

(a) **Schedule for marking tallies**: This schedule has four parts:

1) The first part records the bio-data about the student-teacher who is to be tested on this schedule.

   i) Name of the student-teacher.

   ii) Roll No.

   iii) Topic.

   iv) Class.

   v) Name of the supervisor.

   vi) Date.

   vii) Time duration.

   viii) Teach/Reteach.

2. Second part explains the meaning of the components which constitute the skill of probing questioning so that the investigator can mark the tallies correctly without confusing the different components. These components
are:

1) Prompting questioning.
2) Seeking further information questions.
3) Refocusing questions.
4) Redirected questions.
5) Increasing critical awareness questions.

3. The third part explains in very precise terms the method and instructions to mark tallies for each of the probing questions that occur during the lesson.

4. The last part has two portions. On the left hand are given the names of the components in serial order. On the right side are given the cells opposite each component to mark tallies. The investigator marks one tally when any of these components is used by the student-teacher who is observed on this schedule.

(b) The second type of observation schedule for the skill of probing questioning records the extent to which the skill of probing questioning was used by the student-teacher.

This schedule has three parts:

1. The first part records the bio-data of the student-teacher whose lesson has been recorded on the first schedule for marking tallies.
i) Name of the student-teacher.
ii) Roll No.
iii) Topic
iv) Class
v) Name of the supervisor.
vi) Date
vii) Time Duration
viii) Teach/Research.

2. The second part includes the instructions for marking the extent to which the student-teacher uses the skill of probing questioning. Judgements are to be given on a seven point scale for various components of the skill. The extent of use is indicated by crossing the number which is considered to be fixed by the investigator. The scale value '0' indicates that the particular component or components of the skill was not used at all, whereas scale value '6' means that the student-teacher used the skill component or components very much. Keeping these two extremes in view, the behaviour of the student-teacher is indicated by crossing the appropriate scale value. The maximum possible score is thirty five.
3. The third part has again two portions. On the left side the five components of the skill of probing questioning are given in a serial order. On the right side is given the six point scale on which the extent of the use of the particular component is to be indicated by crossing the appropriate scale value. So these two types of observation schedules when combined give the total picture of the extent of the use of the skill of probing questioning by the student-teacher.

8. **Observation Schedule for the Skill of Explaining:**

The development of the skill of explaining is one of the objectives in the study. Therefore, for observing and measuring this skill the observation schedule for the skill of explaining prepared at CASE, Baroda was used.

This observation schedule is of two types:

(a) For marking tallies.

(b) For ascertaining the extent of the use of skill of explaining.

(a) **For marking tallies:** This schedule has four parts:

1. The first part records the bio-data of the student-teacher who is observed on the schedule. It includes, (i) name of the student-teacher (ii) Roll No. (iii) Topic, (iv) Class, (v) Name of the supervisor, (vi) Date, (vii) Time duration, and (viii) Teach/Reteach.
2. The second part includes the explanation of the different desirable and undesirable behaviours or components of the skill of explaining. The key terms used in the schedule are explained e.g. this portion defines and explains what are explaining links, beginning statements, concluding statements, inappropriate vocabulary, vague words and phrases etc.

3. The third part of the schedule gives instructions for marking tallies. Tallies are to be marked for the occurrence of instances for each of the desirable and undesirable teacher behaviours. The questions which are followed by correct responses are to be tick (✓) marked.

4. The fourth part of the schedule has two parts in which the tallies are to be marked (i) Desirable behaviour (ii) Undesirable behaviour. On the left side of these two parts are given the components of desirable and undesirable behaviour. On the right side are the cells against each component to mark tallies for the occurrence of each desirable and undesirable behaviour. One tally stands for the occurrence of behaviour once.

(b) For ascertaining the extent of the use of the skills
This observation schedule is employed after the use of the observation schedule for marking tallies. This is meant to ascertain the extent of the use of the skill of explaining. It has three parts.

The first part includes the bio-data of the student-teacher whose behaviour has already been observed on the first observation schedule. This part includes the name of the student-teacher, Roll No., Topic taught, class, time, date, name of the supervisor etc.

The second part gives instructions for ascertaining the extent of the use of the skill of explaining. Judgements are to be given on a seven point scale for various aspects of the skill. The extent of the acquisition of the various aspects of the skill is indicated by crossing (x) the appropriate number the investigator deems fit. The scale value '0' indicates that the student-teacher did not use the concerned aspect or aspects of the skill at all. The scale value '6' indicates that the student-teacher used the particular aspect(s) very much. Keeping these two extremes in view the investigator marks the teacher behaviour related to the various aspects of the skill by crossing(x) the right number in the scale value ranging from zero to six. The maximum score on the proforma is seventy which is the
total of the ratings on desirable items and reversed ratings on undesirable items.

The third part of the schedule again has two parts. On the left side are given the various components of the skill of explaining in serial order. On the right side against each component is given the scale on which the extent of the use of the skill of explaining is to be marked on the scale of values of '0 to '6'.

When these two observation schedules are combined together they give the extent of the use of the skill of explaining by the student-teacher.

9. **OBSERVATION SCHEDULE FOR THE SKILL OF ILLUSTRATING WITH EXAMPLES**

This schedule has been used to observe and measure the skill of Illustrating with Examples. It has been prepared at CASE, Baroda.

This observation schedule is again of two types:-

a) For marking tallies.

b) For ascertaining the extent of the use of the skill of Illustrating with Examples.

a) **For marking tallies:**

This part of the schedule has four parts.

1. The first part includes the bio-data of the
student-teacher whose behaviour is to be observed on this observation schedule. It records, (i) name of the student-teacher, (ii) Roll No., (iii) Topic, (iv) Class (v) Date (vi) Time duration, (vii) name of the supervisor and (viii) Teach/Reteach.

2. The second part explains the terms used in the observation schedule, so that the investigator can clearly and distinctly mark the tallies without confusing the different aspects of the behaviour of the teacher. It explains the concept of simple examples, relevant examples, interesting examples, inducto-deductive approach etc. These explanations provide guidelines for marking tallies.

3. In the third part are given the instructions for marking tallies. The investigator is to tick (✓) against each example whether it is simple, relevant, interesting, presented through appropriate media and whether it involves any pupil participation. In the column under 'Approach' the investigator is to write 'I' (inductive) if the example was used for arriving at a concept and 'D' (deductive) if the example was to verify the pupil's understanding. 'R' is also to be written in
the same column for indicating the place where the concept or rule is arrived.

4. The fourth part includes the eight columns where the use of the examples is to be tick (✓) marked. These eight columns are (i) Sr. No. of example, (ii) Simple (iii) Relevant to rule or concept, (iv) Interesting, (v) Medium/Media appropriate, (vi) Approach, (vii) Pupil participation, (viii) Remarks. These eight columns of the fourth part are duly filled by the investigator as the pupil-teacher uses the skill of illustrating with examples.

(b) To ascertain the extent of the use of the skill:

This observation schedule is used when the investigator has duly filled in the previous observation schedule for marking tallies. It is used to ascertain the extent of the use of the skill of illustrating with examples. It has three parts.

1. The first part includes the bio-data of the student-teacher who is already observed and marked by the investigator on the observation schedule for marking tallies. This part records again the name and Roll No. of the student-teacher, topic to be taught, class, date, time etc.

2. The second part of this schedule gives instructions
for ascertaining the extent to which the student-teacher used the skill. Judgements have to be given on a seven point scale. The extent of the use of the various components of the skill is indicated by crossing (x) the number the investigator deems to be fit. The scale value '0' indicates that the student-teacher did not use the component(s) at all. The scale value '6' indicates that the student-teacher used the components very much. Keeping these two extremes in view the investigator indicates the extent of the use of the skill by crossing the right scale values ranging from zero to six. The maximum total score on the performa is sixty three.

3. The third part of the observation schedule is further divided into two parts. On the left side are given the various components of the skill of Illustrating with Examples in serial order. On the right side is given the scale value ranging from '0' to '6' against each component. By crossing (x) the appropriate number the investigator indicates the extent of the use of the skill of Illustrating with Examples by the student-teacher.

When these two observation schedules are combined they give a complete picture of the use of the skill of Illustrating with Examples by the student-teacher.
Content validity of these observation schedules was established by discussing each item in the observation schedules in the tryout stage. The reliability of the observation schedules was established through calculating the interobserver reliability. The trained observers observed the microlessons simultaneously. Using Pearson's Product Moment Correlation, data were analysed. Results revealed that an average correlate between pairs was 0.85.

2.5 STATISTICAL TREATMENT

Statistical procedures have been developed to simplify the large quantities of numerical data and thus to assist in the task of obtaining meaning from them. In this study the undermentioned statistical treatments were applied to give numerical description and meaningful shape to the obtained data:

1. **MEAN**

   The computation of central tendencies like mean, median and mode are common feature in almost all investigations. Mean is the basic statistic which no research can afford to ignore. It is used to give concise description of the whole group. In this
investigation mean has been calculated for different purposes by using the following formula:

\[ \text{Mean} = \frac{\sum X}{N} \]

2. **MEASURE OF VARIABILITY**:

Central tendency gives us the overall picture of the performance of the group whereas measures of variability like standard deviation represent the spread of the distribution. It also tells us the degree to which the scores are clustered around the mean. It is referred to as S.D. S.D. has also been calculated in this study. The following formula has been used:

\[ \text{S.D.} = \sqrt{\frac{\sum X^2}{N}} \]

3. **COEFFICIENT OF CORRELATION**:

Co-efficient of correlation may be thought of essentially as that ratio which expresses the extent to which changes in one variable are accompanied by or dependent upon changes in another variable. The co-efficient varies between +1 to -1. In the present study correlation with product moment method has been calculated to know the relationship between the scores at different stages and for different skills by
applying the following formula:

\[ r = \frac{\bar{x} - \bar{y}}{\sqrt{\text{var}(x) + \text{var}(y)}} \]

4. **STANINE SCALE**

Stanine scale is made to present the raw data against a standard norm. In the present study, the raw scores of the performance of student teachers on BGTC scale have been converted into stanine scores.

5. **SIGNIFICANCE OF DIFFERENCE BETWEEN TWO MEANS**

In order to measure the effect of any type of practice or special training on the group or groups, the difference between the means of initial and final scores or of two groups is calculated. And in order to say with confidence that the difference between two means is not due to sampling error, we need to know the standard error of the difference between two means. In the present investigation, the difference between the two means has been calculated to see the effectiveness of SIAC in developing teaching skills among student-teachers by applying the following formula:

\[ \text{SED} = \sqrt{\frac{\sigma^2_{M_1} + \sigma^2_{M_2} - 2\sigma_{M_1}\sigma_{M_2}}{N_1 + N_2 - 2}} \]

6. **ANALYSIS OF CO-VARIANCE**

When we are not in a position to control factors
which may influence the criterion variable experimentally, we control them statistically by using analysis of co-variance. In this study the analysis of co-variance is used to know the over-all effect of SIAC for developing teaching skills among student-teachers and thus increasing general teaching competence.

2.6 CONCLUSIONS:

The research design, instrumentation, methods and procedures were treated in this chapter. Having described the research design, the method and procedure, the collection analysis and interpretation of data will now be presented in the chapter that follows.