CHAPTER IV

DEVELOPMENT OF INSTRUCTIONAL MATERIAL

4.1 Development of Programmed Learning Material

4.1.1 Preparation
4.1.2 Writing the Programme

4.2 Library Reading

4.3 Discussion

4.4 Practical Work

4.5 Field Testing

4.6 Revision and Final Draft

4.7 Reaction Scale

4.8 Instruments to measure the Students' Characteristics

References

Instructional material forms an important part of the study. The achievement of the objectives to a great extent depends upon the appropriate instructional materials. The development of materials should be tailored to particular student vocabularies, types of experiences, learning patterns and specific objectives. It is, therefore, very important that care should be taken to develop instructional materials according to the pre-decided objectives of each component. The details of the development of instructional materials for four components included in the present study have been described here. In addition to these, this chapter also presents the details regarding the development of other instruments used in this study.

As mentioned in chapter III, in the present investigation, out of the four components, the PLM has been included as the major component of the strategy. Therefore, the procedure of the development of software material for the PLM has been given first, with all the necessary details. After giving the complete procedure upto the individual and group tryout, the procedure about the development of the software material for other three components, viz., library-reading, discussion and practical work followed by procedure of field try-out have been described. According to the order mentioned, the procedure followed to develop the software material for all the

components is as under :

- Development of programmed learning material
- Library - Reading (References)
- Discussion (Points for discussion)
- Practical work assignment
- Field tryout
- Instruments to measure students' characteristics

4.1 Development of Programmed Learning Material

Programmed learning material was developed for the course content. The development of PLM falls under the following phases.

1. Preparation :

(a) Analysis of the course content

(b) Behaviour specifications -

(i) Terminal behaviours

(ii) Entering behaviours and target population

(iii) Criterion test

(c) Task Analysis

(d) Programmed style, presentation format, response mode.

2. Writing the programme :

(a) Writing the frames

(b) Types of frames

(i) Teaching frames

(ii) Practice frames

(iii) Review frames

(iv) Criterion frames

(c) Prompts

(d) First draft of the programme

3. Field Testing :

4. Revision and final draft

4.1.1 Preparation :

4.1.1.1 (a) Analysis of the Course Content : First of all, the course contents were analysed in detail. The course on 'Educational Evaluation' includes six units. It is prescribed as a compulsory course for the B.Ed. students of S.N.D.T. Women's University. The special feature of the course is that, the student teachers have to utilize the knowledge of evaluation in their day-to-day practice-teaching work throughout the year. So units were rearranged according to the importance of utility to provide theoretical and practical knowledge at the right time. Another consideration for the rearrangement of the

units was regarding the development of PLM, which requires some sequential order of units. Proper sequence for the presentation of contents was decided on the basis of flow charts. Flow charts were prepared to study the interdependency of the different concepts to be covered and for the proper sequencing of content material. The course content includes the following six units :

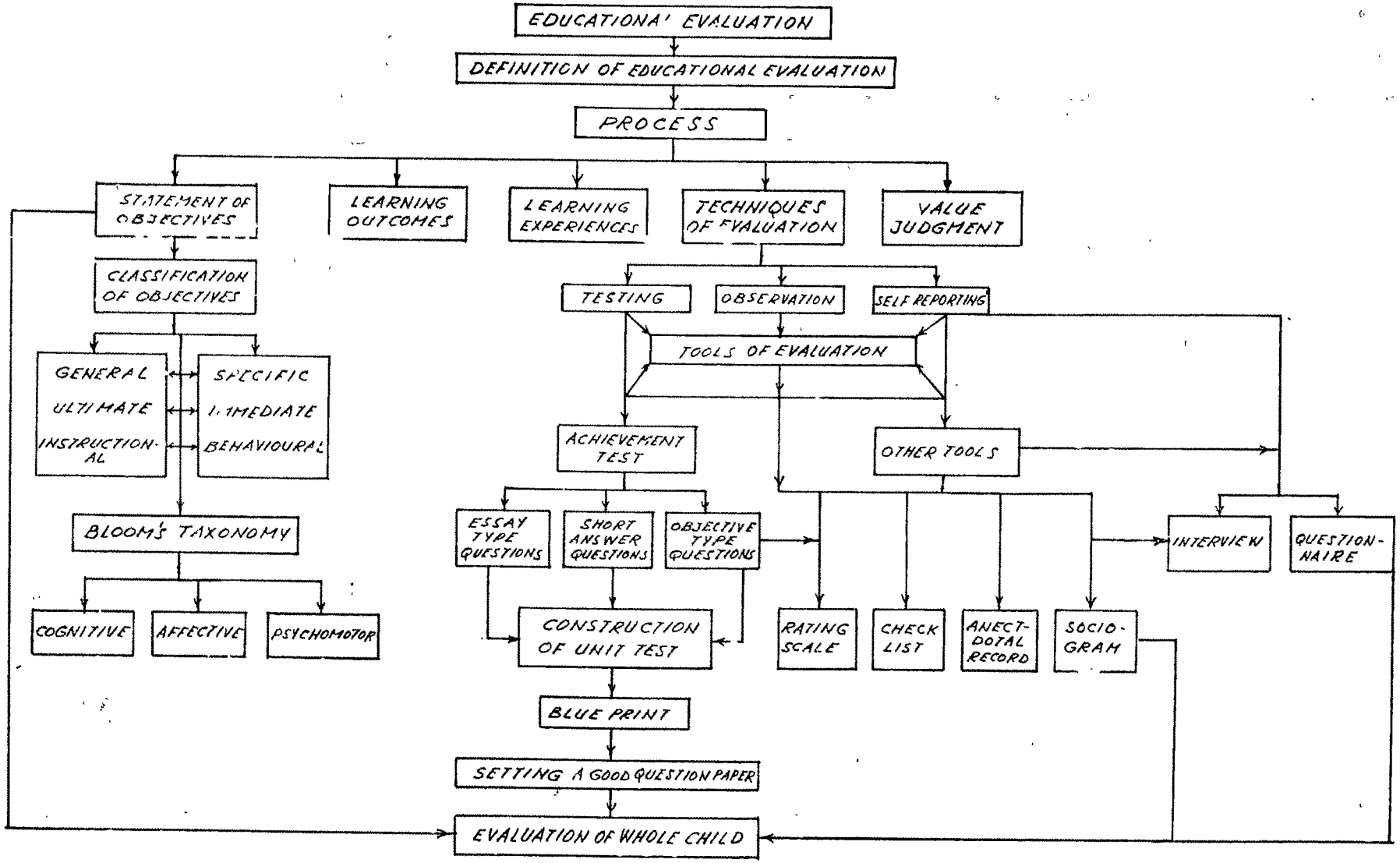
1. The concept and theory of evaluation
2. Taxonomy of educational objectives
3. Techniques of evaluation
4. Types of questions
5. Acquaintance with tools of evaluation
6. Unit test

Flow chart I presents a comprehensive picture of the content of complete course. Flow Chart II presents the analysis of the content included in Unit I. In the same manner flow charts from III to V present the analysis of the content included in the Units III to VI. All the flow charts are presented here.

4.1.1.2 (b) Behaviour Specifications : (i) Terminal behaviours : The first step in designing an instructional system is the specification of the purpose and objectives to be achieved. In an instructional system the 'end-product'

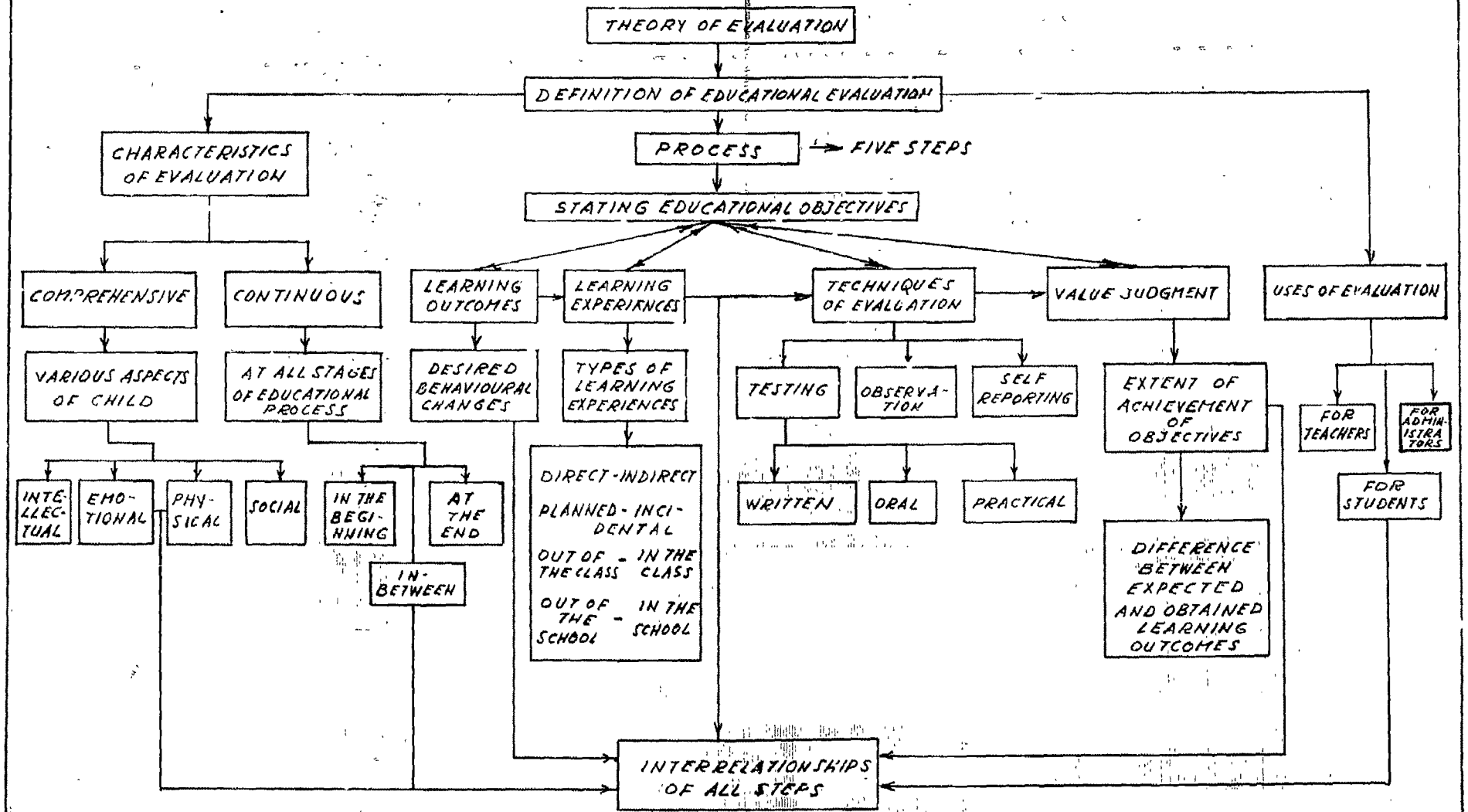
FLOW-CHART - I

A COMPREHENSIVE PICTURE OF THE COURSE-EDUCATIONAL EVALUATION



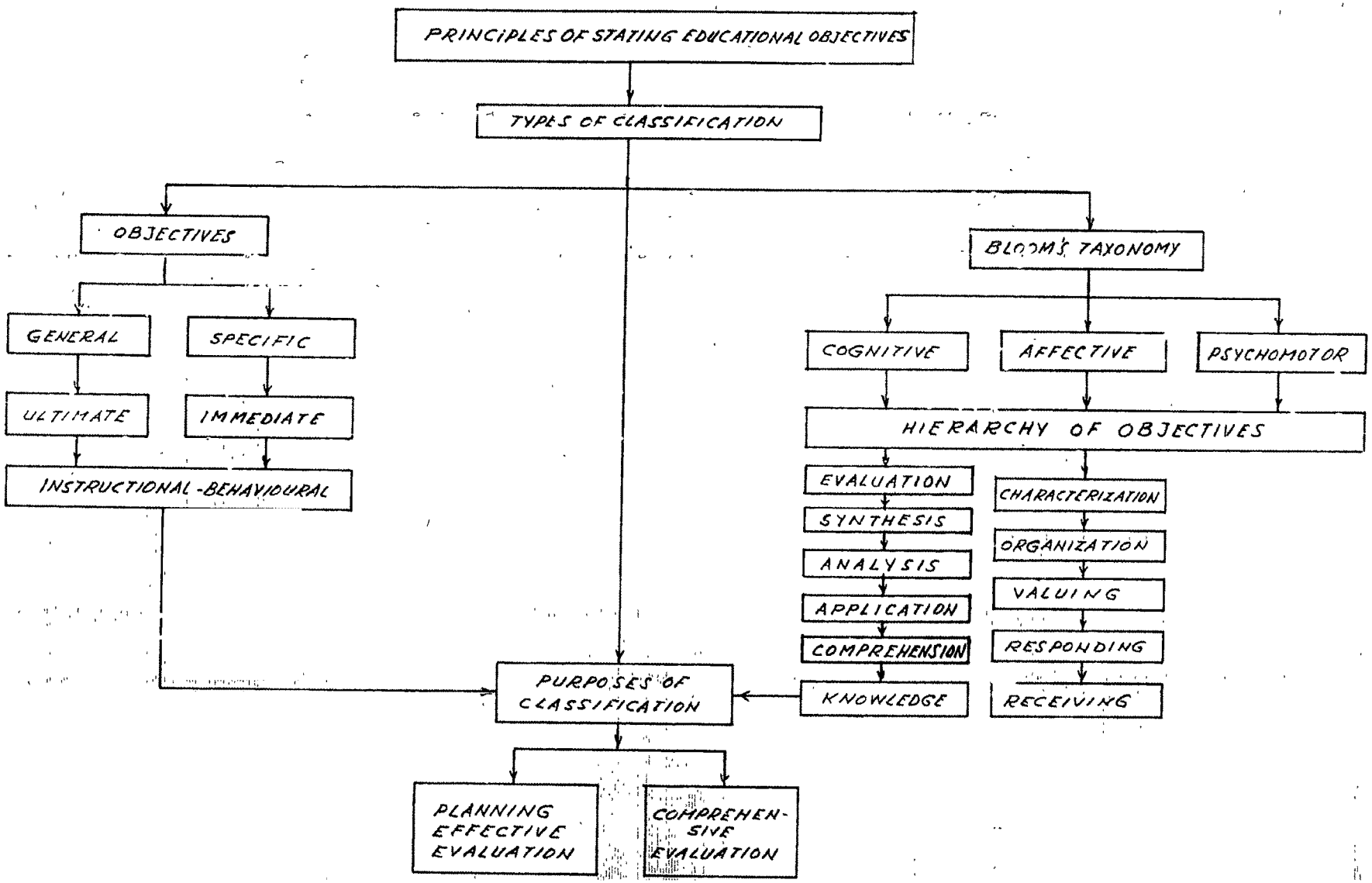
FLOW-CHART-II

UNIT I : CONCEPT AND PROCESS ON EVALUATION



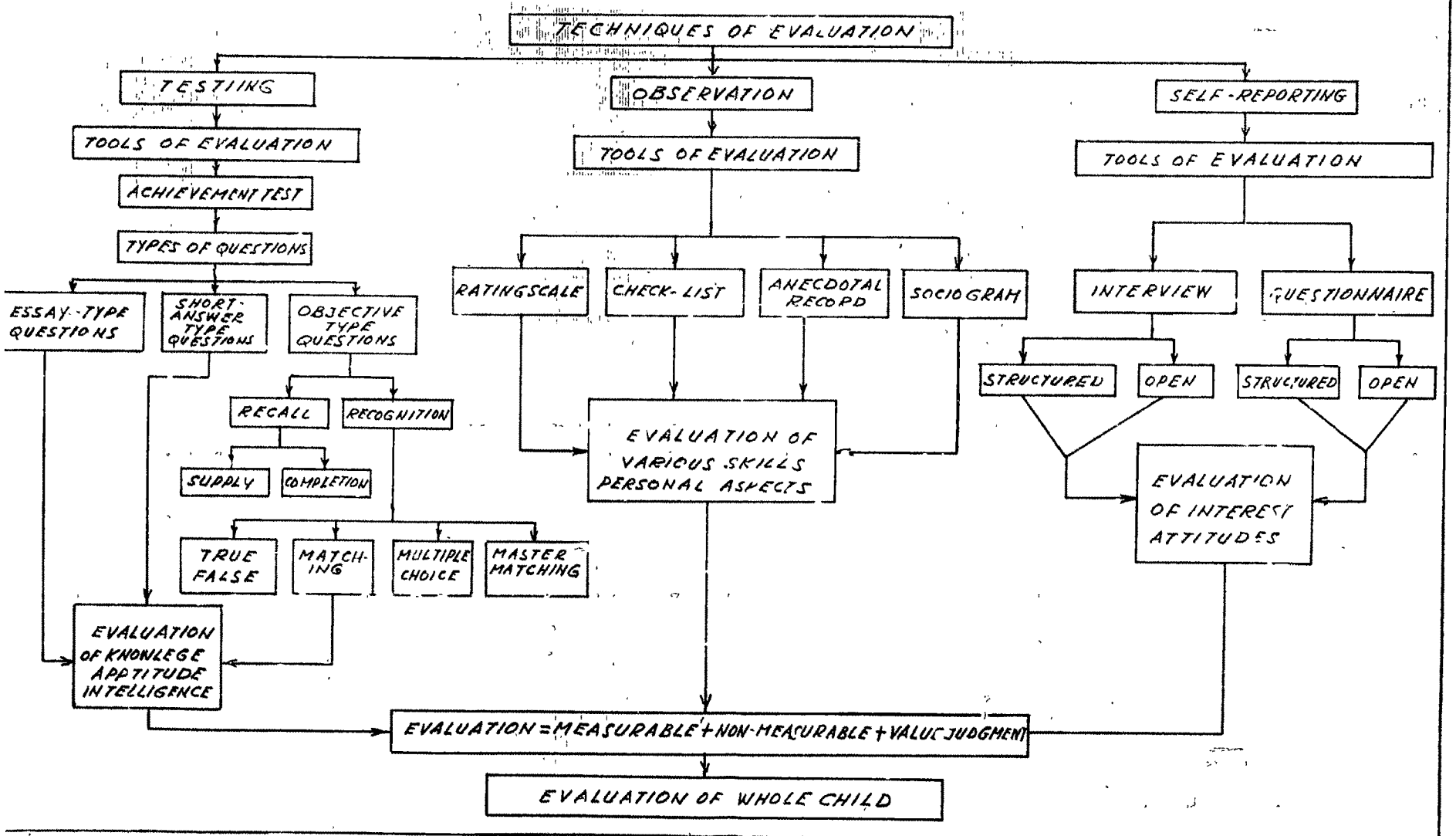
FLOW-CHART - III

UNIT II : CLASSIFICATION OF OBJECTIVES



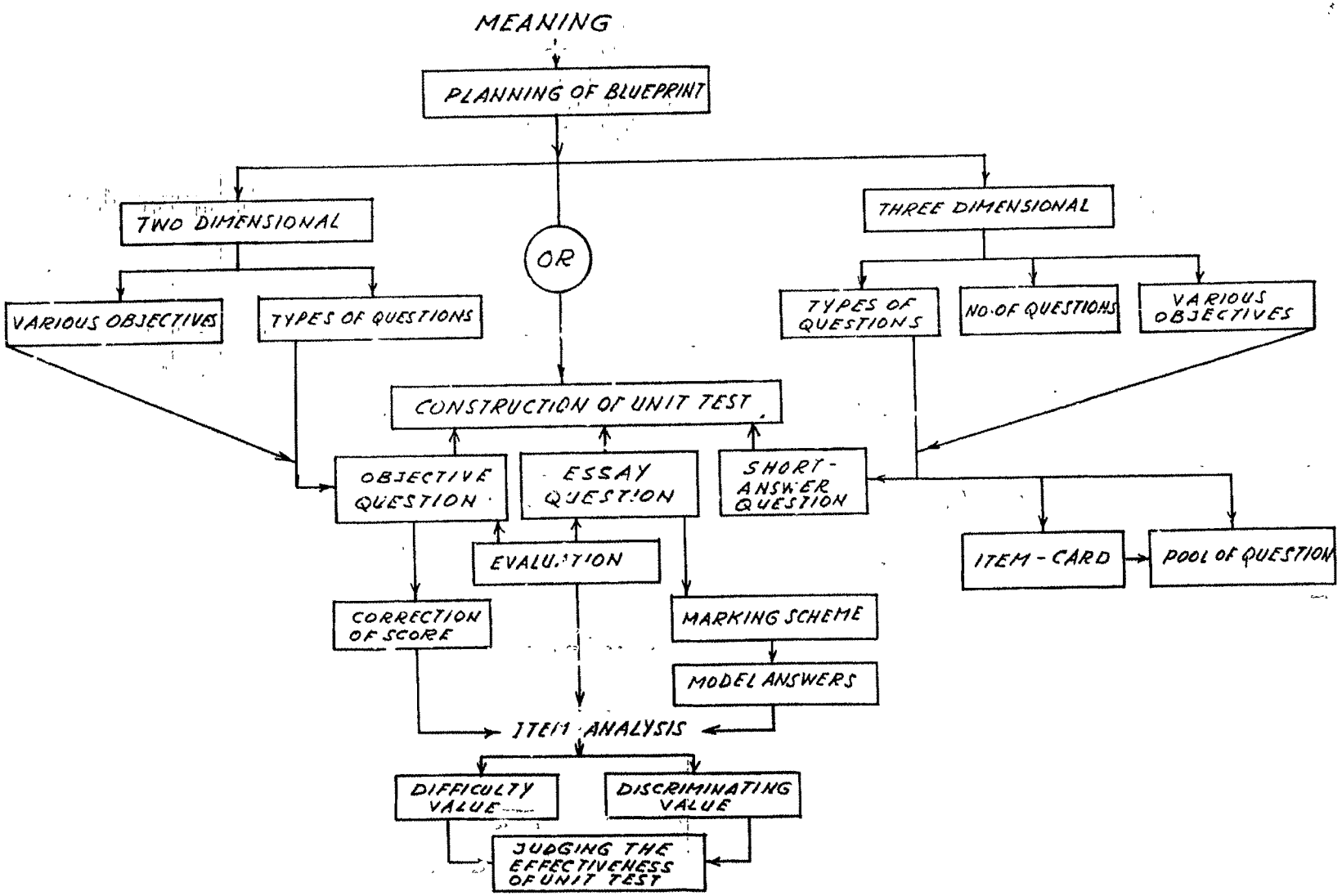
FLOW-CHART - IV

UNIT III, IV, V : TECHNIQUES OF EVALUATION - TYPES OF QUESTION - TOOLS OF EVALUATION



FLOW-CHART - V

UNIT VI : UNIT TEST



is the behaviour of student.

In contrast to the broad educational goals, 'terminal behaviour' is defined by Glaser (1969) as the performance that the student should display at the end of specific instructional situations'. Terminal behaviour is nothing but a description of behaviours which students must acquire during the process of instruction. Effectiveness of instructional work depends on how well the students acquire the terminal behaviours.

Considering the proficiency the B.Ed. students should acquire through the course, for carrying out evaluation work in schools and in consideration to the different content areas included in the course, terminal objectives were specified in behavioural terms for all six units. The list of terminal behaviours for all six units have been presented here.

(i) Terminal Behaviours :

Unit I

At the end of the treatment, the students will be able to -

1. define educational evaluation.
2. analyse the given objectives according to their respective subjects
3. plan learning experiences for desirable behaviour changes
4. define educational objectives
5. arrange in proper order the five specific steps involved in the process of evaluation

6 enumerate the various aspects of child-development to be included in comprehensive evaluation

7 state the two characteristics of good evaluation

8 illustrate the three stages of continuous evaluation

9 distinguish between expected educational objectives and actual learning outcomes

10 plan the given unit according to the five steps of the process of evaluation.

11 explain with illustration the interrelationships of educational objectives, learning outcomes, learning experiences and evaluation techniques in the whole evaluation process.

12 state the uses of evaluation to teachers, students and administrators

Unit II :

At the end of the treatment the students will be able to

1 list the appropriate words for the clear and ambiguous statement of objectives

2 state four objectives in the forms of expected level of behaviour

3 write the two principles of the correct statement of objectives

4 identify the correct statement of objectives in the form of learning outcomes and also in the form of expected level of behaviour

5 distinguish between objectives stated in the form of students' behaviour and expected level, and those not so stated,

6 convert non-behavioural objectives into the students' behavioural forms

7 classify the given objectives into specific, general, ultimate and immediate objectives,

8 write 2 to 3 specific objectives for a given general objectives

9 recognize the type of objective from the statement of different objectives

10 write the specific purpose of the three domains of taxonomy

11 list the appropriate words to represent each domain

12 write the hierarchial order of the objectives of three domains

13 distinguish between written objectives representing the cognitive, affective and psycho-motor domains

14 classify the objectives in cognitive domain as belonging to (a) the lowest level or (b) higher level of objectives

Unit III :

At the end of the treatment the students will be able to

1 recognize the specific characteristics of three techniques of evaluation

2 classify the different aspects of child-development which can be evaluated under the three different techniques of evaluation

3 write the differences between testing, observation technique and self-reporting technique

4 recognize the measurable and non-measurable aspect of child - development

5 explain in 3 - 4 lines that comprehensive evaluation includes both measurable and non-measurable aspects and value judgment

6 discriminate the characteristics of measurement and evaluation

Unit IV :

At the end of the treatment, the students will be able to -

1 write the three characteristics of essay type questions

2 state the types of learning outcomes evaluated by essay-type questions and objectives type questions

3 explain in 4 - 5 lines why essay type questions are unavoidable

4 point out the need, (a) to formulate standard answers for essay type questions (b) to prepare the scoring key

5 identify the good and weak essay-type questions

6 convert the weak essay type questions into an improved form

7 state the two classifications of objective type questions

8 construct the different types of objective questions

9 identify the characteristics of essay type or objective type questions from the given statements

10 write two reasons, specifying each in about 2-3 lines, as to why a good question paper should contain objective type, essay-type, and short-answer questions.

Unit V :

At the end of the treatment the students will be able to -

1 enumerate the learning outcomes evaluated by rating scale

2 prepare a table to classify the tools of evaluation under the three different techniques of evaluation

3 prepare the models of check-list and rating scale for a given behaviours of the students

4 mention the appropriate tool of evaluation for the given situations

Unit VI :

At the end of the treatment, the students will be able to -

1 define unit test

2 write the importance of objectives, course content and types of questions in planning unit test

3 mention the steps in planning unit test

4 explain the term pool of questions

5 prepare the item card

6 mention the details to be written on item card

7 define blue-print

8 write the importance of blue-print for a test construction

9 prepare the two dimensional and three dimensional blue-print

10 write how model answers and marking scheme are important in making the evaluation of unit test as objective as possible.

11 Construct one unit test in any subject considering the principles of construction of a unit test.

12 mention the four precautions while administering a unit test

13 apply the formula of correction of score to the given data

14 calculate the value of item-difficulty and item-discrimination of a given data

15 recognize the good and weak items of a test from a given difficulty values and discriminating values

16 enumerate the characteristics of a good unit test

(ii) Entering Behaviours and Target Population : The PLM is specifically prepared for utilizing it as self-instructional material to study the course 'Educational Evaluation' prescribed for the B.Ed. students of S.N.D.T. Women's University studying through Gujarati medium, the target population for the study.

An investigator has to assume certain behaviours of the students prior to the conduct of an experiment. These behaviours can be described as the entering behaviours. Decacco (1970) described the entering behaviours as, 'the present status of the student's knowledge and skill in reference to a future status the teacher wants him to take'. To make the teaching less precarious, it is important to think of and formulate entering behaviours which would help in turn to make the terminal

behaviours more feasible and accurate. If teaching can be described as getting the student from where he is to where he would like him to be, it can be said that, in programmed learning, teaching means moving the students from entering behaviours to terminal behaviours.

The course on Educational Evaluation is completely a new course introduced at B.Ed. level, and students have no learning experiences upto their graduation level about it. So to study the programmed material developed for the course does not require any specific entering behaviour in relation to the content or subject-matter included in it. What is presumed here is that students admitted to B.Ed. class should have the idea of their school andco college experiences regarding examination system, teaching, school work and school activities. So the entry test includes the items related to these aspects for the target population of the study. The test is given in Appendix I.

(iii) Criterion Test : It is a test on terminal behaviours of the students to find out the extent to which pre-specified behaviours are attained by the students. Writing a criterion test at the preparation stage, as Pipe (1965) says, 'helps to sharpen the objectives and the pre-requisite skills, does a great deal in showing how to approach the suhject-matter when programming starts.'

It provides feedback to the programmer which helps him to modify the programme.

In order to assess the performance of students on six units, one criterion test for each unit was constructed. The criterion tests consisted of short-answer type, objective type and essay-type items. For short answer-type and essay-type items the length of the required answer and the number of points to be included in the answer are clearly specified in order to make them as objectively scorable as possible. (Appendix D.)

In addition to the six criterion tests, a comprehensive test covering all the six units of the course was prepared. In this test all types of items as presented in the criterion tests were included and it covered a representative sample of the objectives set for the course. (Appendix D.)

4.1.1.3 (c) Task Analysis : Task analysis deals with the question of how and to whom it shall be taught. Once the terminal behaviours have been defined and broken down into tasks, the next step in the process is to analyse the task. This refers to the process of elicitting behaviours which will lead the learners to acquire the necessary knowledge and skills. It includes analysis of all the activities that the students have to do during the instructional process.

Task analysis of all the units was done on the basis of terminal behaviours formulated for the student-teachers.

4.1.1.4 Programme Style, Presentation Format and Response Mode : The programme style in the present study is linear as all the students proceed through the same sequence of frames. It is deviating, at times, a little from the linear programming style in the strict sense of term in the following respects. Firstly, frame size is of different length and varies from one or two lines to one paragraph. Secondly, there are many open questions to which the students can give their answers freely. Thirdly, diagrams, tables and illustrations have been provided at various places.

The deviations in the frame size and question style at certain places were adopted considering the suggestions and levels of students under the study. It may be noted here, that the students under the present study were quite mature to give suggestions, as they were the prospective teachers. At the field tryout, while going through the PLM, the students expressed that they felt bored sometimes to proceed through the very small steps and responding frequently in the same fashion i.e. in one or two words. On the basis of their suggestions it was considered worthwhile to modify certain frames into big size and to construct open questions to provide the material according to the maturity level of students. So in the final draft certain frames were modified by combining the small

frames into comprehensive frames, and constructing some big frames wherever possible without disturbing the sequence of the content. At certain places open questions were provided.

One thing strictly followed here is that, whatever the size of the frame it contains only one point of learning, which is one of the basic principles of programming. Following this style of programme, frames have been presented in between horizontal lines. The correct answers were given in the immediate next frame. The following example presents the big frame, open question and format of its presentation.

Example

એકમ ૪-ફ્રેમ નં.૩૯. નિબંધ પ્રકારના પ્રશ્નોની એક મર્યાદા છે કે વિદ્યાર્થીઓએ જવાબમાં શું લખવું અને કેટલું લખવું તેની સ્પષ્ટતા પ્રશ્નમાંથી થતી નથી.

આ સમજવા નીચેનું દૃષ્ટાંત વાંચીએ.

દા.ત.નીચે નિબંધ પ્રકારના એક જ પ્રશ્નને બે રીતે પૂછવામાં આવ્યો છે.

રીત ૧. જાપાન દેશના લોકો વિશે જે જાણતા હોય તેની ચર્ચા કરો.

રીત ૨. જાપાન દેશના લોકોનાં (૧) રહેણી કરણી (૨) ધંધા ઉદ્યોગ (૩) સામાજિક રીતરીવાજો વિશે આશરે દશ દશ લીટી લખો.

ઉપર બે રીતે પૂછેલા પ્રશ્નમાંથી કઇ રીતે પૂછેલા પ્રશ્નમાંથી જવાબ લખવા વિશેની સ્પષ્ટતા થઇ શકે છે ?

સાચો જવાબ ૪૦. બરાબર, રીત નં. ૨ પ્રમાણે પૂછેલા પ્રશ્નથી જવાબ લખવા માટે શેની

બીજી રીતે પૂછેલા પ્રશ્નથી શેની સ્પષ્ટતા થઇ શકે છે ?

સાચો જવાબ ૪૧. જવાબમાં શું લખવું અને કેટલો લાંબો લખવો.

પહેલા રીતમાં પ્રશ્ન સળંગ પૂછવામાં આવ્યો છે. બીજી રીતમાં નિબંધ પ્રશ્નના સ્વરુપને સુધારો કરીને લખવામાં આવ્યો છે. પ્રશ્ન સળંગ ન પુછતા નાના પેટા વિભાગમાં વહેંચી જવાબમાં શું લખવું અને કેટલો લાંબો લખવો તેનો સ્પષ્ટતા કરીને પ્રશ્નના સ્વરુપનું ચોકકસ બંધારણ નકકી કરવામાં આવ્યું છે.

(અ) અહીં ચોકકસ _____ પ્રમાણે સુધારેલા પ્રશ્નના સ્વરુપને લીધે વિદ્યાર્થીઓ જવાબ સ્પષ્ટ અને મર્યાદિત લખશે.

(બ) માટે નિબંધ પ્રશ્નમાં જવાબ કેટલો _____ લખવો અને જવાબમાં કયા _____ લખવા તેનો સ્પષ્ટતા કરી પ્રશ્નના સ્વરુપનું ચોકકસ _____ નકકી કરવાથી પ્રશ્નની અસ્પષ્ટતા ઓછી કરી શકાય છે.

એકમ ૪ ફ્રેમ નં. ૪૨ નો નિબંધ પ્રકારના પ્રશ્નોની અસ્પષ્ટતા ઓછી કરવા શું નકકી કરવું જોઇએ ?

સાચો જવાબ

પ્રશ્નના સ્વરુપનું ચોકકસ બંધારણ નકકી કરવું.

The third deviation, the use or diagrams, tables and illustrations have been adopted in the programme with the purpose of providing varying stimuli which can motivate the students to respond effectively. The presentation of the material in this fashion, was done to help the learner to consolidate the learning and to develop comprehensive view of different concepts included in the course. The examples of each one is given below :

Example 1

મોડ્યુલ 3 ફ્રેમ નં. ૪3 દરેક પ્રવિધિથી મપાતાં જુદા જુદા પાસાંઓ નીચેના કોઠામાં રજૂ કરી શકીએ.

	પરીક્ષા	નિરીક્ષણ	આત્મવૃત્તાંત
	જ્ઞાન બુધ્ધિ અભિયોગ્યતા	કૌશલ્ય વ્યક્તિગત પાસાંઓ	રસ વલણ વ્યક્તિગત મુશ્કેલીઓ

અ. ઉપર રજૂ કરેલા કોઠા પરથી લખો કે મૂલ્યાંકન પ્રવિધિઓ કઇ કઇ છે ?

બ. ૧. આત્મવૃત્તાંત પ્રવિધિથી કયા પાસાંઓનું મૂલ્યાંકન થઇ શકે છે?

૨. કૌશલ્ય અને વ્યક્તિગત પાસાંઓનું મૂલ્યાંકન _____ પ્રવિધિથી થઇ શકે.

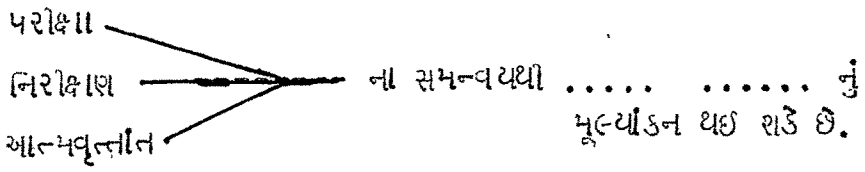
૩. બાકી રહેલી પ્રવિધિ કઇ ?
તેનાથી કયા પાસાંઓનું મૂલ્યાંકન થઇ શકે ?

સાચો જવાબ

અ. પરીક્ષા
નિરીક્ષણ
આત્મવૃત્તાંત

૪૪. આમ ત્રણ જુદી જુદી મૂલ્યાંકન પ્રવિધિઓના સમન્વયથી સમગ્ર બાળકનું મૂલ્યાંકન કરી શકાય છે. તેને નીચે પ્રમાણે રજૂ કરી શકીએ.

બ. ૧. રસ, વલણ
૨. નિરીક્ષણ
૩. પરીક્ષા
જ્ઞાન, બુદ્ધિ
અભિયોગ્યતા



સાચો જવાબ

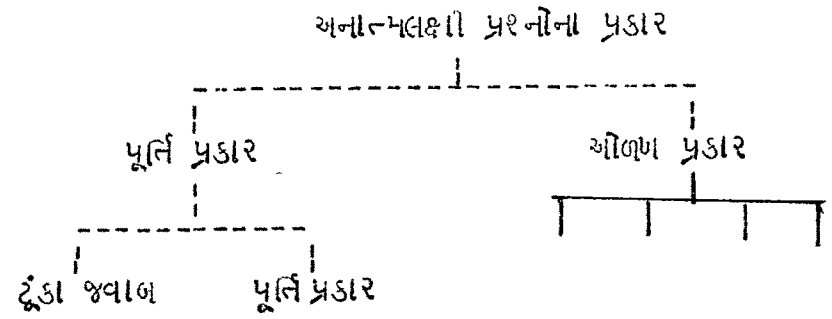
૪૫.

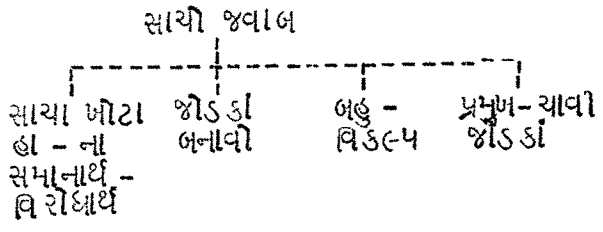
સમગ્ર બાળકનું

Example 2

ચેકમ ૪ ફ્રેમ નં.

૧૪૨. આમ આપણે અનાત્મલક્ષી પ્રશ્નોમાં ઓળખ પ્રકારના પ્રશ્નોમાં ચાર વિશિષ્ટ પ્રકારના પ્રશ્નો શીખ્યાં. તેને નીચેની આકૃતિમાં આપેલા ઓળખપ્રકારમાં રજૂ કરો.





The response mode used for the programme was overt. For each frame, the students were supposed to construct the response either by filling the blanks or giving their own answers in one word to one sentence, or selecting the answer from the choices given, as required by the Skinnarian programme. Considering the maturity of the students, a separate sheet of paper was provided to write their answers in it. In the sheet, along with correct answers, students were asked to write down their suggestions if they feel, regarding the modifications of the frame in terms of wording, size, correct answer, difficulty in understanding etc. The purpose was to get the feedback from the students in the modification of the programme.

4.1.2 Writing the Programme

4.1.2.1 (a) Writing the Frames : After the specifications of behaviours, task analysis, deciding about the presentation format, programme style and response mode, the next work to be done was to start writing the frames.

While writing the frames certain points of good frames as shown below were kept in mind :

(1) Unambiguous wording should be avoided.

(2) Responses from learners should be relevant.

(3) Frames should be challenging and stimulating.

(4) Frames should be so structured that there should be maximum probability of success on the part of the learner.

4.1.2.2 (b) Types of Frames : Frames are the vehicles through which learners travel from entering behaviours to terminal behaviours. They are the basic units of any programmed learning material. Margulies (1964) writes that a frame, 'presents a small unit of information, requires active responses and may be arranged to give immediate reinforcement'. So, in a process of behavioural change, the sequential order of different types of frames is necessary. In the present study the following types of frames have been used :

(i) Teaching frame

(ii) Practice frame

(iii) Review frame

(iv) Criterion frame

Examples of each type of frame have been given hereunder:

(i) Teaching Frame : Example

ટેઠમ_૪_ફ્રેમ_નં.૧૧૯.

હવે ઓળખ પ્રકારના પ્રશ્નોનો ત્રીજો પ્રકાર જોઈએ.

આ પ્રકારના પ્રશ્નોમાં બે વિભાગ હોય છે. ઉપરના વિભાગમાં સીધો પ્રશ્ન પૂછવામાં આવે છે કે અધૂરું વાકય આપવામાં આવે છે, તેને શીર્ષક કહે છે. શીર્ષકની નીચેના વિભાગમાં ૪ થી ૫ જવાબો આપવામાં આવ્યા હોય છે તેને વિકલ્પો કહે છે. તેમાંથી એક સાચો જવાબ ઓળખવાનો હોય છે. આ પ્રકારના પ્રશ્નોને બહુ વિકલ્પ (Multiple-choice Type) પ્રકાર કહે છે.

એક દૃષ્ટાંત લઈ સમજીએ.

નીચે આપેલા પ્રશ્નમાં ઉપરના વિભાગમાં પ્રશ્ન પૂછવામાં આવ્યો છે. નીચેના વિભાગમાં તેના પાંચ શકય જવાબો આપવામાં આવેલા છે. તેમાંથી જે જવાબ સાચો હોય ત્યાં ✓ નું ચિહ્ન કરો.

રમેશની આવડ કરતાં અશોકની આવડ ૨૫ ટકા વધારે છે, તો રમેશની આવડ કેટલા ટકા ઓછી ગણાય ?

(૧) ૨૦ ટકા
(૨) ૫૦ ટકા
(૩) ૨૫ ટકા
(૪) ૭૫ ટકા
(૫) ૧૦૦ ટકા

ઉપરના વિભાગમાં શાખાવાળો વિભાગ કયો છે તે લખી જણાવો ?

૧૧૯. નીચે જે પ્રાંય જવાબો આપવામાં આવેલા છે તેને શું કહેશો ?

૧૨૦. આ પ્રકારના પ્રશ્નોમાં ઘણા અથવા બહુ વિકલ્પો આપવામાં આવતા હોવાથી તેને ------ ------- પ્રકારના પ્રશ્નો કહેવાય છે.

These types of frames (teaching) are used for the specific purpose of teaching the new material. They generally include suitable prompts in order to ensure maximum probability of success.

(ii) Practice Frame :

Example 1

એકમ ૨ ફ્રેમ નં.૭૩ નીચે ત્રણેય ક્ષેત્રો રજૂ કરતા કેટલાંક વર્તનો આપ્યા છે. તે વર્તનો પ્રમાણે હેતુઓ કયા ક્ષેત્રના છે તે તેની સામે તે હેતુ પ્રમાણે જ્ઞા, ભા, કૌ અક્ષરો લખી જણાવો.

વિદ્યાર્થી

૧. કાવ્યની પંક્તિઓ યાદ કરી લખે છે.

૨. ડૉક્ટર થવા માંગે છે.

૩. ચિત્રો દોરે છે.

ઓડમ ૨ ફ્રેમ નં.૭૪ ૧. અહીં પહેલી હેતુ, યાદ કરી લખવું તે _____ પ્રક્રિયા છે, તેથી જ્ઞાનાત્મક છે.

૨. બીજો હેતુ આંતરિક ઇચ્છા બતાવે છે તેથી ____ હેતુ છે.

૩. ત્રીજો હેતુ ચિત્ર દોરવું _____ ક્રિયા છે, તેથી ક્રિયાત્મક હેતુ છે.

The practice frames are included to strengthen the material taught in teaching frames. The care has been taken that learner can make an unprompted response.

(iii) Review Frame : Example 1

ઓડમ ૪ ફ્રેમ નં.૧૨૧. આમ બહુવિકલ્પ પ્રશ્નોની રચનામાં નીચે પ્રમાણે બે વિભાગ હોય છે.

૧. ઉપરના વિભાગને _____ કહેવામાં આવે છે.

૨. નીચેના વિભાગને _____ કહેવામાં આવે છે.

ઓડમ ૨ ફ્રેમ નં. ૧૬. આપણે મૂલ્યાંકનમાં હેતુઓ સ્પષ્ટ સ્વરૂપમાં રજૂ કરવા માટેના ડેટલાંક વિશિષ્ટ શબ્દો શીખ્યા.

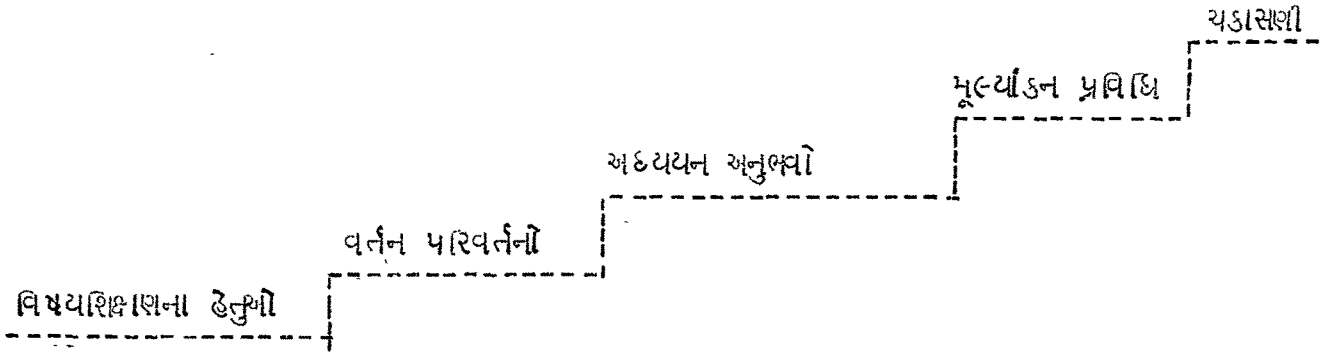
નીચે બે પ્રકારે હેતુ રજૂ કરવામાં આવ્યા છે.
આપણે શીખ્યા તે અનુસાર જેમાંથી કયો હેતુ સ્પષ્ટ સ્વરૂપે રજૂ કરવામાં આવ્યો છે.?

(અ) વિદ્યાર્થીઓ અક્ષાંશ વિશે સમજશે.

(બ) વિદ્યાર્થીઓ અક્ષાંશની આકૃતિ દોરશે

(સાચા જવાબનો અક્ષર લખો.)

ચેકમ ૧ ફ્રેમ નં.૭૮ હવે જો અખીય પ્રક્રિયાના પાંચ સોપાનો નીચે પ્રમાણે રજૂ કરીએ તો મૂલ્યાંકન પ્રક્રિયાનું આરંભબિંદુ શેને ગણીશું ?



સાચું છે, અને તેથી જ શૈક્ષણિક હેતુઓના આધારે બાકીના સોપાનોની વિગતો નક્કી કરવામાં આવે છે.

The review frames are used for the two purposes. One, to review the concept taught in the previous frame and second, to make the learning more meaningful as the students can see the relationship between various points they have already learnt in the preceeding frames. These frames are used before criterion frame and after teaching - practice frame.

(iv) Criterion Frame :

Example 1

ચેકમ ૪ ફ્રેમ નં. ૧૪૩ આપણે બોળ પ્રકારના પ્રશ્નોના ચાર પ્રકાર શીખ્યા. તેમના લક્ષણો નીચે આપ્યા છે, જે લક્ષણ જે પ્રકારના પ્રશ્નને લાગુ પડતું હોય તેનું નામ નંબર આગળ લખો :

૧. ઉત્તેજક કરતા પ્રત્યુત્તર વિભાગમાં વિકલ્પોની સંખ્યા વધુ હોવી જોઇએ.

૨. આપેલી સંજ્ઞા ચેક કરતા વધુ વિધાનને લાગુ પાડી શકાય છે.

૩. આપેલા બે વિકલ્પોમાંથી જવાબની ઓળખ કરવાની હોય છે.

૪. આપેલા વિકલ્પોમાંથી એક જ વિકલ્પ સાચો હોય છે અથવા સૌથી યોગ્ય હોય છે.

૫. જોડકાં બનાવો અને બહુવિકલ્પ પ્રકારના પ્રશ્નોનું વિકસિત સ્વરૂપ છે.

૬. સાચા-ખોટા પ્રશ્નોના પ્રમાણમાં અટકળનું પ્રમાણ ઓછું હોય છે.

૭. પહેલા વિભાગમાં અધૂરું વાકય કે પ્રશ્ન મૂકવામાં આવે છે.

૮. અટકળનું પ્રમાણ વધુ હોય છે.

The criterion frames are used to test the learners on the concept taught, with a view to have the judgement of effectiveness for each concept taught in the previous frames. These frames are used after the review frames and after the prompts are vanished.

4.1.2.3 Prompts : In the present programme, thematic and formal types of prompts have been used considering their suitability in the particular learning situation.

From the experience of tryout, the investigator realized that learners being older students became bored with the frequent use of formal prompts. So, during the modification, such types of prompts have been reduced and thematic prompts have been used frequently. In this programme the principle of fading of prompts has been followed.

4.1.2.4 First Draft of the Programme : After the analysis of the course content and specification of behaviours, the next step to be followed was to write the programme. The first draft of the programme was prepared following the types of frames, their sequence and use of prompts, described in the proceeding sections.

The developed programme should be evaluated to study its appropriateness and effectiveness. The evaluation of programme usually takes place in two distinct stages called developmental testing and field testing.

The purpose of the developmental test is to check how far the first version of the programme is, in fact, suitable to those for whom it is written. It is usually carried out informally with individual learners.

The developed programme for this study was tried out with five individual students. The responses of each individual student were analysed and errors committed were noted down. The programme frames were revised on the basis of error analysis, suggestions from individual learners regarding the frame sequence, prompts and language. After the due modifications, the first draft of the programme was given to the subject-expert to evaluate from the subject-matter point of view, to the programming expert (guiding teacher) to check whether the programming principles have been properly followed and to the language expert to check the language.

Thus, the first draft of PLM was ready for field-testing. Before describing about the field testing, the procedure followed to develop the software materials for other components is given hereunder :

4.2 Library Reading

The library reading proposes to develop--- (1) an independent study habit (2) the power of critical thinking, (3) to fill up the gap remained if any, while reading the PLM, (4) ability to select and organize relevant material.

For the library reading, reference books were given at the end of each unit along with PLM. The necessary details regarding the books such as name of the author, title of the book, chapter number, and page numbers were given. References books were selected keeping in mind the course-content of each unit, the details given about the content and availability of books in the library. Library sessions varying according to the nature and requirements of the units were planned in advance. Students utilized the regular class periods for their library work. Number of library sessions planned in advance according to the units were as per following :

Unit	-	No. of Sessions
I		5
II		2
III		3
IV		4
V		2
VI		2

4.3 Discussion

The objectives to include the discussion as an instructional component were :

(1) to clarify doubts arising while reading the PLM and library references.

(2) to express one's own views

(3) to maximise interactions among group members

(4) to develop group values like tolerance, open-mindedness and co-operation,

(5) to overcome any gap felt between teacher and student, while reading the PLM.

Objectives of this component are of various types and were tried to achieve according to their specific nature. In this context it was necessary to develop the instructional material for objective No.1, but not for objectives 2, 3, 4, and 5. Considering the nature of these objectives, efforts were made to achieve through the proper process of discussion.

The instructional material for the objective No.1, 'to clarify doubts arising while reading the PLM and library references'was developed during the tryout stage.

To evaluate the performance of every student at discussion and to check whether various points regarding the content have been covered or not, observation schedule containing 12 various items was prepared. They were of the following type :

(1) No. of points covered

(2) No. of simple questions

(3) No. of higher level questions

(4) No. of clarification questions

(5) No. of observations

(6) No. of irrelevant questions

(7) Speaking confidently

(8) Speaking precisely

(9) Openness to others' ideas

(10) Objective attitude

(11) Elaborating ideas put forth

(12) Integration of different ideas

The observation schedule prepared for the discussion is given in Appendix A.

The clarification about the purpose of above mentioned different items included in the observation schedule will be helpful in understanding their appropriateness.

(1) No. of Points covered :

The investigator herself conducted the discussion. The points for the discussion were pre-decided to avoid unnecessary talk and to keep discussion on track. These points were identified on the basis of : (1) content analysis and the opinion of the subject specialist. (2) errors committed by students on PLM i.e. the content of the frames for which more than 3 students had

not given correct answers and of unanswered frames, were considered to be included.

Over and above these points the scope was provided to discuss the points raised spontaneously at the time of discussion. To judge how many points were covered during the discussion and to make evaluation clear and simpler, only those points which were pre-decided, were taken into account. Number of such points in different units were different depending upon the length and the nature of units. The list of unitwise points for discussion is given in Appendix B.

(2) Types of Questions :

The items from 2 to 6 in the observation schedule relate to the various types of questions and students' observations. These items were included for two purposes : (1) To know from students' own expression, their doubts, difficulties and understanding regarding material. (2) To know their opinion about the frame language, structure, clarity about concepts in the programme.

To fulfill objectives No. 2, 3, 4, and 5 the items on the observation schedule from 7 to 12 were included. To know the extent of the presence of these personal qualities and any such development which may take place during the discussion session a four-point rating scale was prepared. It was of the following type :

To a great extent - 3

To some extent - 2

To less extent - 1

Absence of qualities - 0

The rating was done only for the items, speaking confidently, speaking precisely, openness to other ideas, elaborating ideas put forth, integration of different ideas which were included for the special objectives and to develop certain personal qualities. For the first six items in the observation schedule, the frequencies were marked. It was the simultaneous process to mark the number and types of questions asked, observations made, points covered, and at the same time to rate their personal qualities.

4.4 Practical Work

The objectives of practical work were to develop (1) various skills to carry out evaluation in school (2) abilities to apply theoretical knowledge in practical situations (3) ability to construct various tools of evaluation.

Topics for practical work were selected on the basis of the nature of the content which can provide practical experiences. The list of such topics was prepared in advance at the time of the analysis of the course content. Throughout the course the following type of practical experiences were

provided : (a) stating objectives in different subjects, (b) planning learning experiences, (c) preparing objective test items, models of tools of evaluation such as check-list, rating scale etc. (d) preparing blue-print, (e) constructing unit-test.etc.

The list of the topics of practical work is given in Appendix C.

Along with PLM, software materialsfor the components library reading, discussion and practical work wereo ready for field tryout. Now the next step to be followed was to tryout the developed material in the actual field to develop the strategy by combining and sequencing the components included in it.

4.5 Field Testing

Field testing is more formal than developmental testing. The purpose of field testing was to assess whether the material developed, achieved its stated objectives satisfactorily when it was used with those for whom it was written.

For the field tryout 30 students of B.Ed. class of the College of Mahila Mahavidyalaya, Baroda were included. The tryout was done in the regular periods of teaching for the full term during the year 1978-79.

The individual component had been tried out by combining and sequencing PLM, library reading, discussion and practical

work with their specific function in relation to the specific objectives to be achieved.

In the beginning, the investigator had provided programmed learning material to each student to work independently and at her own pace. Students learnt each unit through PLM which was followed by library reading. For library reading the list of reference books had been given alongwith PLM. Students were instructed to refer the books after reading the PLM. Students did the library work at their own convenience. They completed it before they came for discussion session. So far, the students had acquired the basic knowledge and understanding into the subject-matter through PLM and library reading. Then the discussion session was arranged to clarify the doubts regarding content, frame sequence, language and like. During the discussion session, clarifications regarding the practical work assigned to them were also made. After that, students completed their practical work assignment and submitted to the teacher. After the completion of the whole procedure in this order, the criterion test was given to measure the extent of the achievement of instructional objectives. The results of students' performance on the criterion tests for all the six units at the field testing are given in the following Table 4.1.

Table :4.1: Mean, SD, and Percentiles of all Criterion Tests

Percentiles	Units					
	I	II	III	IV	V	VI
P_{90}	42.5	39	45.5	44	47	42
P_{80}	39	37.5	43.5	42.5	44	39.5
P_{70}	38.5	36.5	41.5	41	43	37
P_{60}	37.5	35.5	39	39	41.5	34.5
P_{50}	36	34	38	37	40.5	33.5
P_{40}	35	32	36.5	34	38.5	32
P_{30}	33	30	35	33	36.5	30.5
P_{20}	31	27	33	31.5	33.5	29.5
P_{10}	27	21.8	30.5	30	29	29
Mean	34.96	33.20	37.96	36.53	39.13	40.0
SD	5.91	5.76	6.16	6.04	6.25	5.72

* The maximum marks on all criterion tests were 50.

The mean performance of the students on all criterion tests was 66 percent and above. Looking to the percentiles, 70 percent of students scored 60 percent and above.

At this stage the results on criterion tests were analysed. After the evaluation of each criterion test feedback session was arranged to discuss the performance of students. The objective of the feedback session was to provide further

clarification to the concepts where students had gone wrong and had not done upto the level of expectation. During this session, students expressed their views regarding the suitability of questions included in the test and the coverage of content. Thus it served as the feedback to the investigator and helped her too, to modify the criterion test.

4.6 Revision and Final Draft

On the basis of the data obtained from the field testing them the investigator revised the materials and made ready for the validation. (Appendix J.)

4.7 Reaction Scale

One of the objectives of the study was to investigate the effectiveness of each component included in the strategy, in terms of students' reactions towards each component.

For this purpose reactions of students were studied by two ways :

(i) Through students' written expression about how different components helped them in learning.

(ii) Through reaction scale.

To obtain students' reactions in terms of their written expression no instrument was needed.

viz., written material (PLM) was analysed into seven aspects. These seven aspects are small steps, self-pacing, writing the answer, comparing the answer with the right answer, teacher's help, review frames at the end of the concept and introduction to the unit.

The second component namely library reading has two aspects, viz., references suggested at the end of the unit, and its integration with the written material.

Discussion is the third component and it has five aspects, viz., clarifying doubts, discussion about main points, knowing other's views, reacting to other's views, and the sequence in which written material, library work and discussion are used.

Practical work is the fourth component and it has three aspects, viz. getting clarity about concepts, developing ability to apply the knowledge in practical situations, combined use of written material, library reading, discussion and practical work.

Each aspect has been put in the form of a statement to which the students were expected to react in order to express the extent to which it had helped them in learning. Against each statement, therefore, there is a scale with four points, viz., helped very much, helped to some extent, did

not help much and did not help at all.

At the end of each component item for suggestions was provided to collect the suggestions about the overall operation of that component. The final forms of the reaction scale in English and its Gujarati version, with the modifications presented above, are given in Appendix E.

4.8 Instruments to measure Students' Characteristics

One of the objectives of the study was to investigate the relationship between students' characteristics and their achievement through the instructional strategy. Students' characteristics selected for this purpose were :

Intelligence

Gujarati language reading comprehension ability

Academic motivation

The details about the procedure to obtain score on these three characteristics and instruments used have been described hereunder :

Intelligence :

To measure the students' intelligence, Desai-Bhatt Group Test of Intelligence was administered. This test is standardized for the students of the age-group between 12 - 16, while the students under the present investigation are above this age. The doubt about the suitability of the test for these students

may be raised. But it has been used after taking into consideration the following :

1. There is no standardized intelligence test available for adults in Gujarati.

2. Raven's standard progressive matrices would have been the most suitable test for measuring the intelligence of the students under the present study, since it has been standardized for adults and it is non-verbal. However, at the tryout stage when this test was administered twice to the students of B.Ed. for the academic year 1978-79, at an interval of four months (test - retest method), its reliability was found to be only 0.23, which was very low. On the other hand, under similar experimental condition, i.e. using test-retest method on the same group of students, it was found that the reliability coefficient of Desai-Bhatt Group Test of Intelligence worked out to be 0.81. Therefore, to obtain IQ of the students under the present study, Desai-Bhatt Group Test of Intelligence was preferred to Raven's Standard Progressive Matrices. Incidentally, it was observed that hardly 10 percent of students could complete Desai-Bhatt Group Test of Intelligence within the stipulated time.

3. It is realized from the Wechsler Adult Intelligence Scale cross sectional age curve (1955) for its age of 16 to 75 and above that 'The successive increment by which test scores increase with advancing chronological age not only diminish progressively but ultimately vanish altogether.' From this result, psychologists have recognized that, 'Dividing an adult's M.A. score by the actual C.A. in

order to obtain IQ would lead to absurd results. To avoid these absurdity they generally adopted the plan of using as denominator the highest C.A. beyond which the observed M.A. scores cease to increase. This age was set by different authors at some points from 14 to 18 years.'

Accepting this, the test which measures the IQ of the age group of 16 can be considered suitable to obtain IQ of the age group above 16. In this context, in the manual of Desai-Bhatt Group Intelligence Test, IQs above the age of 16 have been given which also suggest that authorities have taken care to provide measures above 16 years of age. In other words, this test can be assumed to be suitable to obtain IQa above the age of 16. The copy of the test is attached in Appendix F. The IQ of the students under present study can be read from the Table 4.2 given below :

Table :4.2: IQs of the B.Ed. Students for the Academic Year 1979-80 (N = 30)

137	110	121	113	97
109	122	119	103	151
126	104	95	122	105
99	102	126	114	114
127	97	110	96	104
112	100	111	112	119

From the Table 4.2, it can be observed that, in a group of 30 students, the IQ of highest intelligence student was 151 and of lowest student, it was 96. Thus, the IQs of students

under the present study ranged from 96 to 151.

Gujarati Language Reading Comprehension :

To measure the Gujarati language reading comprehension ability, the investigator developed a test of Gujarati - reading comprehension. The test consists of four passages. Each passage is followed by multiple choice questions, and each question carries one mark. The whole test was divided into two equal forms, in which form A consists of first two 1 and 2 passages containing 13 items. Form B consists of another two passages 3 and 4, also containing 13 items. The maximum possible score on the test is 26.

The reliability coefficient was found to be 0.79 by parallel form method. The validity of the test was determined by taking the judgement of 3 experts. For this purpose, a questionnaire was prepared on three point scale, which contains 6 questions regarding the suitability of passages.

To consider the suitability from students' point of view, before administering the test to B.Ed. students, it was given to the 5 graduate students. On the bases of experts' opinion and students responses, the necessary modifications were done in the test. Thus, the test for B.Ed. students for Gujarati reading comprehension was developed and administered in the beginning of the final experiment. The test is given in Appendix H. The score obtained by the students on Gujarati

language reading comprehension have been given in the following Table 4.3.

Table :4.3: Score on Gujarati Language Reading Comprehension Ability Test (N = 30)

24	22	20	20	17
18	17	21	16	21
20	20	15	20	14
18	18	24	19	20
17	16	21	19	18
20	11	20	20	18

*Maximum marks on the Test were 26.

The Table 4.3 shows that the highest score obtained by the students on Gujarati language reading comprehension ability test was 24 and the lowest score was 11.

Academic Motivation :

Junior Index of Motivation (JIM) scale developed by Jack Frymier was used to measure the academic motivation of the students. Students' level of academic motivation was decided on the basis of the score obtained by JIM scale. The JIM scale was originally developed and standardized for school children. But assumption related to the age in the development of the scale was such that 'In the society most people between the ages of six and eighteen are involved in some type of formal education. However, other youngsters below the age of six and many people over eighteen are also engaged in educational

pursuits. Given these factors, it was decided that the instrument to be developed should be appropriate for persons of age twelve or so or older'.

The following two excerpts from Frymier's (1970) writing should further clarify the actual nature of the psychological construct being measure through the scale.

> 'Throughout this research, motivation was assumed to be somethings which came from within rather than something which came from without. That is, motivation towards school was assumed to represent an internalized state of being which manifested itself outwardly in particular ways of behaving. In other words, motivation was conceived of as that which a student had or was rather than that which a teacher or other person did to him.'

> 'It can be pointed out that whatever causes one to try to do good work in school comes primarily from within rather than from without, and that whatever this motivation or force is, it is probably rooted in one's personality structure, his value structure, and his curiosity. In the development of items to be included in a motivation index these assumptions were employed.'

The scale consists of 80 items in the form of statements. Although there are 80 items, only 50 items are to be scored. The others are filler items, but should be included. For each statement the student responds by making one of A, B, C, D, which represent, agreement, strong agreement, disagreement, strong disagreement with the content of the statement, respectively. Although the questionnaire is not timed, it takes about 30 minutes for students to complete the items.

For scoring responses A, B, C and D are taken to represent 1, 2, -1 and -2 respectively. Student's score for the 50 items are added algebrically. This sum with sign reversed is the raw score value. This raw score value is then added to +100 algebrically. This score is the student's converted motivation score. Higher scores indicate higher motivational level, and lower scores indicate lower motivational level.

Frymier (1970) has reported a split-half reliability coefficient of 0.67 for college students. Govinda (1975) has reported a split-half reliability coefficient of 0.89 for B.Ed. students of M.S. University. As has been pointed out earlier, the scale has been originally standardized for use with school children. However, in answer to the question whether the scale be valid for use with college students, Frymier (1970) writes, based on the validity studies conducted by him, that the evidences seem to suggest that the scale may have validity for use with groups older than secondary school age. These evidences show that the JIM scale can be used for college students.

The whole scale was translated into Gujarati. It was given to three experts, who have good command over English and Gujarati language, to check the appropriate wording in Gujarati

and to confirm, whether it conveys the same meaning. The JIM scale in the original form and its translation in Gujarati is given in Appendix G. The following table 4.4 presents the Academic Motivation Scale of the students covered under present study.

Table :4.4: Academic Motivation Score (N = 30)

89	108	114	103	102
68	122	86	114	114
101	95	84	109	92
87	110	113	109	109
124	107	118	90	105
120	86	126	113	97

It is revealed from the table 4.4 that the Academic Motivation scores of the students varied from 84 to 124.

The next chapter describes the conduct of the experiment and the evaluation of the instructional strategy.

CHAPTER IV

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